

1 A quantitative assessment and labor supply

2 Regularities in marriage markets

- Positive assortative matching by social attributes.
- Higher social status individuals have higher average age of first marriage than lower status individuals.
- In every social class, significant fraction of individuals never marry.
- More never married men than never married women.
- Men have higher average age of first marriage than women

3 Explanations

- Positive assortative matching:

Social statuses are complements in household production.

Social statuses are public goods in marriage.

- Social status & age of first marriage:

Larger gains to search for higher status individuals.

Delay marriage to acquire status.

- Never married individuals:

Search frictions and exit.

Non-participants.

- More never married men:

Differential fecundity.

- Gender & age of first marriage:

Differential fecundity.

Men delay marriage to acquire human capital.

A simple model

- Men and women are potentially infinitely lived. Each individual will survive into the next period with probability p .
- Men are always fecund.
- Fecund women remain fecund in the next period with probability η . Once infertile, women remain infertile.
- Fertile men and women want to match and marry. If a man and a woman decides to marry, they remain married until one spouse dies. Then the other spouse will return to the marriage market if the survivor is fertile.
- Infertile women do not participate in marriage market.

- There is random matching in the marriage market. Upon meeting, let the probability of a marriage be $\underline{\lambda} = 1 - \lambda$.

n : number of eligible males

N : number of eligible females

e : number of new entrants by gender

q : probability of meeting a female

Q : probability of meeting a male

π : number of married couples

Π : number of fecund married couples

$$q_t = \frac{N_t}{n_t}$$

$$Q_t = 1$$

$$\pi_t = p^2 \{ \pi_{t-1} + n_{t-1} q_{t-1} \underline{\lambda} \}$$

$$\Pi_t = \eta p_{t-1}^2 \{ \Pi_{t-1} + N_{t-1} \underline{\lambda} \}$$

$$n_t = e_{t-1} + p(1-p) \{ \pi_{t-1} + n_{t-1} q_{t-1} \underline{\lambda} \} \\ + p n_{t-1} \{ 1 - q_{t-1} \underline{\lambda} \}$$

$$N_t = e_{t-1} + \eta p(1-p) \{ \Pi_{t-1} + N_{t-1} \underline{\lambda} \} + \eta p N_{t-1} \underline{\lambda}$$

In a stationary equilibrium

$$\begin{aligned}
 q &= \frac{N}{n}, \quad Q = 1 \\
 \pi &= p^2 \{ \pi + nq\lambda \} \\
 \Pi &= \eta p^2 \{ \Pi + N\lambda \} \\
 n &= e + p(1-p) \{ \pi + nq\lambda \} + pn \{ 1 - q\lambda \} \\
 N &= e + \eta p(1-p) \{ \Pi + N\lambda \} + \eta p N \lambda
 \end{aligned}$$

Let one period be δ years.

The average ages of first marriage for men and women in years, m_a and M_A , respectively are

$$\begin{aligned}
 m_a &= \delta(1q\lambda + 2p(1-q\lambda)q\lambda + 3p^2(1-q\lambda)^2q\lambda + \dots) \\
 &= \frac{\delta}{1 - p(1 - q\lambda)} \\
 M_A &= \frac{\delta}{1 - \eta p \lambda}
 \end{aligned}$$

The system consist of 8 equations. Let a period in the model be δ years. Thus altogether, there are nine quantities, $Q, q, n, N, e, \pi, \Pi, m_a$ and M_a ; and four exogenous unknown parameters: p, λ, η and δ .

We need to observe at least five quantities about the society to reduce the number of unknowns to the number of equations.

Assume that we can observe n, π, e, m_a and M_a .

We now have eight equations to solve for the eight unknowns: $Q, q, N, \Pi, p, \lambda, \eta$ and δ .

Data from modern Canada. Let 15 be the age of entry into the marriage market. n is 7.32 million. π is 5.08 million. e is 0.2 million. $m_a + 15$ and $M_a + 15$, are 27.7 and 25.7 respectively.

$p = .98, \Pi = 6.9, \lambda = .94, \delta = .8, N = 4.2, \eta = .998, q = .$

The probability that a marriage will occur with 10 or less matches is $1 - .94^{10} = 0.46$.

The probability that a single woman at age 40 remains eligible is $0.998^{\frac{25}{.8}} = 0.94$.

The probability that an eligible man will meet an eligible woman in a year is 0.86.

