Why do women delay marriage?
A duration analysis of left single in case of Japanese women

Miki Matsui
Miki.Matsui@anu.edu.au

Division of Economics
RSPAS
The Australian National University

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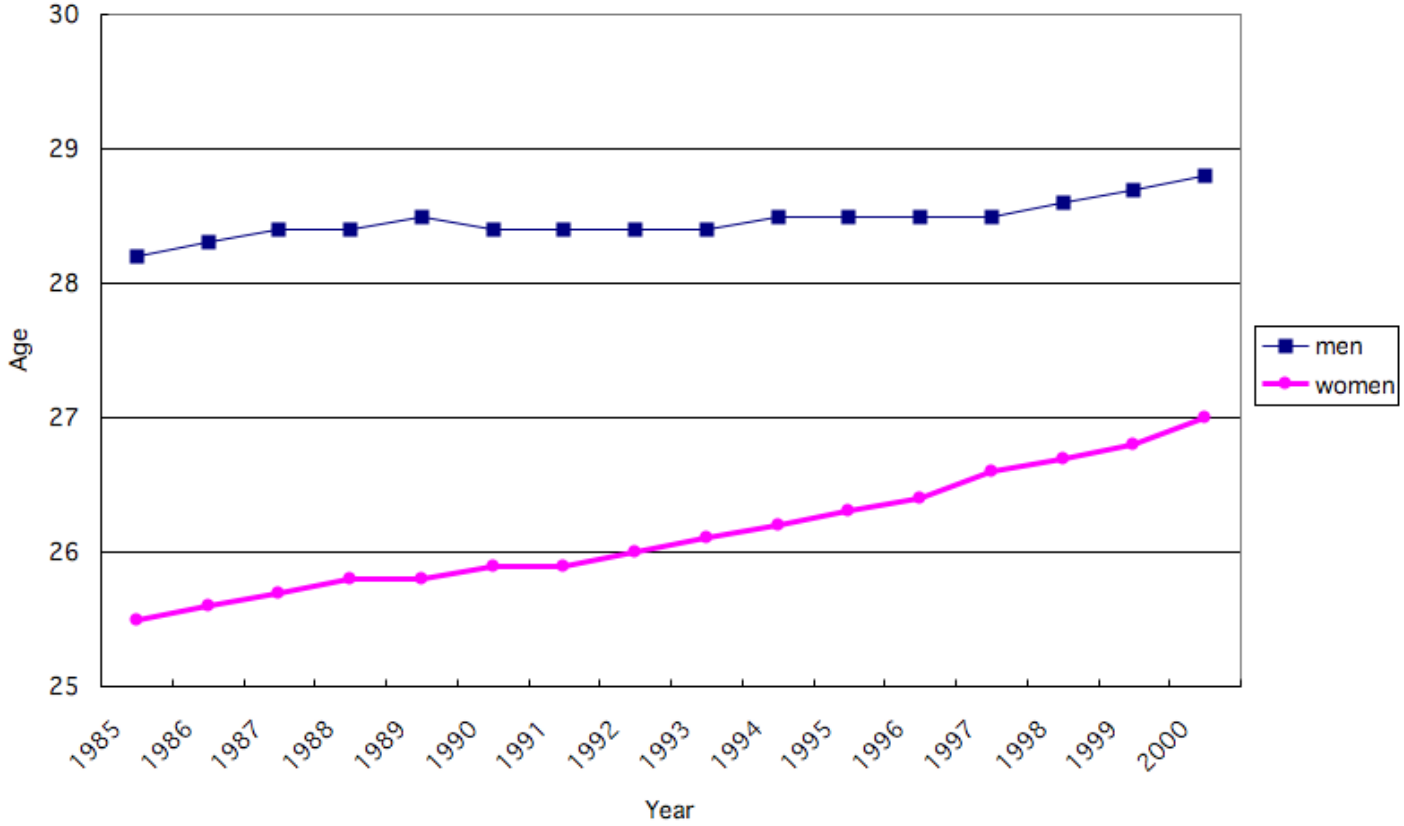
Introduction

Rise in the age of the first marriage



The reason of late marriage

A consensus of public opinion

- Many people choose not to marry as a result of choice.
- Improvement of financial stability of women.
- Higher requirements towards the future spouse.

Literature

- Increase in labour participation of women.
- Raise in education level of women.
- Parasite single.
- Unemployment rate

Data

Japanese Panel Survey of Consumer (JPSC)

