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Abstract

Using an equilibrium model of inter-linked frictional labour and marriage markets, we establish the existence of male marriage premium within a given productivity group, as well as a clear ranking of premia across different groups. We find supporting evidence using Chinese data.

JEL-Codes: D830, J120, J160, J310.

Keywords: constrained sequential search, marriage premium.

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1 Introduction

Married men earn, on average, more than single men: the male marriage wage premium has consistently been found to be anywhere between 10% and 50%. Interestingly, the female marital earnings gap tends to be negative and much smaller. Noticing this startling asymmetry, Bonilla and Kiraly (2013) and Bonilla et al. (2019) show that the male marriage gap can be an equilibrium outcome in a model of inter-linked frictional labour and marriage markets where men are viewed as "breadwinners" in the family.

Here, we first extend the original framework by introducing male productivity heterogeneity. This allows us to obtain a clear prediction about the ranking of marriage wage premia across productivity types. We then carry out an empirical investigation of our theory.

The search-theoretic explanation of marriage premium is quite intuitive. If women only accept partners with high enough wages, the sequential job search of unemployed single men is constrained by expectations in the marriage market, and this affects their reservation wage strategy. In particular, if the required well-paid jobs are difficult to encounter, unemployed single men may be prepared to accept wages that make them unmarriageable, so those who end up getting married are the men who are simply lucky to land jobs with higher wages.

There is a subtle but important difference between our assumptions and the so-called selection hypothesis,[1] according to which women tend to marry men with personal traits that happen to be both productivity-enhancing in the labour market and valued in the marriage market. In contrast, we consider direct selection into marriage based on wage. Grossbard-Shechtman and Neuman (2003) argue that the selectivity effect could be a breadwinner effect, while Ludwig and Brüderl (2018) provide recent empirical evidence of selection into marriage on wage levels and growth.

Furthermore, existing empirical studies rarely look at marriage premia *within* particular groups of men, and the selection hypothesis itself has nothing to say about potential wage gap patterns *across* such groups. By sampling men of similar productivity (proxied by education), and applying standard fixed effects methods we reduce the scope for selection into marriage based on heterogeneous correlated traits. Not only do we find evidence of marriage premia within each group, but we also obtain estimates that confirm the marriage premium patterns across productivity groups, as suggested by our theory.

2 Theoretical model and results

We consider a steady state economy with a continuum of risk neutral women and men. Time is continuous and agents discount the future at rate r.

[1] See Grossbard-Shechtman and Neuman (2003) for a survey of the selection literature.

Men enter the economy unemployed and single. They use costless random sequential search in the labour market, locating jobs at rate λ_0. Men differ in terms of productivity, with subscript i $(= L, H)$ denoting low- and high productivity types, respectively. We model this heterogeneity by assuming that a type i unemployed draws an offer from an exogenous wage distribution $F_i(w)$ with support $[\underline{w}_i, \overline{w}_i]$, where $F_H(w)$ first-order stochastically dominates $F_L(w)$, and $\underline{w}_L < \underline{w}_H$, $\overline{w}_L < \overline{w}_H$. A single man employed at wage w has flow payoff w, constant through his lifetime as there is no on-the-job search. All single men look for female partners, who can observe a man's employment status, his productivity and earned wage (if any). In the marriage market, contact occurs according to a quadratic matching function, with λ denoting the meeting efficiency parameter. A married man earning wage w enjoys flow payoff $w + y$, where $y > 0$ captures the utility of marriage.

Let n denote the measure of single women, all of whom have an exogenous flow payoff x. Women do not look for jobs, but use costless random sequential search to locate single males. Upon contact, a woman decides whether to accept or reject a marriage proposal. Once married, a woman gives up x, and her flow payoff becomes her partner's wage, with $x < \overline{w}_L$, so all marriages are efficient. Blundell et al. (2016) show that female attachment to the labour market weakens considerably after marriage. Gould and Paserman (2003) and others provide evidence that women build this into their expectations and behaviour in the marriage market.

Marriages are for life (there is no divorce), but couples and singles alike leave the economy at an exogenous rate δ. A new single woman enters the economy every time a single woman gets married or exits. We focus on the scenario where women do not marry unemployed men.[2] Every time a type i unemployed single man accepts a job or exits, he is replaced by another type i unemployed single man, hence the steady state measures of unemployed (u_i) can be treated as exogenous.

