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Marriage, divorce and reservation wages

Roberto Bonilla[*], Newcastle University, UK.
Francis Kiraly, Newcastle University, UK.
Miguel Á. Malo, Universidad de Salamanca, Spain.
Fernando Pinto, Universidad Rey Juan Carlos, Spain.

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Abstract

We present an equilibrium model of inter-linked frictional labour and marriage markets. In the marital market, men and women are involved in random sequential search for a partner. Men are seen as breadwinners in the family, and therefore in the labour market unemployed men carry out a *constrained* sequential search for jobs. We establish that when divorce (initiated by women) is an option, in an equilibrium with male marriage premium married men have a higher reservation wage than single men. This result holds with both exogenous and endogenous wage distributions, where the latter scenario implies firms discriminate by marital status. Ironically, at birth men are better off *because* divorce is possible: the wage posting mechanism allows them to extract the utility loss from a *potential* future divorce in the form of higher reservation wages, and thus better wage offer distributions. We successfully test our results using German data.

Keywords: frictional labour markets, frictional marriage markets, reservation wages. *JEL Codes*: D83, J12, J16, J31.

[*]Corresponding author: Newcastle University, Business School, 5 Barrack Road, NE1 4SE, United Kingdom. Tel.: +44 191208 1670. Email: Roberto.Bonilla@ncl.ac.uk

1 Introduction

A crucial theoretical and empirical question in the literature on job search pertains to the determinants of reservation wages. Although important insights could be gained from viewing reservation wages as the key link between two markets, there are relatively few such studies. Bonilla et al. (2019) consider inter-connected frictional labour and marriage markets where the reservation wages of men are such that the equilibrium outcome exhibits male beauty premium and/or marriage wage premium. Linking other markets with a pivotal role for reservation wages has proved less successful so far: for example, Brown et al. (2010) note that "health and labour economics do not yet seem to have met around the concept of the reservation wage".

In the present paper we use an equilibrium model of inter-linked labour and marriage markets and provide theoretical support for marital status as a determinant of male reservation wages. This is doubly important as most contributions to the empirical literature on reservation wages include marital status as an explanatory variable, and typically they do not distinguish by sex. We establish that, with divorce an option, marital status and reservation wages are linked in a systematic way: in an equilibrium with male marriage premium the reservation wage of married men is higher than that of single men. This result is true with both exogenous and endogenous wage distributions faced by men. We also find a simple way of testing for wage discrimination based on male marital status. Interestingly, in such a wage posting equilibrium men are nonetheless better off ex-ante - due to the possibility of divorce.

In our empirical exercise we distinguish by sex and find that the link between reservation wages and marital status differs across men and women, and the results match our main theoretical predictions for males. Overall, we interpret this as another dimension of the gender asymmetry present in the interaction between labour market and marriage preferences and outcomes, as documented in Bonilla et al. (2019). We also provide evidence of wage discrimination based on the marital status of men.

The theoretical model is an extended version of Bonilla and Kiraly (2013), with the crucial difference that here we allow for divorce. In the model, both the labour and the marriage markets are frictional, and linked by explicitly assuming that women's utility in marriage is a function of the husband's wage. This is just a version of the so-called "male breadwinner" effect - see Grossbard-Shechtman and Neumann (2003). With random sequential search in both markets, women's strategy in the marriage market is characterised by a reservation marital wage, while men's strategy in the labour market is characterised by a reservation wage. Interestingly, this is now a non-monotonic function of the female reservation wage, and if in equilibrium the former is higher than the latter, a male marriage wage premium exists. In such an equilibrium, and with divorce an option, men's utility from marriage increases the reservation wage of single males, because accepting an "unmarriageable" wage (a wage lower than women's marital reservation wage) precludes marriage altogether. Crucially, it increases the reservation wage of married men *more*, since married men lose more than single men if they accept an unmarriageable wage: they lose the marriage itself as opposed to just the prospect of a marriage.

This framework has been very useful in the study of several related issues. Bonilla et al. (2021) introduce male heterogeneity in the labour market (some men are more productive than others), and are able to predict the ranking of marriage premia across types of men - a prediction successfully tested using Chinese data. Bonilla et al. (2022) show that the tenure of employment contracts matter: their theoretical result that the marriage wage premium among men employed in "permanent" jobs is higher than that among men on "temporary" jobs is corroborated by empirical tests using Spanish data. In turn, Bonilla et al. (2019) introduce male heterogeneity in the marriage market (some men are more attractive), establish the existence of male beauty premium and investigate its links to male marriage premium, with successful tests using British data. Furthermore, Bonilla et al. (2017) introduce female heterogeneity in the marriage market and show that this can lead to equilibrium class formation and male marriage wage premium patterns. Finally, Bonilla and Kiraly (2023) introduce male schooling investment and show that the feedback from the marriage market can contribute to the observed lag in male educational attainment relative to female education.

The theoretical literature on reservation wages used as motivation in the related empirical work is limited to the findings of job search theory and the ensuing reservation wage - see Shimer and Werning (2007). Empirical studies would then typically investigate questions such as the effect of unemployment benefits on the reservation wage - see Addison et al. (2009).

By analysing linked frictional labour and marriage markets, we are able to study the effect of marriage market variables on that same reservation wage concept. Previously, the lack of such formally modelled linkage offered no adequate framework for thinking about how marriage status affects reservation wages. Consequently, empirical labour economics studies that consider marriage market variables tended to either not include marital status and gender in the estimated equations, or include them but without providing strong theoretical motivation. For instance, Brown et al. (2010) include marital status as determinant, but do not consider gender. Koenig et al. (2016) include gender and marital status as separate regressors in samples that include both men and women. Prassad (2003) does estimate reservation wages by gender, and finds that marriage is positively correlated with reservation wages. However, their exercise is limited to OLS regressions, and does not view reservation wages as labour market strategies in an equilibrium where marriage market considerations may also be relevant.

In stark contrast, our main result provides a clear and precise link between the reservation wages of men and their marriage market status, both endogenously determined in a market equilibrium. To achieve this, our analysis makes use but also leads to several gender asymmetries in the labor and marriage market, and it is probably useful to relate these to the existing literature. Gousse et al. (2016) show that female attachment to the labour market weakens considerably after marriage. Gould and Paserman (2003) argue for the relevance of a search model of the marital market, with women's decisions being crucial. They find that women are more selective in the marriage market when female wages increase (a proxy for the value of being single relative to married) and that they are less selective when male wages increase (proxy for the value of being married relative to single). Importantly, in all these the analogue is not true for men. Finally, they suggest that increased male wage inequality leads to a decline in marriage rates for women. Similarly, Oppenheimer and Lew (1995) find that increased economic independence leads to a delay in marriage for women. Oppenheimer (1988) calls this the "extended spouse search" theory, and argue that the analogue is not true for men. Crucially, in all these studies men's economic potential is positively related to the likelihood of marriage, providing support for the "breadwinner" effect.

2 The model

We consider a steady-state economy with a continuum of agents: men (mass u) and women (mass n). They are all risk neutral and discount the future at rate r. All men and women enter the economy single, and look for partners in the marriage market, using a random, costless sequential search method.

While single, women receive a per-period flow utility $x > 0$, which captures their options outside the marital market (possibly linked to their labour market participation). While married to an employed man, women give up x completely; if married to an unemployed man, they enjoy x, where $0 <$ < 1. With this, we model the widely reported empirical finding that the labour supply of women whose husbands are unemployed is higher than that of those married to employed men.[1] Furthermore, assume that x is a private good so the unemployed husband does not benefit from it. We do this in order to highlight the interesting mechanism that generates our main results; assuming instead that x was a public good within the marriage would reinforce our key findings.

Contact with a woman occurs with probability λn, where λ is the efficiency parameter of the matching process in the marital market. Women do not search in the labour market, but men are born unemployed and search for employment. Consider the range of wages faced by single (S) and married (M) men respectively. They are captured by the distribution functions $F_i(w)$ with supports $[\underline{w}_i, \overline{w}_i]$, where $i = S, M$. Men's job search is costless, random and sequential, and contact with a firm occurs at rate λ_0. There is no on-the-job search, and jobs are for life.[2] In a marriage partnership the man's wage is a public good. On top of this, a married man enjoys an additional flow utility $y > 0$. All agents are cloned as single agents (also unemployed if male) when they have left both search markets, with no possibility that they will come back to either. Crucially, marriages can also break up endogenously: either party can initiate an immediate, costless divorce.

[1] See Gough and Killewald (2011).

[2] One could allow for potential job loss, an event following which the wife would increase her labour supply (regain a proportion of x) and then decide whether to divorce or not. However, this decision to marry an unemployed or remain single would be the same as the decision a single woman would have to make upon meeting an unemployed man (as is the case in our current framework). We have therefore chosen to simplify the analysis by excluding the possibility of job losses.