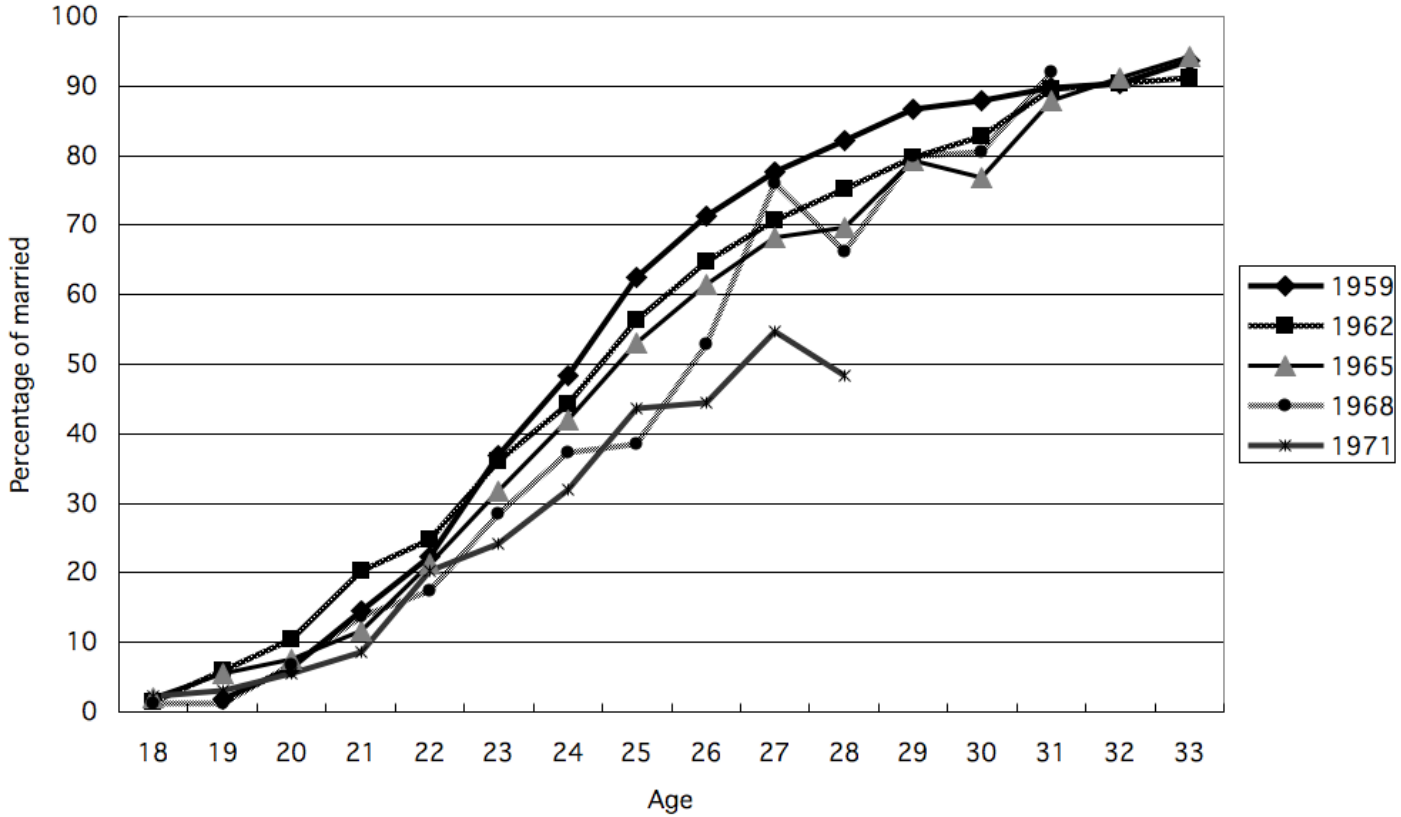
- Conducted by the Institute of Household Economic Research since 1993
- Cohort A: Age 24 - 34 women in 93. 1500 samples
- Cohort B: Age 24 - 27 women in 97(Panel 5). 500 samples
- Available data sets: Panel 1-7(93-99).
- Personal characteristics, wage, income, employment, marital and fertility situations. etc.

Observations and marital status

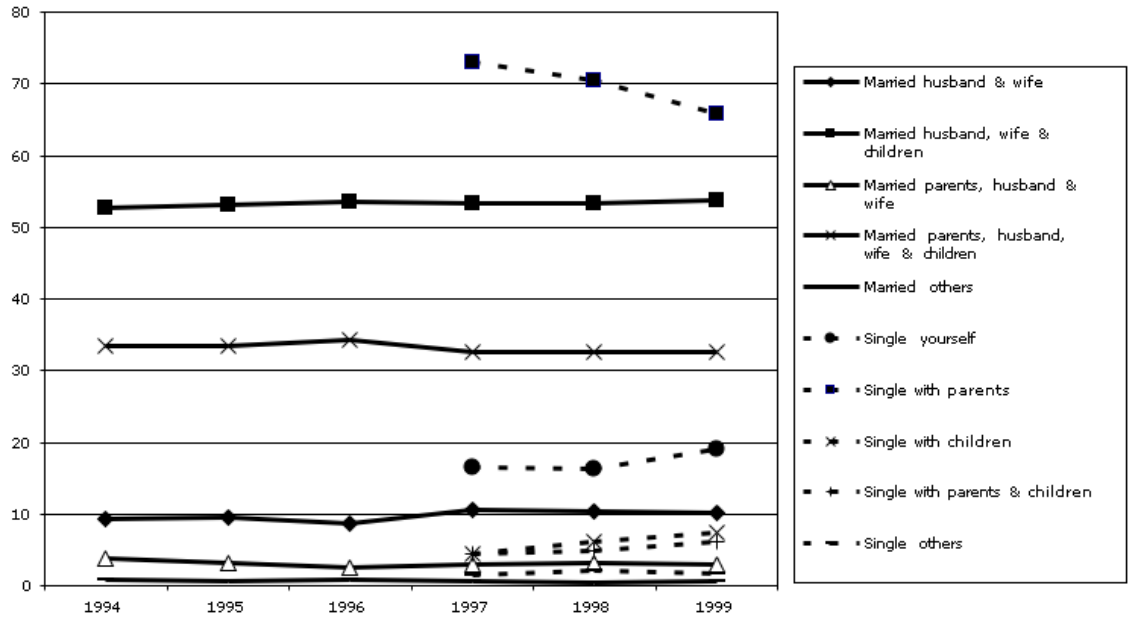
- 70 % are married
- 30 % are single

Panel	1	2	3	4	5	6	7
married	66.8	70.7	74.6	77.1	67.2	71.1	74.3
single	33.2	29.3	25.4	22.9	32.7	28.9	25.7
obser#	1500	1415	1341	1289	1749	1628	1537