Since the value of being a single woman is constant while the value of marriage is increasing in her partner's wage, the optimal search strategy of females has the reservation property. Let W^S denote the value of being a single woman, W_i^M the value of being married to a type i employed man, and T_i the respective female reservation wages. Then, standard arguments lead to:

$$(r+\delta)W^S = x + \frac{\lambda u_H \lambda_0}{(\lambda n + \delta)} \int_{T_H}^{\overline{w}_H} \left[W_H^M(w) - W^S\right] dF_H(w) +$$

$$+ \frac{\lambda u_L \lambda_0}{(\lambda n + \delta)} \int_{T_L}^{\overline{w}_L} \left[W_L^M(w) - W^S\right] dF_L(w).$$

[2]The scenario where they do is not interesting - see Bonilla et al. (2019)

Female reservation wages are implicitly given by $W^S = W_H^M(T_H) = W_L^M(T_L)$. Crucially, here we have $W_H^M(w) = W_L^M(w) = w/(r+\delta)$ since, once employed, a man's type is irrelevant for a woman. It follows immediately that $T_H = T_L \equiv T$, so all men face the same constraint in the marriage market.

Unemployed single men are therefore involved in a so-called *constrained* sequential search. This decision problem was derived in detail by Bonilla et al. (2019). There, male types denote something other than productivity, so distribution functions are not type-dependent, as they are here. With that being the only difference for men's decision problem, one can show that in any equilibrium where the marriage market affects the jobs search of all men (i.e $\underline{w}_H < T < \overline{w}_L$), the reservation wage *functions* are continuous and piecewise differentiable, with:

(i) $R_i(T) = T$ for $T \in (\underline{R}_i, \widehat{T}_i]$, where

$$\underline{R}_i = \frac{\lambda_0}{r+\delta}\left[\int_{\underline{R}_i}^{\overline{w}_i} [1 - F_i(w)]\, dw\right] \text{ and}$$

$$\widehat{T}_i = \frac{\lambda_0}{r+\delta}\left[\int_{\widehat{T}_i}^{\overline{w}_i} [1 - F_i(w)]\, dw + \frac{[1 - F_i(\widehat{T}_i)]\lambda n}{r+\delta+\lambda n} y\right] \quad (> \underline{R}_i)$$

(ii) $R_i(T) < T$ and decreasing in T for $T \in (\widehat{T}_i, \overline{w}_i)$, where

$$R_i(T) = \frac{\lambda_0}{r+\delta}\left[\int_{R_i(T)}^{\overline{w}_i} [1 - F_i(w)]\, dw + \frac{[1 - F_i(T)]\,\lambda n}{r+\delta+\lambda n} y\right] \quad (< T)$$

(iii) $R_i(T) = T$ for $T = \overline{w}_i$.

For relatively low female reservation wages, men refuse jobs that preclude marriage. There is a threshold female reservation wage ($\widehat{T}_i$) such that a further increase in this wage results in a decrease in the male reservation wage: unemployed men now choose to accept wages below T and therefore potentially jeopardise their marriage prospects. For higher and higher female reservation wages men react by relying more and more on luck for landing jobs that permit marriage.

Crucially, while in Bonilla et al. (2019) the male types have the same reservation wage function, here the optimal job search strategies of unemployed men differ due to the separate wage distributions. In particular, here we have $\underline{R}_H > \underline{R}_L$ and $\widehat{T}_H > \widehat{T}_L$, so high productivity men have a higher pure labour market reservation wage and they give up on the marriage market later than the less productive men, simply because $F_H(w)$ stochastically dominates $F_L(w)$.

In equilibrium, the female reservation wage gives rise to two best responses R_i^*. These male reservation wages determine average earned wages, and their position relative to T determines the size of the marriage wage gap. We define the marriage premium among type i men (MP_i) as the difference between the average wage of type i married men and the average wage of type i single men. Denoting these average wages by $\widetilde{w}_i^M$ and $\widetilde{w}_i^S$, we have $MP_i \equiv \widetilde{w}_i^M - \widetilde{w}_i^S$, and are ready to state our main theoretical result:

Proposition 1 $MP_H \leq MP_L$.