Anticipating slightly at this point, please note that given the nature of sequential search, the agents in our economy will use an optimal stopping strategy that boils down to having a reservation value. Denote by T the reservation wage consistent with the reservation value set by women in the marriage market. It is the lowest acceptable wage earned by *men* whom they are willing to marry. In turn, married and single unemployed men will set reservation wages R_i in the labour market, that are themselves *functions* of T whenever marriage market considerations are active - that is when the existence of a marriage market affects men's decisions in the labour market.

We consider three different setups, under which all our main results hold. In the main body of the paper we investigate in detail two such scenarios. In Section 3 below, all men (married or single) face the same exogenous distribution of wages offered. That is, $F_M(w) = F_S(w) = F(w)$. This will allow us to characterise in detail and discuss the determinants of male reservation wages. In Section 4 we endogenise the wage distributions, allowing in principle that $F_M(w) \neq F_S(w)$. In that section, we show the existence and fully characterise an empirically relevant market equilibrium.

For expositional purposes, in both of these scenarios above we allow paid wages to be adjusted if male workers credibly threaten to quit and raising the wage is indeed a firm's optimal reaction to this threat. Naturally, this may be considered somewhat awkward in the scenario with exogenous distribution of offered wages. However, it is straightforward to show (see Appendix C), that if instead one considers fixed paid wages within the exogenous wage distributions scenario - so firms do not raise wages as a response to a credible quit threat - we obtain the exact same results.

One implication of our assumptions in the main body of the paper is that employed men will never quit their jobs in order to marry, should a woman request so. Instead, if at the current wage the man is indeed willing to quit, what will occur is that the wage will be increased until the threat to quit becomes non-credible: that is, until the man prefers to reject the woman and work at that higher wage instead of quitting in order to get married. In contrast, this will not happen in the case with completely exogenous (and fixed) wages analysed in Appendix C.

3 Reservation wages

3.1 Women

We first consider the two-fold problem of single women: their willingness or otherwise to marry unemployed men while at the same time being picky when marrying employed men. To investigate this, it is useful to first derive the relevant stocks in steady state.

Let N denote the number of men who are marriageable, that is single men who earn a wage no lower than T. Below we show in detail the derivation of N and the distribution of wages $G(w)$ *earned* by them. In Appendix A we also derive the steady state stocks of married unemployed men and single unemployed men, and show that the latter can be treated as exogenous. Appendix A also contains the derivation of the steady state for the stock of women married to unemployed men, and we show there that the stock of single women (n) can also be treated as exogenous.

First, note that the inflow into the stock of marriageable men is given by those unemployed men who find a marriageable wage: $u\lambda_0[1 - F_S(T)])$. In turn, the flow out is given by those marriageable men who get married: $N\lambda n$. Then, steady state requires:

$$N = \frac{u\lambda_0[1 - F_S(T)]}{\lambda n}.$$

Next, consider the distribution of wages earned by marriageable men. The flow of single men entering employment at a marriageable wage lower than w is $u\lambda_0[F_S(w) - F_S(T)]$. In turn, the measure of marriageable men earning wage w or less is given by $NG(w)$, and each of those men leaves the stock upon meeting a woman. This means a flow out equal to $NG(w)\lambda n$. Using N as above we obtain the steady state $G(w)$ given by:

$$G(w) = \frac{[F_S(w) - F_S(T)]}{[1 - F_S(T)]}.$$

We can now analyse the problem faced by a single woman, and establish the conditions under which she marries an unemployed man while accepting an employed man only if his wage is higher than her optimally determined reservation wage T.

Recall that while single, a woman enjoys an instantaneous utility $x > 0$. Let W^S and W_u^M denote her value of being single and her value of being married to an unemployed, respectively. Also recall that a man's wage is a public good in a marriage, and denote by $W^M(w)$ the value of being married to a wage w earner. Then, in a configuration where women do find it optimal to marry unemployed men, we have:

$$(r+\delta)W^S = x + u[W_u^M - W^S] + N \int_T^{\overline{w}_S} \left[\frac{w}{r} - W^S\right] dG(w).$$

That is, a woman meets an unemployed single man at rate u, and if she does she marries him to now enjoy value W_u^M. A woman may also meet a marriageable employed man (at rate N), and if she does she marries him to enjoy a discounted lifetime value w/r.

Making use of the steady state expressions for N and $G(w)$ above, this becomes:

$$rW^S = x + u[W_u^M - W^S] + \frac{u\lambda_0}{\lambda n} \int_T^{\overline{w}_S} \left[\frac{w}{r} - W^S\right] dF_S(w). \tag{1}$$

Also recall that a woman married to an unemployed man keeps x. Bearing this in mind, the value of being married to an unemployed man is given by:

$$rW_u^M = x + \lambda_0 \int_T^{\overline{w}_M} \left[\frac{w}{r} - W_u^M\right] dF_M(w) + \lambda_0[F_M(T) - F_M(R)][W^S - W_u^M]. \tag{2}$$

That is, the married woman stays with an employed man if he finds and accepts a wage not less than T, but she divorces him (becomes single again) if the man accepts a wage lower than T.

The female reservation wage T is defined by $W^S = T/r$, the equality between the value of being single and the value of marriage to an employed man whose wage is T. Importantly, we are also interested in the cut-off point where women are indifferent between being single and marriage to an unemployed, so we impose $W_u^M = W^S = T/r$ in equations (1) and (2) above. We obtain:

$$rW^S = x + \frac{u\lambda_0}{\lambda n} \int_T^{\overline{w}_S} \left[\frac{w - T}{r} \right] dF_S(w),$$

and

$$rW_u^M = \quad x + \lambda_0 \int_T^{\overline{w}_M} \left[\frac{w - T}{r} \right] dF_M(w).$$

In turn, this implies equality across the right-hand sides so, after the use of integration by parts in both, we have $W^S = W_u^M$ if:

$$x_1 = \frac{1}{1 -} \frac{\lambda_0}{r} \left[\int_T^{\overline{w}_M} [1 - F_M(w)]dw - \frac{u}{\lambda n} \int_T^{\overline{w}_S} [1 - F_S(w)]dw \right]. \qquad (3)$$

It is easy to show that $\partial W^S / \partial x > \partial W_u^M / \partial x > 0$.

At this point, it is instructive to consider briefly the scenario where all men (single and married) face identical labour market prospects: $F_S(w) = F_M(w) = F(w)$, with support $[\underline{w}, \overline{w}]$.

It follows that $W_u^M > W^S$ if $x < x_1$, where:

$$x_1 = \frac{1}{1 -} \frac{\lambda_0}{r} \left[1 - \frac{u}{\lambda n} \right] \int_T^{\overline{w}} [1 - F(w)]dw$$

Since we assumed x positive, equilibrium configurations where women marry unemployed men require $x_1 > 0$. Intuitively, this is the case if the rate at which such a prospective man encounters marriageable jobs $\lambda_0[1 - F(T)]$ is higher than the rate at which the woman would meet another marriageable man if she were to reject this one: $\frac{u\lambda_0}{\lambda n}[1 - F(T)]$. In turn, as one can see clearly from the expression for x_1 above, this boils down to: $\lambda > u/n$. However, as we will show, this condition is in fact not necessary when the wage distribution functions are endogenous. Throughout the paper, we are working under the scenario where $x < x_1$, so women are indeed willing to marry unemployed men.[3]

3.2 Men

Being aware that wages earned may affect their marriage prospects, unemployed men undertake a so-called constrained sequential search in the labour market.

Of course, when the marriage market is irrelevant (for example, but not limited to the case when $y = 0$), men will use a pure labour market reservation wage. We denote this by $\underline{R}$, and it is just the standard reservation wage used in the literature:

$$\underline{R} = \frac{\lambda_0}{r} \int_{\underline{R}}^{\overline{w}_S} [1 - F_S(w)] dw. \tag{4}$$

Clearly, this is also the reservation wage when either (i) men can completely ignore the marriage market when searching for jobs (i.e. when $T < \underline{R}$), or (ii) men cannot influence their marriage prospects at all (i.e. when $T > \overline{w}_S$).

Crucially, when the marriage market *is* relevant (i.e. when $\underline{R} \leq T \leq \overline{w}$), unemployed men set reservation wages when married as well as when single. We denote them by R_M and R_S, respectively.

3.2.1 Married men

Consider the case with $x < x_1$ as discussed previously, so unemployed men can get married. For $R_M < T$ the lifetime discounted value of an unemployed and married man (denoted by U_M) is given by:

$$rU_M = y + \lambda_0 \int_{R_M}^{T} \left[\frac{w}{r} - U_M\right] dF_M(w) + \lambda_0 \int_{T}^{\overline{w}_M} \left[\frac{w+y}{r} - U_M\right] dF_M(w).$$

[3] The case with $x > x_1$ corresponds to the scenario in Bonilla and Kiraly (2013).

The interpretation is as follows. The man enjoys flow utility y from marriage, and at rate λ_0 he finds a job, which he accepts only if the wage offer w is no lower than the reservation wage R_M. However, if he accepts a job with $w \in [R_M, T)$, then his wife divorces him immediately. Following that, with no prospect of another marriage his lifetime discounted utility becomes simply w/r. On the other hand, if he accepts a job with $w \in [T, \overline{w}_M]$, then the marriage continues with flow utility $w + y$ until he dies.