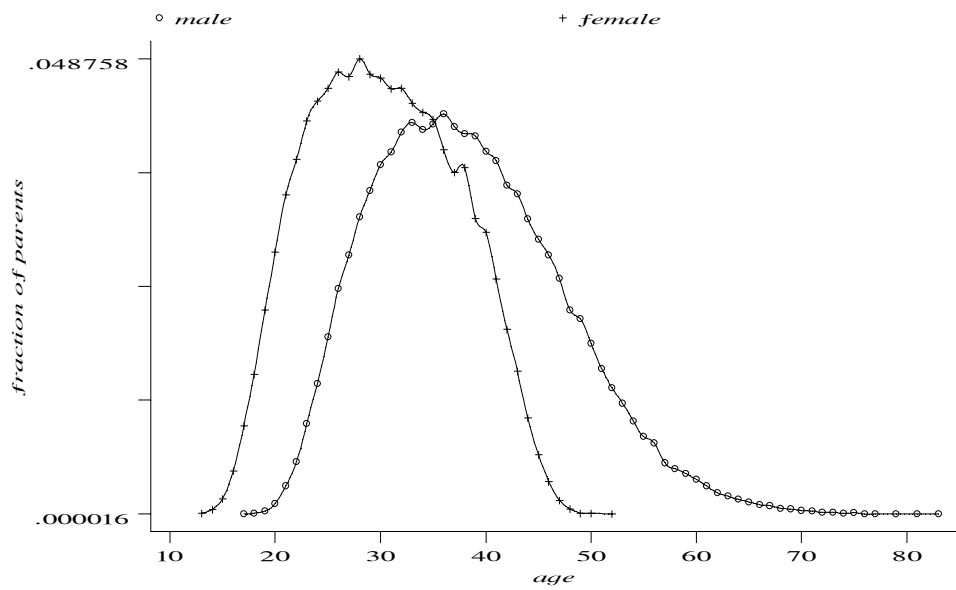


Figure 1: Densities of Parent's Age at Birth of Child

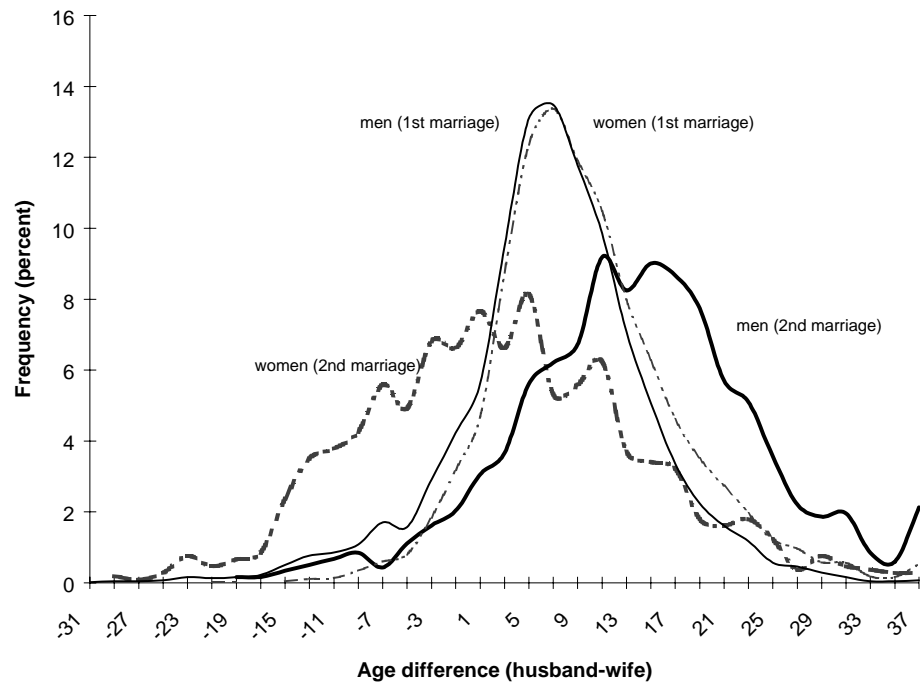


Figure 2: Spousal Age Differences: by Gender and Marriage Rank

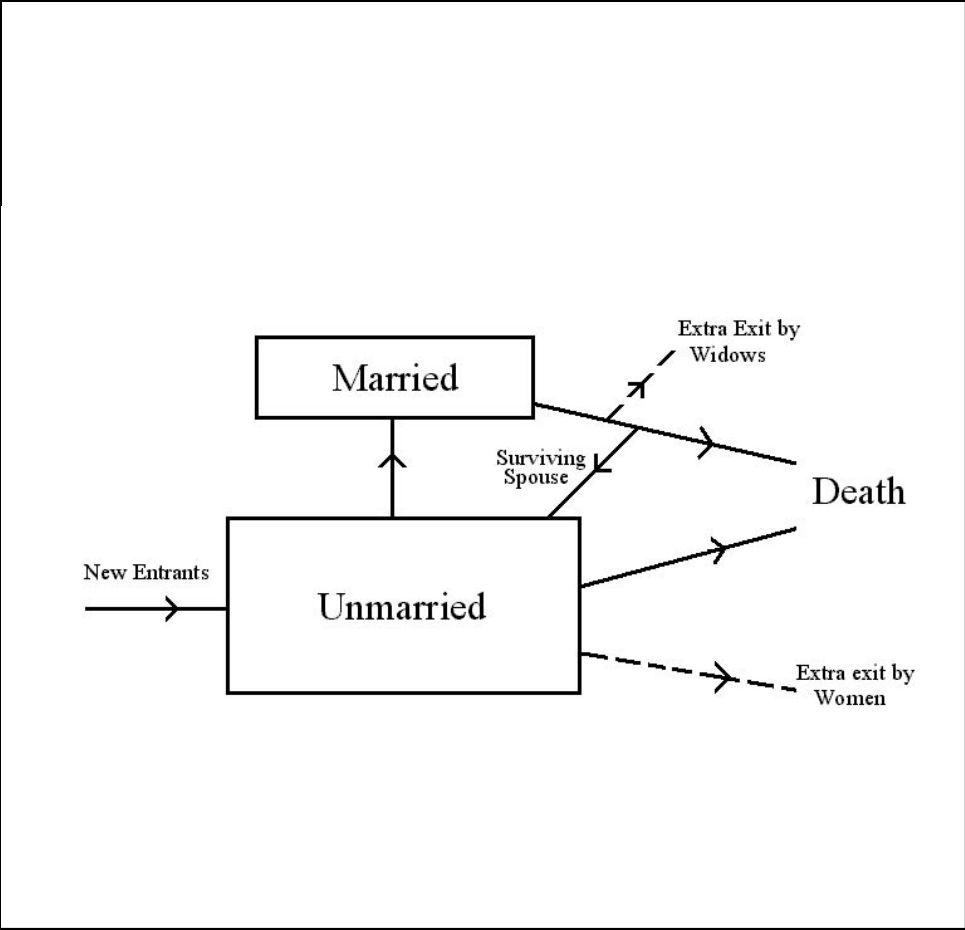


Figure 3: Flow chart of marriage market

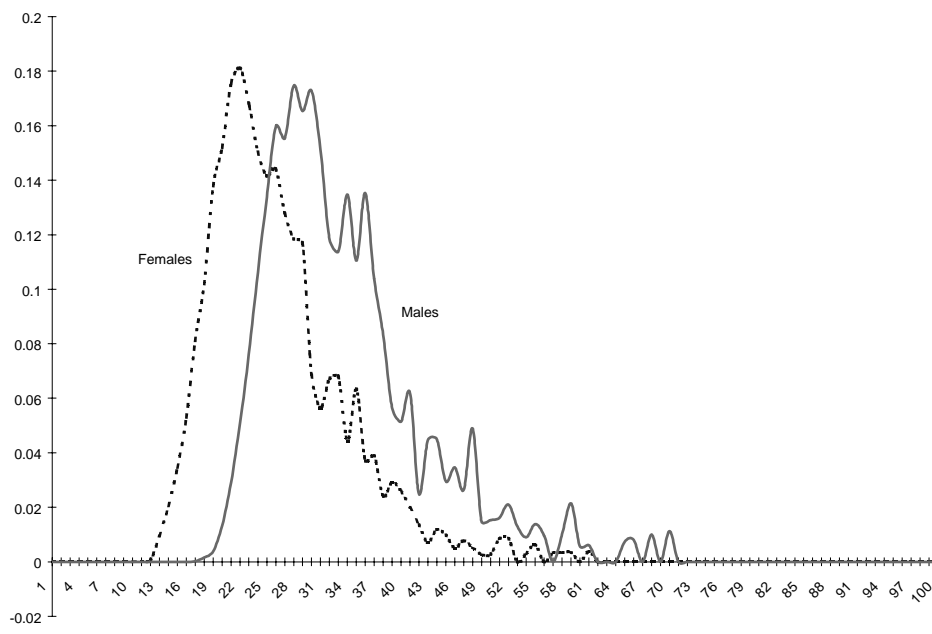


Figure 4: Marriage Hazard Rates by Gender

		Observed means		Estimated means	
		(1)	(2)		
		NB	NBQ	(3)	(4)
				NB	NBQ
(1)	% h^*	5.8	10.7	η	0.994 0.965
(2)	Life span h^*	53.7	51.1	p_h	0.980 0.951
(3)	Life span l^*	57.8	56.0	p_l	0.982 0.957
(4)				δ	0.725 1.669
(5)	% unmarried $h m^*$	41.1	50.9	$q(H)$	0.060 0.068
(6)	% unmarried $h f^*$	35.7	35.8	$q(L)$	0.468 0.324
(7)	% unmarried $l m^*$	17.7	22.1	$Q(h)$	0.091 0.150
(8)	% unmarried $l f^*$	12.2	13.0	$Q(l)$	0.909 0.850
(9)	% widowers remarry	44.6	46.4	$\lambda(H, h)$	0.824 0.631
(10)	% widows remarry	26.8	31.1	$\lambda(H, l)$	0.968 0.914
(11)				$\lambda(L, h)$	0.964 0.938
(12)	$\frac{\pi_{Hl}}{\pi_{Ll}}^*$	0.024	0.043	$\lambda(L, l)$	0.841 0.614
(13)	$\frac{\pi_{Lh}}{\pi_{Ll}}$	0.022	0.057	$\frac{\pi_{Lh}}{\pi_{Ll}}$	0.022 0.026
(14)	$\frac{\pi_{Hh}}{\pi_{Ll}}$	0.021	0.062	$\frac{\pi_{Hh}}{\pi_{Ll}}$	0.013 0.030
(15)	MAFM $h m$	31.4	30.2	MAFM $h m$	32.5 35.2
(16)	MAFM $h f$	21.8	21.3	MAFM $h f$	27.4 25.4
(17)	MAFM $l m$	28.2	28.7	MAFM $l m$	24.8 26.9
(18)	MAFM $l f^*$	21.3	21.3		
(19)	N (births)	11578	2428		
(20)	N (marriages)	6837	1007		
(21)	% m (birth sample)	46.50	44.32		

Source: Samples include individuals with known life span who lived until at least age 15.

Table 1: Reduced form estimates

6 Differential fecundity and labor supply

1. The age of first marriage for men is positively correlated with their wage.
2. Controlling for age, married men have higher wages than non-married men.