Proof. Computing MP_i follows Bonilla et al. (2019). If $T \in [\underline{R}_i, \widehat{T}_i]$, then $R_i^* = T$ and $\widetilde{w}_i^M = \widetilde{w}_i^S$, so $MP_i = 0$. In contrast, if $T \in (\widehat{T}_i, \overline{w}_i)$, then $R_i^* < T$ and $\widetilde{w}_i^M > \widetilde{w}_i^S$, so $MP_i > 0$, which is increasing in $T - R_i^*$. Since $\underline{R}_H > \underline{R}_L$ and $\widehat{T}_H > \widehat{T}_L$, our main result follows. ■

When unemployed men choose to match the female reservation wage, all employed men get married and hence there is no male marriage premium. In contrast, when unemployed men are willing to accept wages lower than the female reservation wage, only those who still land a sufficiently high wage get married. The marriage premium is now the wedge between the average wage of these lucky men and that of their unlucky comrades.

A corollary of the above is that for any number of productivity types, taking any two types at a time, the male marriage premium in the higher productivity group is *never higher* than the one in the lower productivity group. This generalisation will be key for our empirical analysis below, but for now Figure 1 illustrates a particular equilibrium marriage premium pattern, with only two types.

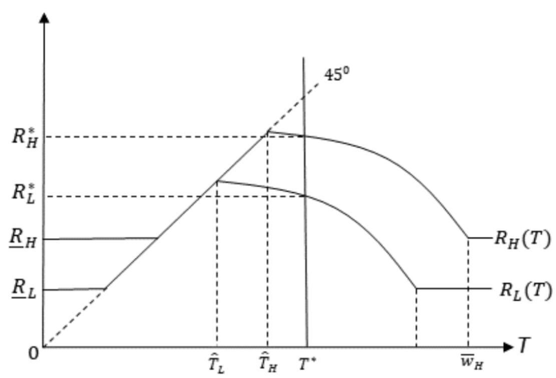

Figure 1

3 Empirical evidence

Proposition 1 offers clear predictions about the ranking of marriage premia across men of different productivity. We test this by estimating the marriage premia for a heterogeneous male workforce. We use education as proxy for productivity, and estimate the marriage premium by regressing income on marital status, controlling for a range of other factors and using fixed effects. By applying the within-transformation we sweep out time-invariant individual heterogeneity, including within-educational group productivity differences.

China appears to be a suitable choice: the importance of material posessions (including wage) for male success in the marriage market is well documented, while the gender imbalance lends itself to testing our model with one-sided heterogeneity. We use data from the Chinese Health and Nutrition Survey (CHNS), a longitudinal panel data set established to examine a range of economic, sociological, demographic and health questions. The survey covers Chinese households from nine regions that cover approximately 56% of the total Chinese population, with data collected in 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011 and 2015.

The data contains information on income, education, marital status, employment and health, among others. The original survey covered around 19,000 individuals, while the most recent covered 30,000, and follow-up levels are high. We focus on men between ages of 18 and 60, who are either single or in their first marriage, and who are working full time. After the deletion of missing data, this provides a final sample of 9,461 individuals, giving 27,404 observations. We group individuals according to their education status. The three groups are 1) No qualifications/completed primary education (low productivity), 2) High school leavers qualifications (medium productivity), and 3) Post high school leavers qualifications (high productivity).

The key outcome variable is income. In the CHNS individuals report their total net individual income, which is then adjusted, according to CPI, to 2015 prices. We use the log of this variable, and include controls for age, employment type (self-employed, the reference category, employed, temporarily employed, other types of employment), sector of employment (government sector, reference category, state sector, a collective, a family farm, the private sector or another sector), health status and wave dummies. Summary statistics for the full sample and each sub-sample are given in Table 1; note that as qualification increases the average log of income increases.