Let $J(w)$ denote the lifetime discounted value of having a job with wage w. Then, the reservation wage R_M solves $J(R_M) = U_M$. If $R_M < T$, we have that $J(R_M) = R_M/r$ $(= U_M)$. After integrating by parts, R_M is obtained implicitly as the fixed point of:

$$R_M = \frac{\lambda_0}{r} \int_{R_M}^{\overline{w}_M} [1 - F_M(w)]\, dw + y + \frac{\lambda_0}{r}[1 - F_M(T)]y. \tag{5}$$

This is quite intuitive. Accepting the reservation wage implies an immediate divorce, because the wife now prefers being single over marriage to him while earning R_M. Hence, this reservation wage must compensate not just for the standard lost prospects of better wages, but also for the instantaneous loss of marriage utility y following the divorce, together with the lost opportunity of finding a job that preserves the marriage.

It is now clear that R_M is a function of T, and please note that $\partial R_M/\partial T < 0$, so an increase in the female reservation value reduces the labour market pickiness of a married man. This is also quite intuitive: since wages that would keep him married are now less likely to be found, the value of continued search decreases, leading to a lower reservation wage.

Let $\widehat{T}_M = R_M(\widehat{T}_M)$. Then, we have:

$$\widehat{T}_M = \frac{\lambda_0}{r} \int_{\widehat{T}_M}^{\overline{w}_M} [1 - F_M(w)]\, dw + y + \frac{\lambda_0}{r}[1 - F_M(\widehat{T}_M)]y. \tag{6}$$

Hence, R_M as obtained from (5) holds for any $T \geq \widehat{T}_M$.

3.2.2 Single men

We now turn our attention to the problem faced by single men. First note that any man earning a wage $w \in [R_S, R_M)$ will *credibly* threaten to quit upon meeting a woman: given the definition of R_M, men are better off unemployed and married than single and employed at any wage $w < R_M$. This being the case, firms will increase the wage up to R_M when such a man meets a woman. At the same time, working at any wage $w < T$ precludes marriage, whereas working at any wage $w \geq T$ guarantees marriage upon meeting a woman. Hence, if R_S and R_M are both less than T, the value of employment, denoted $J(w)$ is given by:

$$J_1(w) = w + \lambda n \left[\frac{R_M}{r} - J_1(w)\right] \quad \text{for } w \in [R_S, R_M);$$

$$J_2(w) = w/r \quad \text{for } w \in [R_M, T);$$

$$J_3(w) = \frac{w}{r} + \frac{\lambda n}{r(r+\lambda n)} y \quad \text{for } w \geq T.$$

Please note that $J(R_S) = \frac{R_S}{r+\lambda n} + \frac{\lambda n R_M}{r(r+\lambda n)}$ for $R_S < R_M$, while $J(R_S) = R_S/r$ for $R_M \leq R_S$.

Following this, the lifetime discounted value of a single unemployed man (U_S) is given by:

$$\begin{aligned}(r+\delta)U_S &= \lambda_0 \int_{R_S}^{R_M} \Phi\left[J_1(w) - U_S\right] dF_S(w) + \\ &+\lambda_0 \int_{R_M}^{T} \left[J_2(w) - U_S\right] dF_S(w) + \\ &+\lambda_0 \int_{T}^{\overline{w}_S} \left[J_3(w) - U_S\right] dF_S(w) + \\ &+\lambda n \left[\ U_M - U_S\right],\end{aligned} \tag{7}$$

where $\Phi = 1$ if $R_S < R_M$, $\Phi = 0$ otherwise, and $\quad = 0$ iff $U_M - U_S < 0$.

The interpretation is similar to that for a married unemployed man. Here, the man will accept a job only if the wage offer w is no lower than the reservation wage R_S. The first term is non-zero if $w \in [R_S, R_M)$: the worker becomes unmarriageable but rightly expects a wage increase to R_M upon him meeting a woman. If $w \in [R_M, T)$, the worker is still unmarriageable, and thus enjoys a lifetime discounted value of $J_2(w) = w/r$. If instead $w \in [T, \overline{w}_S]$, the worker will be accepted for marriage once he meets a woman, with the lifetime discounted value now given by $J_3(w) = \frac{w}{r} + \frac{\lambda n y}{r(r+\lambda n)}$. Finally, if the man finds a woman and $U_M \leq U_S$, then $\quad = 0$ as the man will not want to marry - and this is independent of the fact that a woman is willing to accept an unemployed, as marriage requires mutual agreement of course.

If $R_S < T$, we have that $J(R_S) = \frac{R_S}{r+\lambda n} + \frac{\lambda n R_M}{r(r+\lambda n)}$. With R_S defined as a reservation wage, $U_S = J(R_S)$ implies that $rU_S = \frac{rR_S}{r+\lambda n} + \frac{\lambda n R_M}{r+\lambda n}$. Using this in (7) above, we obtain:

$$
\begin{aligned}
\frac{rR_S}{r+\lambda n} \quad = \quad & \lambda_0 \int_{R_S}^{R_M} \Phi \left[\frac{w - R_S}{r+\lambda n} \right] dF_S(w) - \frac{\lambda n R_M}{r+\lambda n} + \qquad (8) \\
& + \lambda_0 \int_{R_M}^{\overline{w}_S} \left[\frac{w}{r} - \frac{R_S}{r+\lambda n} - \frac{\lambda n R_M}{r(r+\lambda n)} \right] dF_S(w) + \\
& + \frac{\lambda_0 [1 - F_S(T)] \lambda n}{r(r+\lambda n)} y + \lambda n \left[\quad U_M - U_S \right].
\end{aligned}
$$

Here, while accepting the reservation wage implies losing the value of search for better wages, it provides the opportunity of receiving a wage increase to R_M - at the rate of meeting a woman (λn). The reservation wage should compensate for this net effect. Furthermore, accepting the reservation wage implies renouncing completely the prospect of marriage in the future. Hence, R_S should also compensate for the lost option of finding a marriageable wage (which would occur at rate $\lambda_0[1 - F_S(T)]$), subsequently meeting and marrying a woman (at rate λn) and thus enjoying flow utility y. Once again, it is clear that R_S is also a function of T, and that $\partial R_S / \partial T < 0$.

Let $\widehat{T}_S = R_S(\widehat{T}_S)$. Then we have:

$$\begin{aligned} \frac{r\widehat{T}_S}{r+\lambda n} &= \lambda_0 \int_{\widehat{T}_S}^{R_M} \Phi\left[\frac{w-\widehat{T}_S}{r+\lambda n}\right] dF_S(w) - \frac{\lambda n R_M}{r+\lambda n} + \\ &+\lambda_0 \int_{R_M}^{\overline{w}_S} \left[\frac{w}{r} - \frac{\widehat{T}_S}{r+\lambda_n} - \frac{\lambda n R_M}{r(r+\lambda n)}\right] dF_S(w) + \\ &+\frac{\lambda_0[1-F_S(T)]}{r(r+\lambda n)} y + \lambda n\, [\ U_M - U_S]. \end{aligned} \tag{9}$$

Once again, we consider first the case where $F_S(w) = F_M(w) = F(w)$, and below we provide the complete characterisation of the male reservation wage functions R_i (where $i = M, S$) for any given female reservation wage.

Claim 1 *Let T denote the female reservation wage. Then:*
(i) For $T \in [\widehat{T}_i, \overline{w}]$ we have $R_i < T$ as given by (5) and (8);
(ii) For $T \in [\underline{R}, \widehat{T}_i)$ we have $R_i = T$;
(iii) For $T < \underline{R}$ and $T > \overline{w}$ we have $R_i = \underline{R}$.

The formal proof of this Claim follows closely the derivation in Bonilla and Kiraly (2013) and Bonilla et al. (2019). Here, we present the intuition, which is quite straightforward.

First, note that for $T > \underline{R}$, men are not marriageable at $w = \underline{R}$. This provides men with an incentive to increase their reservation wage above the pure labour market one, for marital reasons. For relatively high female reservation values ($T \geq \widehat{T}_i$) holding out for such a wage implies a labour market cost that is too high and men (both single and married) set a reservation wage below T (as discussed above).[4] Of course, this does not automatically

[4]Please note, this is different from the case studied in Bonilla and Kiraly (2013) and Bonilla et. al (2019), where the option of divorce does not exist. In that scenario, women refuse to marry unemployed men, and men also face a marriage market cost from holding out for a higher reservation wage.

destroy their marriage prospects - there is still a chance that they land a marriageable wage.

However, the strategy $R_i < T$ does not survive as an optimal strategy for $T < \widehat{T}_i$, where in fact we have $R_i = T$. To see this, note that setting a reservation wage higher than T is clearly never optimal: with a binding marriage market, men have an incentive to use a reservation wage higher than $\underline{R}$ for marital reasons, but this brings a labour market related cost. Since $R_i > T$ does not provide any marital benefits compared to setting $R_i = T$, the latter is always preferred.