Rate of marriage

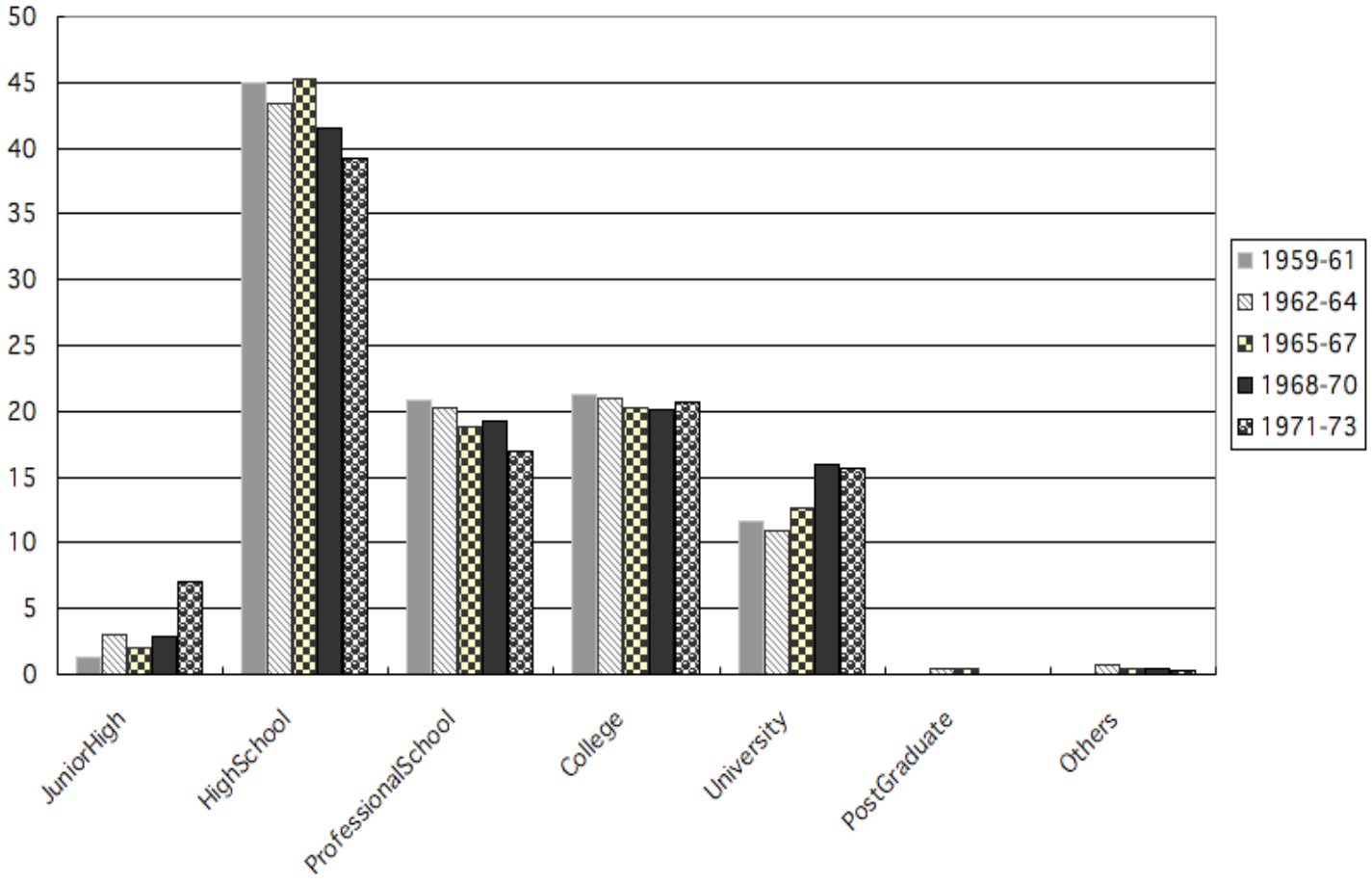


Family Structure