We estimate the marriage premium for each sample using fixed effects, which controls for unobservable heterogeneity and also removes all time invariant variables, such as education status, from the model. We follow Cornwell and Rupert (1995) and consider a wage equation of the form:

$$\ln(w_{it}) = \beta M_{it} + \gamma' X_{it} + \alpha_i + \varepsilon_{it},$$

where the dependent variable is the log of income, M_{it} is an indicator showing marital status, and X_{it} is a vector of control variables. In turn, α_i captures time-invariant individual heterogeneity and ε_{it} is the standard idiosyncratic error

Table 1: Summary statistics

	Full Sample mean/sd	Primary/no qual mean/sd	High School mean/sd	Post-High School mean/sd
Log Income	9.000	8.463	8.933	9.685
	(1.243)	(1.198)	(1.209)	(1.071)
Married	0.895	0.926	0.897	0.862
	(0.307)	(0.262)	(0.304)	(0.345)
Age	40.325	45.267	39.226	39.125
	(10.625)	(10.308)	(10.393)	(10.309)
Employed	0.446	0.216	0.382	0.846
	(0.497)	(0.412)	(0.486)	(0.361)
Self Employed	0.473	0.706	0.528	0.097
	(0.499)	(0.456)	(0.499)	(0.297)
Temp Employed	0.055	0.055	0.063	0.031
	(0.228)	(0.228)	(0.244)	(0.173)
Other Employment	0.015	0.008	0.015	0.023
	(0.122)	(0.087)	(0.120)	(0.150)
Government Sector	0.177	0.074	0.141	0.378
	(0.382)	(0.262)	(0.348)	(0.485)
State Sector	0.182	0.103	0.150	0.346
	(0.386)	(0.304)	(0.357)	(0.476)
Collective	0.311	0.514	0.329	0.072
	(0.463)	(0.500)	(0.470)	(0.259)
Family Farm	0.132	0.180	0.156	0.016
	(0.338)	(0.384)	(0.363)	(0.124)
Private Sector	0.160	0.098	0.185	0.142
	(0.367)	(0.297)	(0.389)	(0.349)
Other Sector	0.038	0.031	0.038	0.046
	(0.192)	(0.173)	(0.191)	(0.209)
Good Health	0.294	0.383	0.307	0.176
	(0.456)	(0.486)	(0.461)	(0.381)
Observations	27404	5079	16701	5624

Table 2: Results

	Full Sample	Primary/no qual	High School	Post-High School
Married	0.209***	0.278*	0.202***	0.156**
	(4.97)	(1.67)	(3.85)	(2.38)
Employee	0.302***	0.447***	0.318***	0.0723
	(10.75)	(5.99)	(9.53)	(1.05)
Temp_emp	0.0755*	0.226**	0.103**	-0.334***
	(1.92)	(2.49)	(2.18)	(-2.68)
Other_emp	0.128*	0.0321	0.0648	0.0831
	(1.89)	(0.12)	(0.72)	(0.87)
State Sector	0.170***	0.0372	0.130***	0.0736*
	(7.58)	(0.54)	(4.35)	(1.80)
Collective	0.0637**	0.0572	0.0259	-0.000598
	(2.01)	(0.67)	(0.65)	(-0.01)
Fam_farm	-0.180***	-0.0900	-0.113*	-0.478***
	(-3.82)	(-0.76)	(-1.87)	(-2.88)
Private	0.110***	0.0631	0.178***	-0.0751
	(2.69)	(0.52)	(3.32)	(-1.07)
Other_sec	0.116**	0.171	0.179***	-0.103
	(2.23)	(1.17)	(2.63)	(-1.15)
Good health	0.0819***	0.0640	0.0944**	0.0996**
	(2.97)	(1.21)	(2.49)	(2.37)
age 31-40	0.153***	0.377***	0.134***	0.0280
	(5.03)	(3.78)	(3.46)	(0.58)
age 41-50	0.150***	0.494***	0.0987	-0.0126
	(3.27)	(3.75)	(1.64)	(-0.17)
age 51-60	-0.0167	0.423**	-0.0842	-0.135
	(-0.26)	(2.43)	(-0.98)	(-1.38)
Constant	9.717***	8.941***	9.670***	10.58***
	(109.47)	(28.33)	(84.73)	(77.93)
N	27,404	5,079	16,701	5,624

t statistics in parentheses

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

term. For a positive marriage premium, the estimate of β must be positive and significant.

We estimated the equation above for the full sample and for each education category. Table 2 contains our empirical findings.

The results support our theoretical predictions. In particular, the first row of Table 2 shows that the marriage premium is positive and highly significant for the whole sample, and each sub-group has a positive and significant marriage premium. Furthermore, the estimate for the group with primary education/no qualifications is the largest (and significant at the 10% level of significance), with the size of the estimate falling as the level of education increases.

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