Finally, for very low or very high female reservation values, marriage market considerations disappear as men are either always marriageable (and no divorce ever occurs), or they are forced to give up on the prospect of marriage altogether. With marriage market considerations inactive, men set the pure labour market reservation wage $\underline{R}$.

We are ready to provide the comparison of reservation wages set by single and married unemployed men in response to all relevant female reservation wages T:

Proposition 1 *Consider any configuration where marriage market considerations are active. Then:*
(i) $\widehat{T}_M > \widehat{T}_S$*;*
(ii) For $T \in (\widehat{T}_M, \overline{w}]$ *we have* $R_S < R_M < T$*;*
(iii) For $T \in (\widehat{T}_S, \widehat{T}_M)$ *we have* $R_S < R_M = T$*;*
(iv) For $T \in [\underline{R}, \widehat{T}_S]$ *we have* $R_S = R_M = T$*.*

Proof. To see (i) above, consider $R_S, R_M < T$. In this case, we have that $\partial R_i/\partial T < 0$ for $i = M, S$. It cannot be the case that $R_M \leq R_S$. To see this, note that $R_M \leq R_S$ would mean $U_M \leq U_S$ so $(\ U_M - U_S) = 0$ in (7), in which case $R_S = R_M$ for $y = 0$. But $\partial R_M/\partial y > \partial R_S/\partial y$, and it follows that for $y > 0$ we must have $R_M > R_S$. Then, $R_S < T$ when $R_M = T = \widehat{T}_M$, and hence $\widehat{T}_M > \widehat{T}_S$. This, together with Claim 1 confirms items (ii), (iii) and (iv). ■

The intuition of the above result is also straightforward:

Consider the interesting case where both married and single men set reservation wages below the female reservation wage. If a *married* man has a reservation wage lower than T, it is because that reservation wage compensates him for the loss of *marriage.* In turn, if a *single* man has a reservation wage lower than T, it is because that wage compensates him for the loss of *marriageability.* Since the value of marriage is higher than the value of marriageability, it follows that the reservation wage of a married man is higher than that of a single man.

Figure 1 below captures our results diagrammatically:

Figure 1 here

4 Equilibrium

In this section we generalise the above results to the case with endogenous wage distributions, and characterise all possible equilibrium outcomes in which marriage market considerations are active.

First, we endogenise the wage-setting behaviour of firms, and confirm that the distributions of wages *faced* by married and single men will differ.

Let $H_M(w)$ and $H_S(w)$ denote the cumulative distribution functions of wages *offered* by firms in which all hired workers have the same productivity p. Following Bonilla and Kiraly (2013) we consider the following "noisy" aspect of job search: given an unemployed man makes contact, with probability he receives two offers (from two separate firms), and with probability $1 -$ he receives only one offer. This noisy search environment generates a conceptually distinct equilibrium distribution of wages offered for each type of unemployed worker (married and single).

The distribution of wages offered to married workers, $H_M(w)$, is derived from the equal profit condition which states that offering any wage in its support leads to the same expected profit as those generated by offering R_M:

$$\left[\frac{p-R_M}{r}\right]\left[\frac{1-\quad}{1+\quad}\right]=\left[\frac{p-w}{r}\right]\left[\frac{1-\quad}{1+\quad}+\frac{2\quad}{1+\quad}H_M(w)\right].$$

In the above, the firm offering the reservation wage R_i will get a worker only if the job seeker only contacted this particular firm, i.e. there was no contact with another firm. This happens with probability $(1-\quad)/(1+\quad)$. Any firms that offer a wage $w > R_i$ also attract a worker if, in the event that this job seeker has contacted another firm (probability $2\quad/(1+\quad)$), the other firm's wage offer is lower (probability $H_M(w)$).

We thus obtain the wage distribution $H_M(w)$ given by:

$$H_M(w)=\frac{(1-\quad)(w-R_M)}{2\quad(p-w)}\quad\text{and}\quad \underline{w}_M=R_M. \tag{10}$$

Obtaining the distribution of wages offered to single men is somewhat more cumbersome, since any firm that offers a wage $w \in [R_S, R_M)$ must foresee that it will have to increase the wage to R_M as soon as the employee meets a woman - recall, this is in order to ward off a credible quitting threat.

Therefore, the profit $\pi(w)$ of such a firm is given by:

$$r\pi(w)=p-w+\lambda n\left[\frac{p-R_M}{r}-\pi(w)\right],$$

which means that the profit from offering R_S is:

$$\pi(R_S)=\frac{p}{r}-\frac{R_S}{r+\lambda n}-\frac{\lambda n R_M}{r(r+\lambda n)}.$$

This is of course not true for any firm offering a wage $w > R_M$.

Let $\widehat{H}_S(w)$ denote the distribution of wages conditional on $w \in [R_S, R_M)$, let $\widetilde{H}_S(w)$ denote the distribution of wages conditional on $w \in [R_M, \overline{w}_S)$ and let q denote the proportion of firms offering $w \in [R_S, R_M)$.

For $w \in [R_S, R_M)$, $\widehat{H}_S(w)$ solves the following equal profit condition between $\pi(R_S)$ and $\pi(w)$:

$$\left[\frac{p}{r}-\frac{R_S}{r+\lambda n}-\frac{\lambda n R_M}{r(r+\lambda n)}\right]\left[\frac{1-}{1+}\right]$$
$$=\left[\frac{p}{r}-\frac{w}{r+\lambda n}-\frac{\lambda n R_M}{r(r+\lambda n)}\right]\left[\frac{1-}{1+}+\frac{2}{1+}q\widehat{H}_S(w)\right].$$

In turn, q solves the equal profit condition between $\pi(R_S)$ and $\pi(R_M)$:

$$\left[\frac{p}{r}-\frac{R_S}{r+\lambda n}-\frac{\lambda n R_M}{r(r+\lambda n)}\right]\left[\frac{1-}{1+}\right]$$
$$=\left[\frac{p-R_M}{r}\right]\left[\frac{1-}{1+}+\frac{2}{1+}q\right].$$

Finally, for $w > R_M$, $\widetilde{H}_S(w)$ solves the equal profit condition between $\pi(R_M)$ and $\pi(w)$:

$$\left[\frac{p-R_M}{r}\right]\left[\frac{1-}{1+}+\frac{2}{1+}q\right]$$
$$=\left[\frac{p-w}{r}\right]\left[\frac{1-}{1+}+\frac{2}{1+}\left[q+(1-q)\right]\widetilde{H}_S(w))\right].$$

Clearly, the *unconditional* distribution of offered wages for single men is then given by:

$$H_S(w)=\left\{\begin{array}{cc} q\widehat{H}_S(w) & \text{for } w\in[R_S,R_M) \\ q+(1-q)\widetilde{H}_S(w) & \text{for } w\in[R_M,\overline{w}_S) \end{array}\right\}.$$

To be more specific, the solutions to the above equations are as follows:

$$\widehat{H}_S(w)=\frac{r(1-\quad)(w-R_S)}{2\quad q\left[p(r+\lambda n)-rw-\lambda n R_M\right]},$$

$$q=\frac{(1-\quad)r(R_M-R_S)}{2(r+\lambda n)(p-R_M)},$$

$$\widetilde{H}_S(w) = \frac{(2\ \ q - \ \ \ +1)(w - R_M)}{2(p-w)\ \ (1-q)},$$

$$H_S(w|w \in [R_S, R_M)) = q\widehat{H}_S(w) = \frac{(1 - \ \ \ )(w - R_S)r}{2\ \ [p(r + \lambda n) - rw - \lambda n R_M]},$$

$$H_S(w|w \in [R_M, \overline{w}_S)) = q + (1-q)\widetilde{H}_S(w) = \frac{(1 - \ \ \ )\,[\lambda n(w - R_M) + r(w - R_S)]}{2\ \ (p-w)r\lambda n}.$$

From this, one can see immediately that $H_S(w) > 0$ while $H_M(w) = 0$ for any $w < R_M$. Some further algebra establishes that $H_S(w) > H_M(w)$ for any $w > R_M$. Hence, $H_M(w) < H_S(w)$ for any wage $w \in [R_S, \overline{w}_M]$.[5]

It therefore follows that the relevant distributions of wages faced *and* earned by type $i = S, M$ workers are given by $F_i(w) = (1 - \ \ \ )H_i(w) + \ \ [H_i(w)]^2$, and that $F_M(w) < F_S(w)$ for any wage $w \in [R_S, \overline{w}_M]$.

Proposition 2 below states that the results in Proposition 1 carry through with endogenous wage distributions, where the respective supports of each distribution are now $[R_i, \overline{w}_i]$.