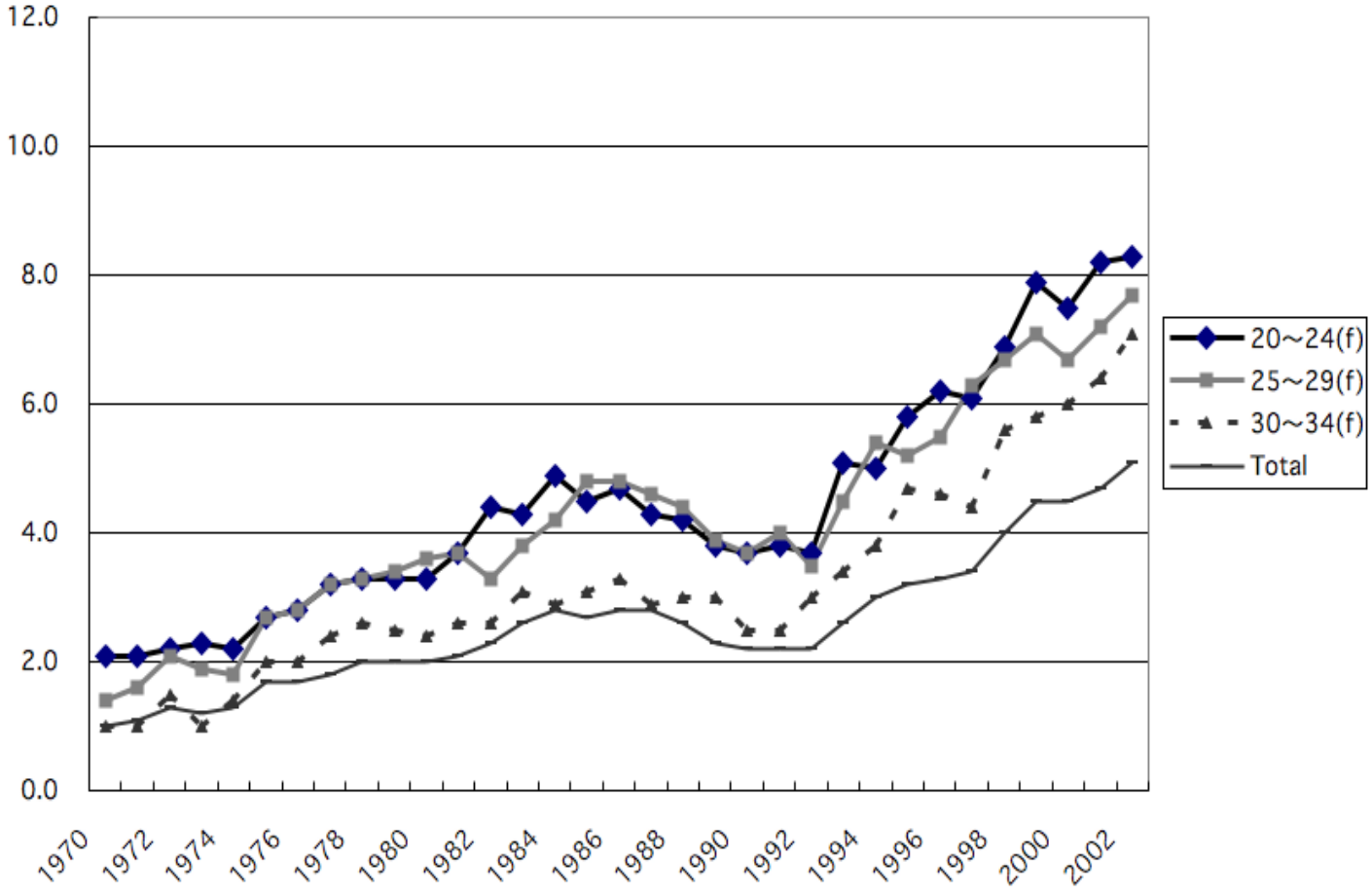


- 70-80% of single live with parents with the same budget.