3. Married men spend more time in the labor force than married women. They spend less time on child rearing than their spouses.
4. Married men have higher wages than married women.

Consider a constant population society where individuals live for three periods, one as a child, one as a young adult and one as an old adult.

Every young adult has to decide whether to marry or remain single.

The only reason to marry is to have children. Young and old men are fecund whereas only young women are fecund.

An adult may have at most one spouse at a time (monogamy).

An adult may marry when young, divorce and remarry another person when old.

Young single men and women, old single and divorced men may marry.

Old single and divorced women will not marry or remarry respectively.

Eligible men must offer the same reservation utility to prospective spouses (young women) if they wish to marry.

Assume women prefer to marry rather than remain single which means that all young women will marry.

In a stationary equilibrium without population growth and with an equal number of young men and women, some young men must remain single when some divorced men remarry.

Some of these single young men will remain unmarried when they are old. If all single young men marry when old, then divorced men cannot remarry since there will not be enough eligible women. Thus when some divorced men remarry, some men will always be single. Since all young women marry, there are proportionately less never married women than men.

While some men will always remain single, some single young men will marry when they become old. Thus

the average age of first marriage is lower for women than men.

All young adults have the same labor market opportunities. Time at work produces current income and increases the expected future wage of the individual. Due to uncertainty in human capital accumulation, only some old adults will be successful in obtaining a higher wage. Single old men who marry have higher wages than young married men. They use this higher wage to compensate their spouses for marrying older men (Point (1)).

Single old men who marry will also have higher wages than single old men who do not marry (Point (2)).

When a young couple marry, they each have to decide how much time to spend in the labor market and how much time to spend with their children. The mother can use her future labor earnings to only buy private consumption when old. The father can use his future

labor earnings to buy future private consumption and to compete for a new wife (and have another child) if his current marriage fails. Thus the young father has a potential additional use for future labor income which is not available to the mother. The cost of working, time spent with their child, is the same for both parents. With an additional benefit but the same cost, the father will choose to spend more time at work than the mother (Point (3)).

His future wage will also be higher (Point (4)).

The positive correlation between the level of future labor earnings and the incidence of remarriage is critical in generating current differences in time use between husbands and wives. Divorced men who remarry must outbid some old single men for spouses. In this model, human capital uncertainty allows some lucky divorced men to outbid unlucky single old men for spouses.

Without human capital uncertainty, divorced men will not be able to outbid single old men for spouses.

There is no remarriage and no difference in time use between young husbands and wives.

These alternative predictions under alternative market structures show the importance of market structures in determining gender roles.