Proposition 2 *Consider a noisy search equilibrium with active marriage market considerations. Then:*
(i) $\widehat{T}_M > \widehat{T}_S$*;*
(ii) For $T \in (\widehat{T}_M, \overline{w}_i]$ *we have* $R_S < R_M < T$*;*
(iii) For $T \in (\widehat{T}_S, \widehat{T}_M)$ *we have* $R_S < R_M = T$*;*
(iv) For $T \in [\underline{R}, \widehat{T}_S]$ *we have* $R_S = R_M = T$*.*

[5] Finally, $H_M(w) < H_S(w|w \in [R_M, \overline{w}_S))$ simplifies to

$$-\frac{(1 - \ \ \ )r(R_M - R_S)}{2\ \ (p-w)(r + \lambda n)} < 0,$$

which is true, so $H_M(w) < H_S(w)$ for any $w > R_M$.

Proof. As before, $R_i < T$ for $i = M, S$ implies R_M is given by (5) and R_S is given by (8). For $y = 0$ we have $R_M = R_S$ and $H_M(w) = H_S(w)$ as the only possible solutions to (5),(8) and (10). We have $\partial R_M/\partial y > \partial R_S/\partial y$, $R_M > R_S$ iff $H_M(w) < H_S(w)$ and $H_M(w) < H_S(w)$ iff $F_M(w) < F_S(w)$. From this we get that $R_M > R_S$ and $H_M(w) < H_S(w)$ for $y > 0$. One can then conclude that the proof of Proposition 1 carries through. ■

Note that in a noisy search equilibrium with $T \geq \widehat{T}_S$, married men search in a better pool of wages than the one faced by single men. Marriage makes men credibly pickier in the labour market ($R_M > R_S$), and thus $H_M(w) < H_S(w)$. It is important to note that the rate at which jobs are accepted is λ_0 for both because $\underline{w}_M = R_M$ and $\underline{w}_S = R_S$. The implications of all this are reflected in equation (3) which we reproduce below:

$$x_1 = \frac{1}{1-}\frac{\lambda_0}{r}\left[\int_T^{\overline{w}_M}[1 - F_M(w)]dw - \frac{u}{\lambda n}\int_T^{\overline{w}_S}[1 - F_S(w)]dw\right].$$

Indeed, since $\underline{w}_S = R_S < R_M = \underline{w}_M$ and $F_S(w) > F_M(w)$, we have that $\int_T^{\overline{w}_M}[1 - F_M(w)]dw > \int_T^{\overline{w}_S}[1 - F_S(w)]dw$. It then follows that now $x_1 > 0$ is possible *even if* the condition $\lambda > u/n$ does not hold. The reason that the $x_1 > 0$ condition is relaxed is that after marriage men become credibly pickier in the labour market and firms respond accordingly, so there is now an additional incentive for women to marry unemployed men. Clearly, this is also true in an equilibrium with $T \in [\widehat{T}_S, \widehat{T}_M]$ because in that scenario we have $R_M = T > R_S$.

We are now ready to state our main result.

Theorem 1 *There are no equilibria with $R_S > R_M$. Equilibria characterised by $R_S \leq R_M$ with active marriage market considerations and marriageable unemployed men exist for a permissible range of parameters.*

Proof. See Appendix B. ■

Crucially, there is a systematic link between the equilibrium patterns of male reservation wages and the so-called male marriage premium. Such wage gap patterns being empirically relevant, we will use this link to test our theoretical results in the empirical section below.

For this, we first define the marriage wage premium as the difference between the average wage of the employed married men and the average wage of the never married employed men.[6] It is easy to see that $MP \gtreqless 0$ if $\widehat{T}_S \gtreqless R_S$ and that the size of this marriage wage premium increases with the difference $T - R$. This of course follows from the simple observation that the wages among married employed men are higher than T and some of these men (those who encountered a job while married) - found a job while searching in a better pool wages; in turn, the stock of single employed men is made up of those with unmarriageable wages (lower than T), who will never marry (technically, in our model, also those whose wife divorces them).

Given the definition of marriage premium, and our results in Proposition 1 and Proposition 2, it follows that: (i) there is a positive marriage premium for $T \in (\widehat{T}_s, \overline{w}_S]$, and (ii) there is no marriage premium for $T \in [\underline{R}, \widehat{T}_S]$.

Figure 2 below captures the equilibrium with marriage premium where both married and single men set reservation wages below the female reservation value T.

Figure 2 here

Of course, the female reservation value T is not directly observable. However, if a particular economy is characterised by male marriage premium, and one is able to estimate reservation wages across married and single men, Corollary 1 below provides a straightforward test of our theoretical model.

Corollary 1 *Consider an equilibrium (with or without endogenous wages) where marriage market considerations are active. Then,* $MP > 0$ *iff* $R_M > R_S$ *and* $MP = 0$ *iff* $R_M = R_S$*.*

[6] This follows the tradition in the emprical literature on marriage wage premia, which recognises the different incentives of divorced and never married individuals.

Proof. From the definition of marriage premium, if $R_M > R_S$ we have $MP > 0$. On the other hand, if $R_M = R_S$, we have $MP = 0$. ■

In turn, Corollary 2 below points out another implication of our theoretical model, concerning potential labour market discrimination based on marital status. In our model we captured such discrimination by having two different offered and faced wage distributions, with $\underline{w}_i = R_i$ for $i = M, S$.

Corollary 2 *If $R_M > R_S$ and the transition to employment is the same for all men (married and single), then firms are wage discriminating according to marital status. If, alternatively, we have that $R_M > R_S$ and single men transition faster into employment, then firms are not wage discriminating.*

Finally, an additional observation concerning the effect of divorce:

Corollary 3 *At birth, men are better off because divorce initiated by women is possible: the wage posting mechanism allows them to extract the expected utility loss from a potential future divorce in the form of higher reservation wages, and thus better wage offer distributions.*

All our results above show that the introduction of divorce to the Bonilla and Kiraly (2013) - henceforth BK - model leads to several new and interesting results. With specific reference to Corollary 3, please note that in BK the impossibility of a divorce results in women choosing to reject unemployed men when the marriage market is active (i.e. relevant for male job search in the labour market). In such a scenario, if women's marital reservation wage (T) is higher than men's pure labour market reservation wage ($\underline{R}$), the argument runs as follows: Suppose a woman married an unemployed man. Then, for this man there would effectively be no marriage market to worry about, as he is already marriageable or married (forever). But then he would immediately drop his reservation wage to $\underline{R}$. However, with $T > \underline{R}$, the woman would now prefer to be single. As she cannot divorce, she anticipates all this and does not marry him in the first place. Incidentally, this is also the intuitive argument for $R = \underline{R}$ if $T = \underline{R}$.

With this in mind, the one crucial reason that makes it not only possible, but also straightforward to compare our results here with our results in BK, is that the pure labour market male reservation wage $\underline{R}$ is exactly the same in both models. The only difference is the option of divorce. In this paper we have shown that when women can initiate an immediate and costless divorce, it is now optimal (given parameter values) for them to marry unemployed men - even if they will reject marriage to low earners. That is, they accept unemployed men not only if $T < \underline{R}$, but also when $T > \underline{R}$ (please refer to the proof of our existence Theorem, in Appendix B). Furthermore, we have shown that for $T \geq \underline{R}$ we have that $\underline{R} < R_S \leq R_M$. Since single unemployed men (whose job search strategy and lifetime discounted value is characterised by R_S) can - and choose to - marry upon contact with a woman (with a labour market search strategy now characterisd by R_M), it follows that $R_M > R_S$ leads to men being better off. This is a direct consequence of divorce: it is the availability of such an option that makes women accept single unemployed men for marriage.

5 Empirical test

In this section we test the theoretical results, as summarised in Corollaries 1 and 2 above. The data come from the European Community Household Panel (ECHP) from 1994 to 2001 for Germany. Individuals are interviewed every year, providing detailed information on socio-demographic characteristics and different economic variables. The longitudinal structure of this dataset allows for the examination of changes in economic and social circumstances across time, which matches the objectives of our empirical analysis.

First, we use wage regressions with fixed effects to estimate the difference in earned wages across single and married men. This will indicate which of the alternatives in Corollary 1 should we test: a) $MP > 0$ iff $R_M > R_S$ or b) $MP = 0$ iff $R_M = R_S$. It turns out that the data leads us to test the former since we find positive male marriage premia in our samples.

Second, we estimate conditional logit models to examine the impact of marital status on the transition to employment of men. This follows the insight from Corollary 2, and provides an indication of whether firms wage-discriminate based on marital status.

5.1 Data and summary statistics

We use data for Germany from the ECHP from 1994 to 2001; summary statistics are shown in Table 1. The original sample size for Germany for this period provides results for approximately 10,000 observations. When we select our sample with valid values for all our variables, we have 5,250 observations. Table 1 shows the summary statistics of the variables for the samples of males and females, and the sample restricted to males.

Table 1 here

The ECHP includes a question on the minimum net monthly income the person would accept to work.[7] This question is asked from those not in employment looking for a job and those in underemployment (working less than 15 hours per week) looking for a job. This is our measure of the reservation wage. For earned wages, we use net monthly wage and salary earnings.[8] In both cases, wages were in German Marks (in short DM).[9] The mean reservation wage is almost DM 2,000 for females and DM 2,415 for males.