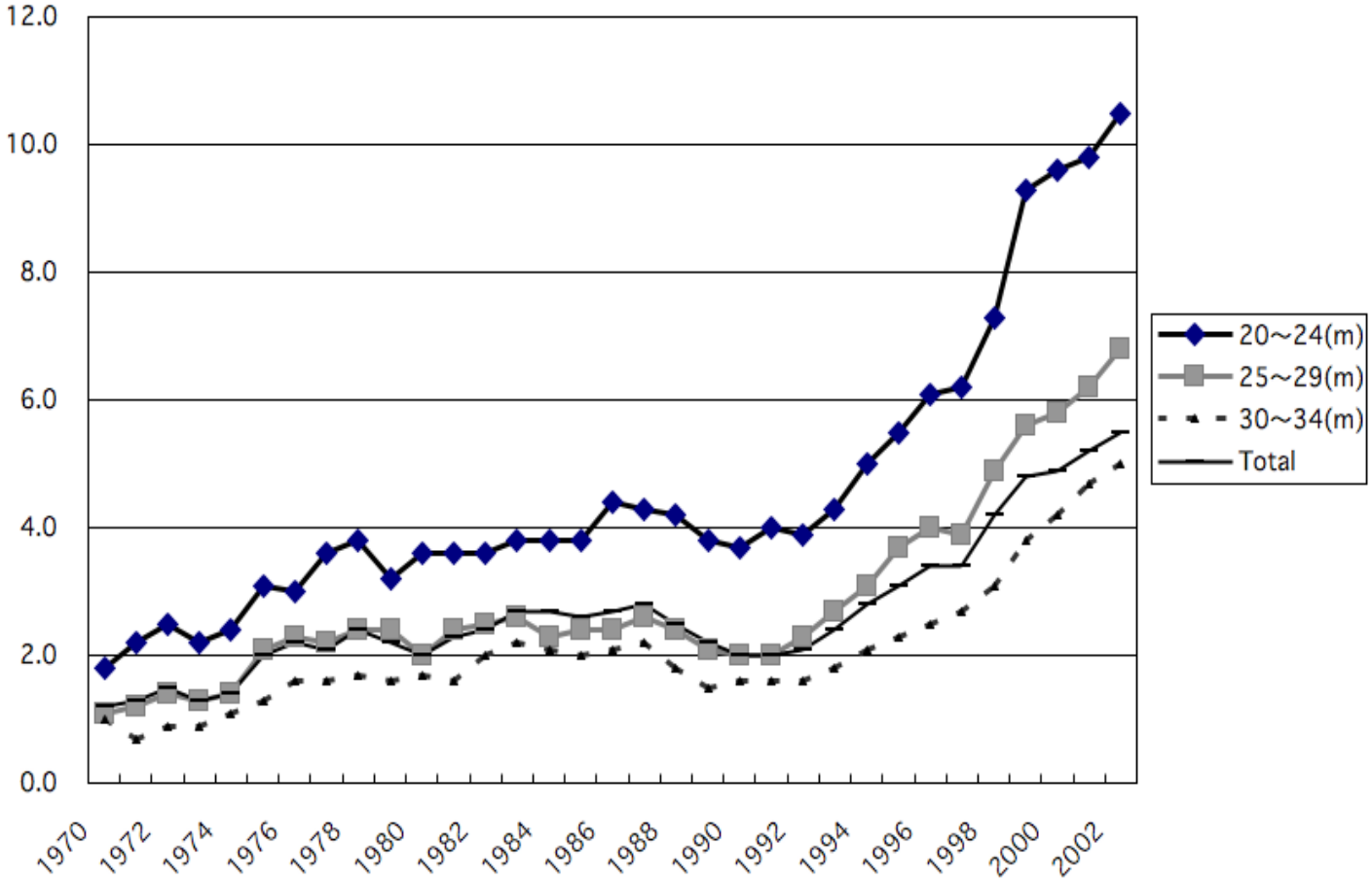
Education level



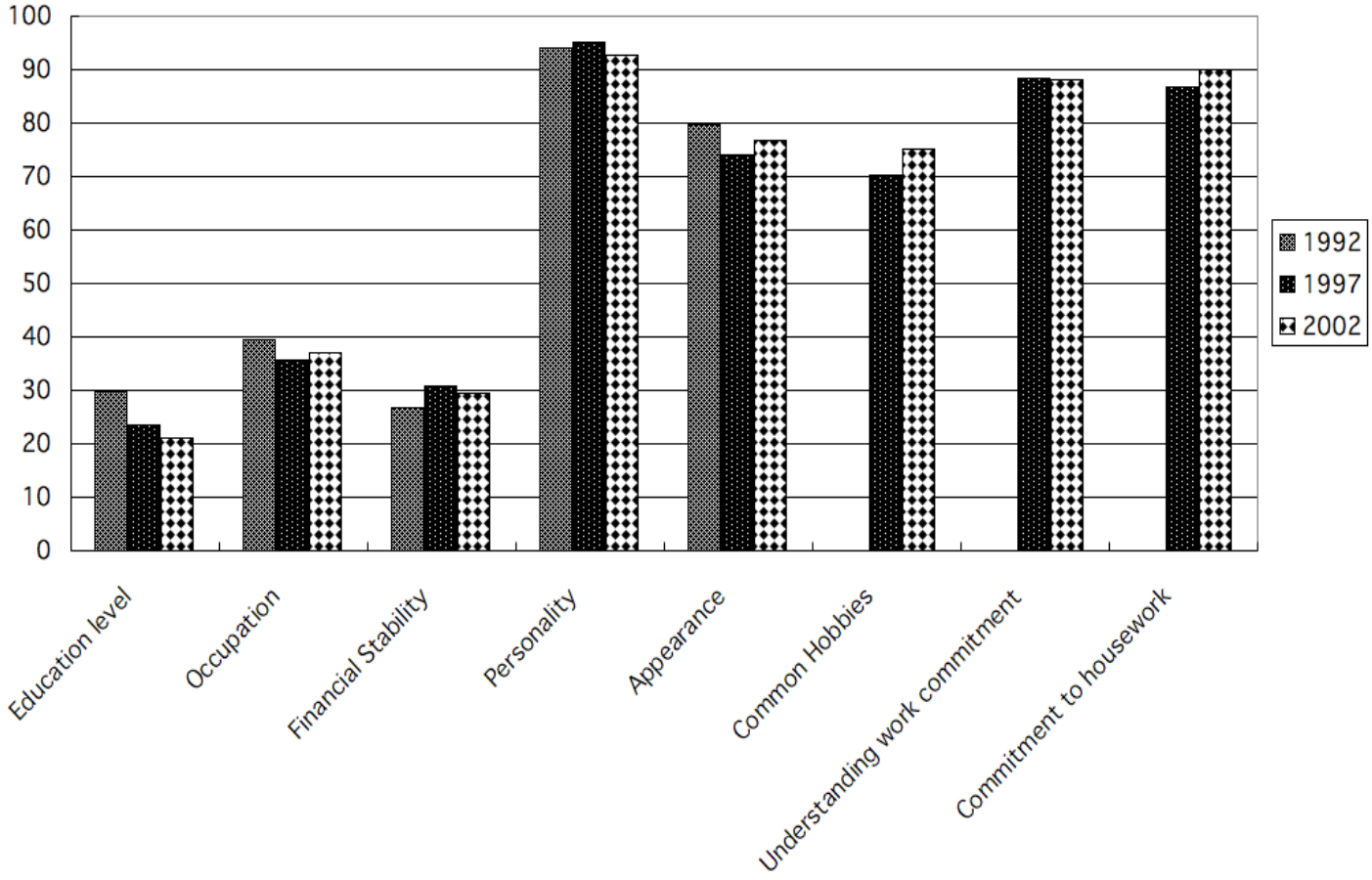
Female unemployment rate



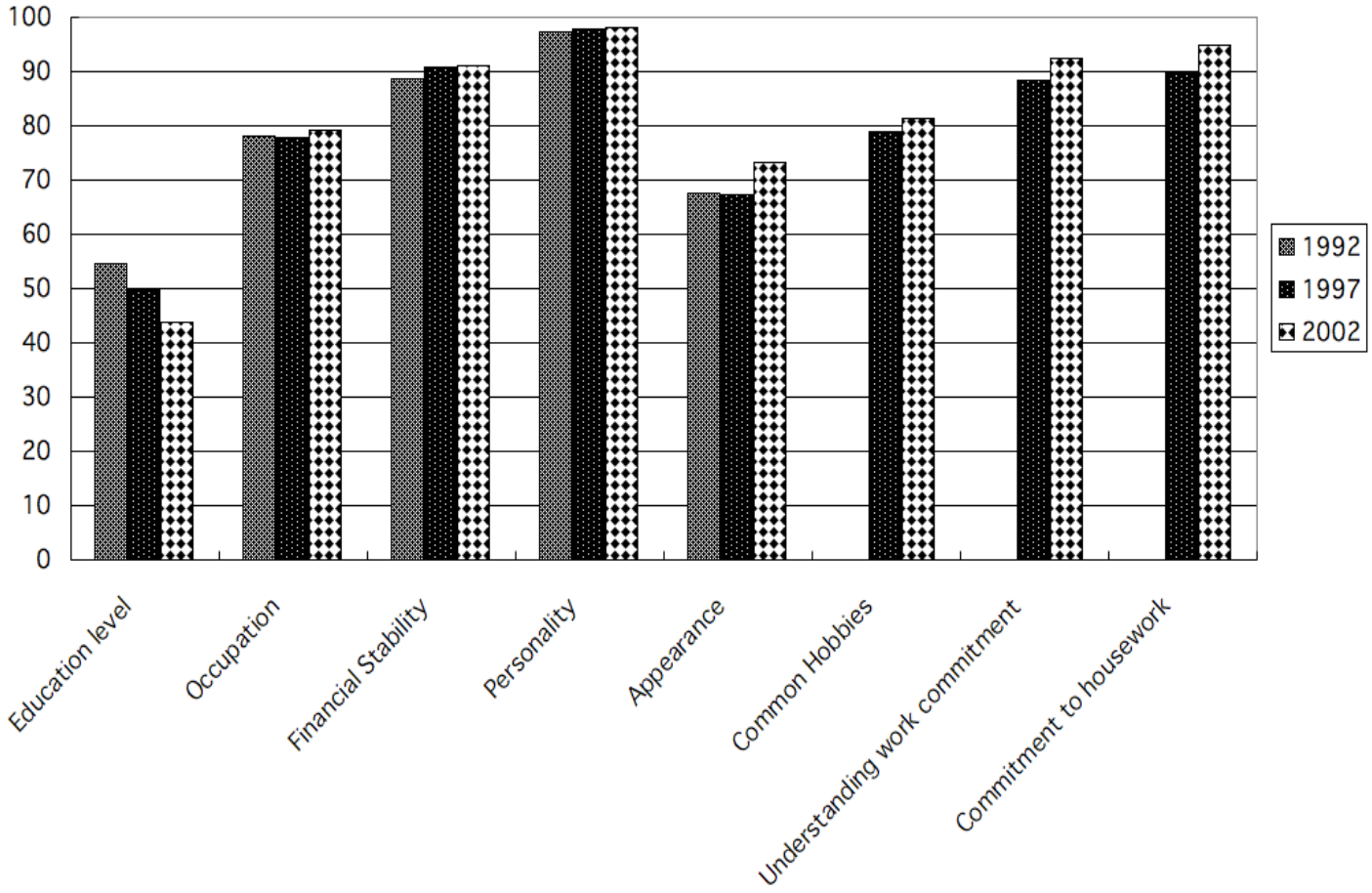
Male unemployment rate



Marriage partner:Male



Marriage partner:Female



Summary & Questions

Summary

- Decline in rate of marriage/Delay in marriage.
- Rise in university graduates.
- Increasing unemployment rate for marriageable age.
- Parasite single does not seem to be prominent.
- Requirements for a partner does not seem to be changed.

Questions

- Higher education level makes the women more choosy?
- High unemployment rate attributes less marriageable men?

Studies of marriage in Japan

Some interesting findings

- Increase in education level
  - Higher the education level later the marriage
- Increase in female labor supply
  - Utility from work is higher/utility from marriage is low
- Unemployment rate
  - Unemployment rate at the graduation $\rightarrow$ earlier the marriage
  - Unemployment rate $\rightarrow$ delay the marriage

How can we interpret?

- Do women should be uneducated and not work?
- Endogenous: education, decision of labor supply
- Search theoretic approach?

A search model of marriage

Search before realization of marriage

- Market frictions: The agents will spend time and cost for a search.

The goods traded

- Utility obtained from marriage.

Imperfect information

- Information about opportunities of encountering a potential marriage partner is imperfect.