The rest of variables are sex, age, marital status, health, university education, and household size. Females are almost 58% of the total sample and the mean age of males and females is around 37. As far as marital status is concerned, 56% per cent of females and 47.1% of males are married. Health is rather good for the whole sample (57.5% report good or very good health) and the sub-sample of males (58.2%). Around 30 percent of the total sample attained a university educational level (this is 31.2% for males). The household size is on average slightly above 3 for both sub-samples, although it is lower for males (3.07) than for all (3.19).

[7] Our variable corresponds to the variable PS007 in the original data file the ECHP dataset.

[8] Our variable of current wages corresponds to the variable pi211m in the original data file of the ECHP.

[9] We have corrected the original information on wages through updating according to the German CPI between 1994 and 2001 (Bundesbank Database), whose values are: 62.7in 1994, 64.8 in 1995, 66.4 in 1996, 68.4 in 1997, 69.7 in 1998, 72.4 in 1999, 74.4 in 2000, and 79.4 in 2001. Therefore, all analyses correspond to real wages.

5.2 Wage regressions

In this section, we present wage regressions to estimate the existence of male marriage premium in our samples. We run fixed effects regressions, including control variables, in order to control for unobserved heterogeneity. Following Cornwell and Rupert (1995) we estimated the following fixed effects linear regression:

$$\ln(w_{it}) = \quad Marriage_{it} + \quad{}' X_{it} + \quad{}_i + \varepsilon_{it}$$

Here, $ln(w_{it})$ is the natural log of earned wages, $Marriage_{it}$ is a dummy variable of a male getting married, X_{it} denotes a matrix of control variables (sex, age, household size, and health status), $\quad{}_i$ is the individual specific time-invariant heterogeneity (i.e. the fixed effects), and ε_{it} is the standard idiosyncratic error term. The coefficient of interest is , which measures the effect of getting married on the (log of) monthly reservation wages. An estimate of $\quad > 0$ suggests the existence of positive marriage premium.

Table 2 below shows the results of the earned wages regression for all men, and confirms the existence of marriage wage premium, with a significant estimate of of 0.238.

Table 2 here

In order to investigate the impact of marriage on reservation wages we run a similar regression, but now the dependent variable is $ln(R_{it})$: the natural logarithm of monthly reservation wages. Here, a positive estimate of suggests an increase in the reservation wage upon marriage.

Our theoretical model predicts that there is a positive effect of marriage on reservation wages, and Table 3 below shows indeed a positive and significant estimate (0.087) linked to marriage for the reservation wage equation for all men.

Table 3 here

Next, we perform two separate exercises to test the robustness and significance of our results. Firstly, note that while our model is formally silent about the effect of marriage on the reservation wages of women, there is a strong underlying suggestion that it is qualitatively different than that for men. Table 4 below shows the result of running the regression for men and women. The estimate of the "married" parameter is now *negative* and significant, completely in line with this interpretation. Secondly, Table 5 below confirms that the effect of marriage on reservation wages is positive also within education groups: the relevant coefficient is positive and significant both for men with and men without university studies.

Table 4 here

Table 5 here

We now turn our attention to Corollary 2. With the aim of investigating the transition towards employment, we estimate a conditional logit model - this is equivalent to fixed effect logits for panel data (see Chamberlain (1980)).

Since we have found empirical results supporting that the reservation wage of married men is higher than that of single men ($R_M > R_S$), if we were to find that transition to employment is *not* affected by marital status, this would suggest that firms discriminate based on marital status.

We use the following econometric specification:

$$P(empstatus_{it} = 1 | X_{it}) = \frac{\exp(\quad _i + \quad X_{it})}{1 + \exp(\quad _i + \quad X_{it})}$$

In the above, the left-hand side variable is the employment status. By construction, the sample is restricted to those who change their status from non-employment into employment. We do something similar for the right-hand side variables too, as the estimation only includes individuals with changing values. Please note that as the model is conditioned to individuals with changing variable values across time, a usual problem is the low sample size of estimations: in our case, 295 observations. Therefore, the estimated coefficients usually suffer of a lack of precision.

To be more specific, $empstatus_{it}$ stands for being in employment or not, X_{it} is the set of explanatory variables (including "married", which would indicate dichotomously whether individual i is married or not at time t), as well as the control variables introduced in the previously explained fixed effects regression model: age, household size, and health status.

The results of the estimation on the probability of being employed for men are shown in Table 6. Note the negative but not statistically significant coefficient for being married, which would suggest that firms discriminate on the basis of marital status.

Table 6 here

6 Conclusion

We argue that this is the first paper to study both theoretically and empirically a systematic link between gender, marital status, and reservation wages. The theoretical framework is an equilibrium model of inter-linked frictional labour and marriage markets. In the marital market, men and women are involved in random sequential search for a partner. Men are seen as breadwinners in the family, and therefore in the labour market unemployed men carry out a constrained sequential search for jobs.

We establish that when divorce is an option, in an equilibrium with male marriage premium married men have a higher reservation wage than single men. This result holds with both exogenous and endogenous wage distributions, where the latter scenario implies firms discriminate by marital status. Ironically, this means that at birth men are better off *because* divorce is possible: the wage posting mechanism allows them to extract from firms the utility loss from a *potential* future divorce in the form of higher reservation wages, and thus better wage offer distributions.

We test our results using German data, and overall the empirical results are in line with the main predictions of our theoretical model. Using current wages, we confirm the existence of a male marriage wage premium and that, in accordance with the model, the impact of getting married on men's reservation wages is positive - for the whole sample as well as for educational sub-samples. Interestingly, being married does not affect the probability of being employed. Given our theoretical setup, this would suggest that firms do indeed discriminate on the basis of marital status.

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7 Appendices

7.1 Appendix A

We focus on the scenario in which women marry unemployed men. In principle, this means men earning $w \in [R_S, R_M)$ could be willing to leave employment for marriage once they meet a woman. However, we have shown that this does not happen.

Married unemployed men. Let u_m denote the measure of married unemployed men - in the scenarios in which these men are marriageable. The flow out of the stock is given by those men who find a wage above their reservation wage: $u_m\lambda_0[1 - F_M(R_M)]$. The flow in is given by those unemployed men who encounter a woman: $u\lambda n$. Equality between those two flows leads to:

$$u_m = \frac{u\lambda n}{\lambda_0[1 - F_M(R_M)]}.$$

Single unemployed men. The flow out is given by (i) single men who get married: $u\lambda n$, (ii) single men who get a marriageable wage: $u\lambda_0[1-F(T)]$, and (iii) single men who get a wage that precludes marriage: $u\lambda_0[F(T) - F_S(R_S)]$. In turn, the flow into u is composed of all those who leave the economy never to come back and are thus cloned as single unemployed men: (i) unemployed married men who get a job: $u_m\lambda_0[1 - F_M(R_M)]$, (ii) single unemployed men who accept a wage that precludes marriage: $u\lambda_0[F_S(T) - F_S(R_S)]$, and (iii) marriageable men who get married: $N\lambda n$. This leads to a steady state equation given by:

$$\begin{aligned} & u\lambda n + u\lambda_0[1 - F(T)] + u\lambda_0[F(T) - F_S(R_S)] \\ = \quad & u_m\lambda_0[1 - F_S(R_M)] + u\lambda_0[F(T) - F(R_S)] + N\lambda n \end{aligned}$$

It is easy to show that if N and u_m are in steady state, then u is also in steady state, since the above condition is satisfied. As men are cloned into the pool of single agents, this must be interpreted as u exogenous.

Women married to unemployed men. Denote the number of women married to unemployed men by n_{mu} and recall that we denoted the number of single women by n. The flow out of this stock is given by those whose husband finds a job (either marriageable or unmarriageable). The flow into this stock is given by those single women who meet an unemployed man. Then, n_{mu} is in steady state if:

$$n_{mu}\lambda_0[F_M(T) - F_M(R_M)] + n_{mu}\lambda_0[1 - F_M(T)] = u\lambda n$$

so

$$\frac{u\lambda n}{\lambda_0[1 - F_M(R_M)]} = n_{mu}(= u_m).$$

Single women. Recall that we assume that women who leave the economy for good are cloned as singles. Hence, the flow into this stock is given by (i) married women whose husband accepts an unmarriageable wage (they immediately divorce their husband and become single), (ii) women married to unemployed men, whose husband accepts a marriageable wage (these are cloned as single women and never come back to any search market), and (iii) single women who meet a man with a marriageable wage and are cloned as single women (they never come back to any search market). Then, the steady state requires:

$$\lambda n[N + u] = n_{mu}\lambda_0 \left[F_M(T) - F_M(R_M)\right] + n_{mu}\lambda_0[1 - F_M(T)) + \lambda nN$$

It follows that, if w_{mu} is in steady state $\left(n_{mu} = \frac{u\lambda n}{\lambda_0[1-F_M(R_M)]}\right)$ then n is also in steady state since the above steady state condition is satisfied. Because women are cloned into the pool of single women, we must interpret all this as n being exogenous while $n_{mu} = n_{mu}(n) = \frac{u\lambda n}{\lambda_0[1-F_M(R_M)]}$.

Finally, if $R_M = T$ we have that women who get married to unemployed men never come back to search as they will never get divorced. Hence we have that all women who move on from being single are cloned directly and n can also be treated as exogenous.

7.2 Appendix B

From the above discussion, it is clear that the condition for active marriage considerations is $T > \widehat{T}_S$. In turn, the marriageability of unemployed men requires $x < x_1$. Thus, for an equilibrium characterised by both to exist, $T(x_1) > \widehat{T}_M$ is a sufficient condition, while the necessary condition is that $T(x_1) > \widehat{T}_S$.

Using $x = x_1$ from (3), which implies $W^S = W_u^M$ as in (1) and (2), the $W^S = T/r$ yields:

$$T(x_1) = \frac{1}{1-}\frac{\lambda_0}{r}\left[\int_{T(x_1)}^{\overline{w}_M}[1-F_M(w)]dw + \frac{-}{1-}\frac{u}{\lambda n}\int_{T(x_1)}^{\overline{w}_S}[1-F_S(w)]dw\right]. \tag{11}$$

Recall that our focus is on equilibria with endogenous wage distributions. Consider first equilibria where $T > \widehat{T}_M (> \widehat{T}_S)$. Then $R_S < R_M < T$. In the cut-off point where $\widehat{T}_M = T(x_1)$ and $R_M = \widehat{T}_M$ so $F_M(\widehat{T}_M) = 0$. Equating the right hand sides of (11) and (6), we get $\widehat{T}_M = T(x_1)$ if $y = \widehat{y}$ where:

$$\widehat{y} \equiv \frac{}{1-}\frac{\lambda_0}{(r+\lambda_0)}\left[\int_{T(x_1)}^{\overline{w}_M}[1-F_M(w)]dw - \frac{u}{\lambda n}\int_{T(x_1)}^{\overline{w}_S}[1-F_S(w)]\right].$$

Please observe that $\widehat{y} > 0$ indeed under the condition that $x_1 > 0$. Since $\partial\widehat{T}_M/\partial y > 0$ while $\partial T(x_1)/\partial y = 0$, we have that $\widehat{T}_M < T(x_1)$ if $y < \widehat{y}$.

Still with endogenous wage distributions in mind, consider now equilibria where $\widehat{T}_S < T < \widehat{T}_M$. From the above analysis, $T(x_1) < \widehat{T}_M$ requires $y > \widehat{y}$. Finally, if $T(x_1) = \widehat{T}_S$, then $\widehat{T}_M = \widehat{T}_S$, $F_S(w) = F_M(w)$ and $F_i(\widehat{T}_i) = 0$ (for $i = M, S$). Then, $T(x_1) = \widehat{T}_S$ if $\lambda n = \widehat{\lambda n}$ where:

$$\widehat{\lambda n} = \frac{\frac{\lambda_0}{1-}\int_{T(x_1)}^{\overline{w}_M}[1-F_S(w)]dw\left[1-\frac{u}{\lambda n}\right]}{\frac{y(\lambda_0\lambda n + r)}{(r+\lambda n)}}.$$

Please observe that $\widehat{\lambda n} > 0$ indeed for $x_1 > 0$. Since $\partial\widehat{T}_S/\partial\widehat{\lambda n} > 0$ while $\partial T/\partial\widehat{\lambda n} = 0$, we have that $\widehat{T}_S < T(x_1)$ if $\lambda n < \widehat{\lambda n}$. That is, if $y < \widehat{y}$, for our equilibrium we need $\lambda n < \widehat{\lambda n}$.

Finally, the result that no equilibrium exists with $R_S > R_M$ follows directly from Proposition 2.

7.3 Appendix C

Here, we consider an alternative assumption set, namely that when the distribution of wages offered is exogenous, and paid wages are also exogenous: firms cannot increase their wage offer to a male worker in order to ward off a credible threat to quit. While this change leads to the same set of results, it deserves a more formal analysis. Below we address the impact of this new set of assumptions, focusing on equilibria where women would marry unemployed men, even if picky when considering marriage to employed men.

7.3.1 Single women

Single women must now anticipate that marriage will occur if they meet a man earning wage $w \in [R_S, R_M)$. By the definition of R_M, at such a wage the man would be better off married and unemployed, while the woman would be happy to marry him if he quits into unemployment. Using $\widehat{N}$ to denote the steady state stock of men earning a wage $w \in [R_S, R_M)$, equation (1) is amended as follows:

$$rW^S = x + (u + \widehat{N})[W_u^M - W^S] + \frac{u\lambda_0}{\lambda n} \int_T^{\overline{w}_S} \left[\frac{w}{r} - W^S\right] dF_S(w).$$

It follows that the analysis in Section 3.1, which is based on the key threshold $W_u^M = W^S$, remains valid.

7.3.2 Single men

We now consider the problem of single unemployed men in Section 3.2.2 but under this alternative specification. For any single employed man, the values of employment at wage w are given by:

$$r\widehat{J}_1(w) = w + \lambda n \left[U_M - \widehat{J}_1(w))\right] \text{ for } w \in [R_S, R_M);$$

$$J_2(w) \text{ as in the paper for } w \in [R_M, T);$$

$$J_3(w) = \frac{w}{r} + \frac{\lambda n}{r(r+\lambda n)} y \text{ as in the paper for } w \geq T.$$

However, note that with $R_M < T$, we have $U_M = R_M/r$, which means that $\widehat{J}_1(w) = J_1(w)$. From here, it follows that the analysis in Section 3.2.2 applies to this alternative specification as well.

7.3.3 Steady states

In this new scenario, the stock of men earning $w \in [R_S, R_M)$, which we denote by $\widehat{N}$, becomes potentially relevant. We have shown in the previous two subsections that the analysis of men's and women's problem - taking stocks (in particular, u and n) as given - is still valid. Here we show that it remains true that u and n can indeed be treated as exogenous.

Single men earning $w \in [R_S, R_M)$, denoted by $\widehat{N}$. The flow in contains those men who are unemployed and find a job with $w \in [R_S, R_M)$. This is given by $u\lambda_0[F_S(R_M) - F_S(R_S)]$. The flow out is given by those men in $\widehat{N}$ who find a woman and quit their jobs. This is given by $\widehat{N}\lambda n$. It follows that $\widehat{N}$ is in steady state when:

$$\widehat{N} = \frac{u\lambda_0[F_S(R_M) - F_S(R_S)]}{\lambda n}.$$

Married unemployed men. Let u_m denote the measure of married unemployed men - in the scenarios in which these men are marriageable. The flow out of the stock is given by those men who find a wage above their reservation wage: $u_m\lambda_0[1 - F_M(R_M)]$. The flow in contains unemployed men and those men earning $w \in [R_S, R_M)$ who meet a woman. This is given by $u\lambda n + \widehat{N}\lambda n$. Equality between those two flows leads to:

$$u_m = \frac{\lambda n(u + \widehat{N})}{\lambda_0[1 - F_M(R_M)]}.$$

Single unemployed men. The flow out is given by (i) those who get married: $u\lambda n$, (ii) those who get a marriageable wage: $u\lambda_0[1 - F(T)]$, and (iii) those who get a wage that precludes marriage: $u\lambda_0[F(T) - F_S(R_S)]$. In turn, the flow into u is composed of all those who leave the economy never to come back and are thus cloned as single unemployed men: (i) unemployed married men who get a job: $u_m\lambda_0[1 - F_M(R_M)]$, (*ii*) single unemployed men who accept a wage that precludes marriage: $u\lambda_0[F_S(T) - F_S(R_S)]$, and (*iii*) marriageable men who get married: $N\lambda n$. This leads to a steady state equation given by:

$$\begin{aligned} & u\lambda n + u\lambda_0[1 - F(T)] + u\lambda_0[F(T) - F_S(R_S)] \\ = \; & u_m\lambda_0[1 - F_S(R_M)] + u\lambda_0[F(T) - F(R_S)] + N\lambda n \end{aligned}$$

It is easy to show that if N and u_m are in steady state, then u is also in steady state, since the above condition is satisfied. As men are cloned into the pool of single agents, this must be interpreted as u exogenous.

Women married to unemployed men. Denote the number of women married to unemployed men by n_{mu} and recall that we denoted the number of single women by n. The flow out of this stock is given by those whose husband finds a job (either marriageable or unmarriageable). The flow into this stock is given by those single women who meet an unemployed man or an $\widehat{N}$ man. Then, n_{mu} is in steady state if:

$$n_{mu}\lambda_0[F_M(T) - F_M(R_M)] + n_{mu}\lambda_0[1 - F_M(T)] = \lambda n(u + \widehat{N})$$

so

$$\frac{\lambda n(u + \widehat{N})}{\lambda_0[1 - F_M(R_M)]} = n_{mu}(= u_m).$$

Single women. Recall that we assume that women who leave the economy for good are cloned as singles. Hence, the flow into this stock is given by (*i*) those married women whose husband accepts an unmarriageable wage (they immediately divorce their husband and become single), (*ii*) women married to unemployed men, whose husband accepts a marriageable wage (these women never come back to any search market and thus are cloned as single women), and (*iii*) single women who meet a man with a marriageable wage and are cloned as single women (they never come back to any search market and thus are cloned as single women). The flow out is given by single women who meet either a marriageable man (stock N), or a man earning $w \in [R_S, R_M)$ (stock $\widehat{N}$), or an unemployed man (stock u).