Single women and single men coexist

A single sided search

A partial equilibrium model

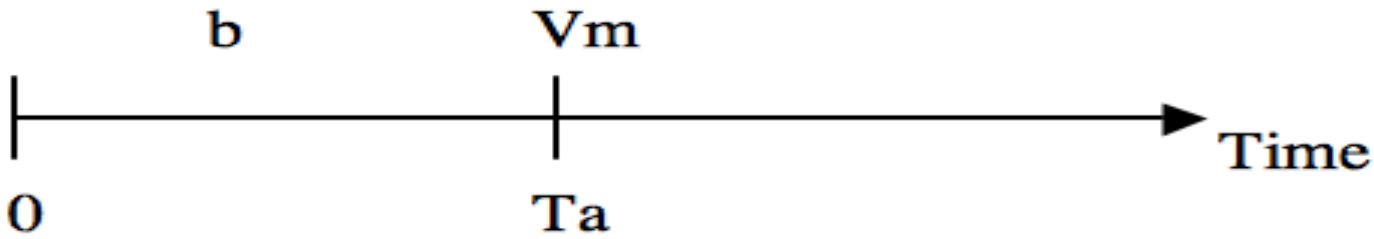
- Exogenous: arrival rate α and distribution $F(x)$
- Women are looking for men for a husband.
- Men are characterized by the distribution: $F(x)$
- The arrival rate is random: $q(\alpha) = f_\alpha(t) = \alpha e^{-\alpha t}$
- Decision rule: A cut-off rule: Reservation utility R.

Life time utility

$$\int_0^\infty C(t)e^{-rt}dt$$

$$\text{with} \quad C(t) = \begin{cases} V_m & \text{if marry} \\ b & \text{if single} \end{cases}$$

Time to find a husband



$$T_\alpha \sim q(\alpha)$$
$$q(\alpha) = f_\alpha = \alpha e^{-\alpha t}$$

Expected life time utility

$$V_s = \mathbf{E}\left[\int_0^{T_\alpha} b e^{-rt} dt + e^{-rT_\alpha} V_m\right]$$
$$V_m = \mathbf{E} \max\left(V_s, \frac{x}{r}\right)$$

Reservation utility

Using $V_s = \frac{R}{r}$,

Reservation utility

$$R = b + \frac{\alpha}{r} \int_R^{\bar{x}} (x - R) dF(x)$$

Since $R = rV_s$,

Optimal search strategy

$$rV_s = R = b + \frac{\alpha}{r} \int_R^{\bar{x}} [1 - F(x)] dx$$

Probability of marriage at date

Hazard rate: H_t

$$H_t = H = \alpha[1 - F(R)]$$

- The mean duration of single: $\frac{1}{H}$
  The mean duration until next arrival is given by

$$\begin{aligned} \mathbf{E}T_H &= \int_0^\infty tHe^{-Ht}dt \\ &= \frac{1}{H} \end{aligned}$$

Impact of parameters

Arrival rate:α

- R: Positive(If she is popular, she will be choosy.)
- H: Positive(If she is popular, she will marry earlier.)

Instanteneous utility of single:b

- R: Positive(Greater utility of being single, she will be choosy.)
- H: Negative(Greater utility of being single, she will remain single.)

Discount rate:r

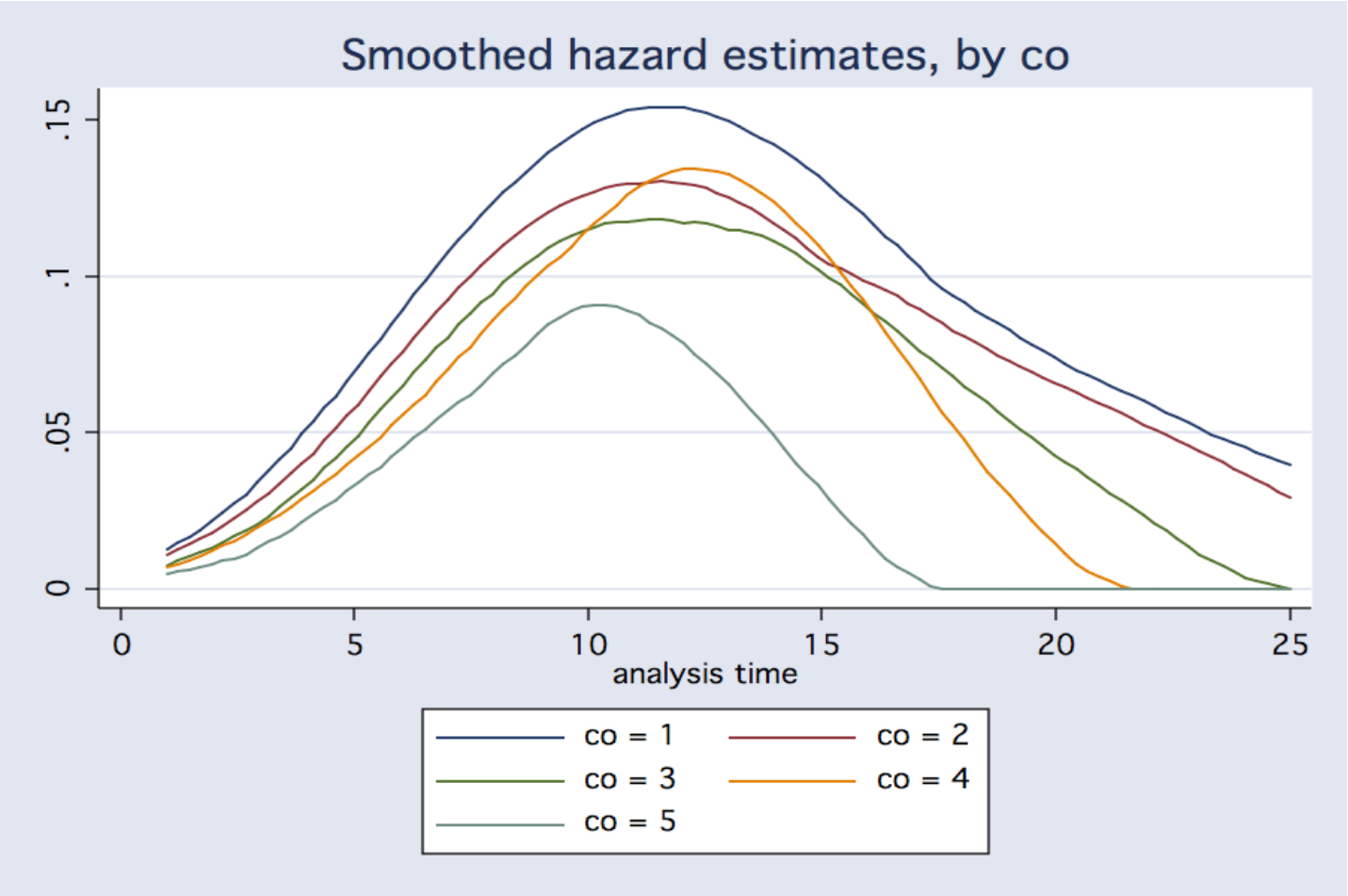
- R: Negative(If she is myopic, she will not be choosy.)
- H: Positive(If she is myopic, she will marry earlier.)