The steady state requires that:

$$\lambda n[N + \widehat{N} + u] = n_{mu}\lambda_0 \left[F_M(T) - F_M(R_M)\right] + n_{mu}\lambda_0[1 - F_M(T)) + \lambda n N$$

or

$$\lambda n[N + \widehat{N} + u] = n_{mu}\lambda_0 \left[1 - F_M(R_M)\right] + \lambda n N$$

It follows that, if n_{mu} is in steady state - recall that $n_{mu} = \frac{u(\lambda n + \widehat{N})}{\lambda_0[1 - F_M(R_M)]}$ - then n is also in steady state since the above steady state condition is satisfied. Because women are cloned into the pool of single women, we must interpret all this as n being exogenous while $n_{mu} = n_{mu}(n) = \frac{u\lambda n}{\lambda_0[1 - F_M(R_M)]}$.

Finally, if $R_M = T$ we have that women who get married to unemployed men never come back to search as they will never get divorced. Hence we have that all women who move on from being single are cloned directly and n can also be treated as exogenous.

Figure 1: Graph of R_S and R_M against T

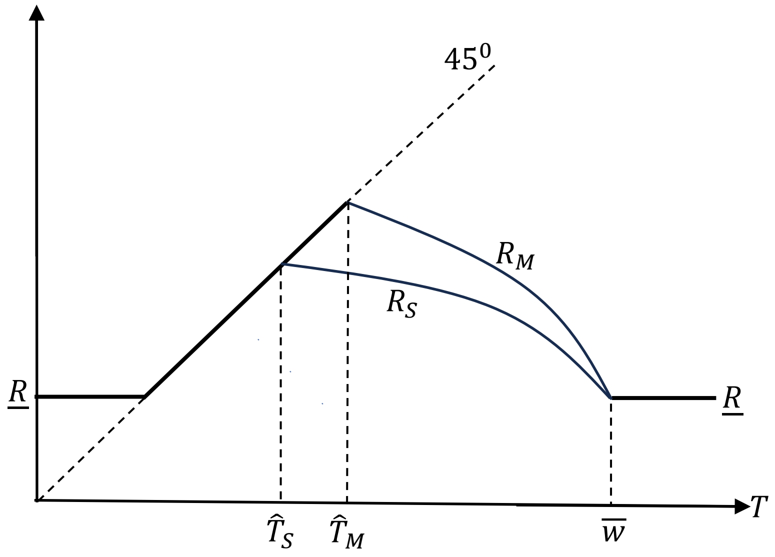

Figure 2

Equilibrium in $T(R_S, R_M)$, R_S space. Equilibrium in $T(R_S, R_M)$, R_M space

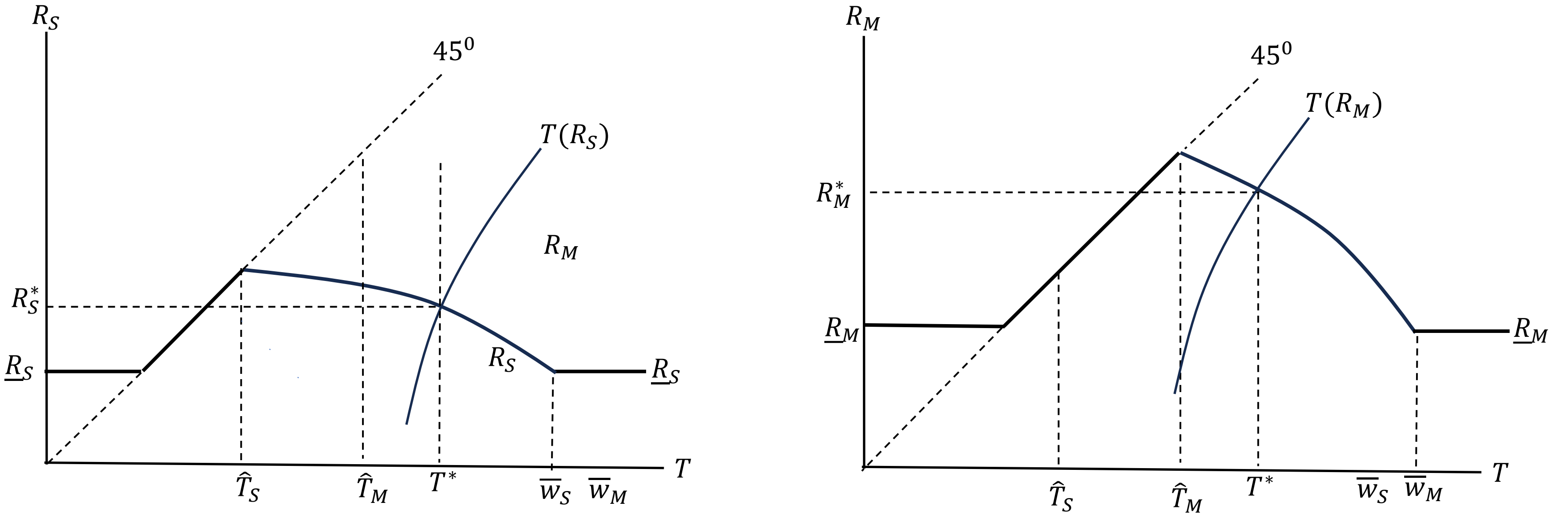

Table 1. Descriptive statistics for the total sample, only for males, and for the subsample included in the conditional logit.

	All		Males		Sub-sample (C-Logit)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Monthly wage (in German Marks)	2.192,33	1038,52	2.652,36	1051,98	2.421,22	1.080,65
Sex (1=Female)	0.579	0.493	-	-	-	-
Age	36.69	12.22	37.05	13.26	38,34	11,23
Married	0.560	0.496	0.471	0.499	0.443	0.456
Household size	3.192	1.366	3.074	1.411	3.055	1.328
Health (1=Good or very good)	0.575	0.494	0.582	0.493	0.562	0.481
University education (1=Yes)	0.300	0.458	0.312	0.463	0.322	0.512
Observations	5,250		2,210		295	

Source: Authors' analysis from European Community Household Panel (EHCP) from 1994 to 2001.

Table 2. Fixed-effects earned wages regression. All men.

	Earned wages
Married	0.238***
	(0.022)
Age	0.190***
	(0.004)
Age2	-0.002***
	(0.000)
Household size	-0.015***
	(0.006)
Health	0.198***
	(0.019)
Constant	3.638***
	(0.090)
Observations	8.752
R-squared	0,348

Source: Authors' analysis from European Community Household Panel (EHCP) from 1994 to 2001.

Table 3. Fixed-effects reservation wages regression. All men.

	No Controls	With Controls
Married	0.081***	0.087***
	(0.018)	(0.023)
Age		0.0342***
		(0.004)
Age2		-0.000***
		(0.000)
Household size		0.007
		(0.007)
Health		0.046**
		(0.019)
Constant	7.671***	7.058***
	(0.012)	(0.096)
Observations	2,210	2,210
R-squared	0.009	0.041

Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' analysis from European Community Household Panel (EHCP) from 1994 to 2001

Table 4. Fixed-effects reservation wages equation. All men and women.

	No controls	With Controls
Married	-0.163***	-0.112***
	(0.013)	(0.015)
Female		-0.365***
		(0.001)
Age		0.023***
		(0.003)
Age2		-0.001***
		(0.000)
Household size		-0.011**
		(0.005)
Health		0.025*
		(0.014)
Constant	7.584***	7.390***
	(0.010)	(0.066)
Observations	5,250	5,250
R-squared	0.027	0.159

Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' analysis from European Community Household Panel (EHCP) from 1994 to 2001.

Table 5 (from X5). Fixed-effects reservation wages regression for men, with and without university studies.

	University	Non-university
Married	0.076*	0.096***
	(0.044)	(0.027)
Age	0.045***	0.025***
	(0.008)	(0.006)
Age2	-0.000***	-0.000***
	(0.000)	(0.000)
Household size	0.014	0.009
	(0.011)	(0.008)
Health	0.034	0.045***
	(0.036)	(0.023)
Constant	6.945***	7.320***
	(0.155)	(0.136)
Observations	690	1.520
R-squared	0.063	0.034

Source: Authors' analysis from European Community Household Panel (EHCP) from 1994 to 2001.

Table 6(X6). Conditional logit model for the effect of being married on the employment status of men with control variables.

	Coefficients
Married	-0.0965
	(0.714)
Age	0.293
	(0.217)
Age2	-0.00538*
	(0.00293)
Household size	-0.444**
	(0.201)
Health	-0.341
	(0.356)
Observations	295

Standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' analysis from European Community Household Panel (EHCP) from 1994 to 2001.