Impact of parameters

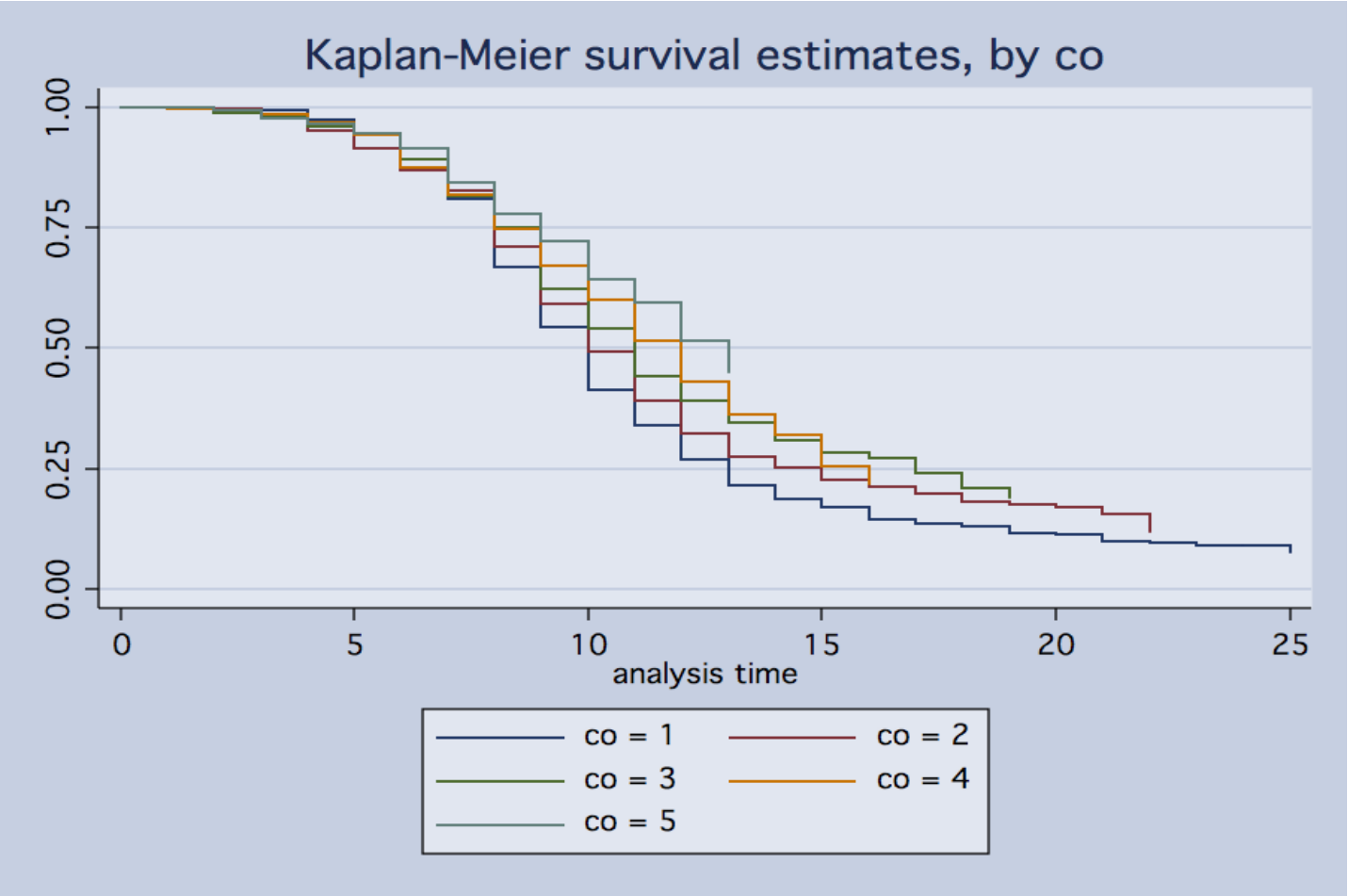
Men's distribution: $F(x)$

- Mean
  - R: Positive(If men are more attractive on average, she will be more choosy.)
  - H: Positive(If men are more attractive on average, she will marry earlier.)
- Variance
  - R: Positive(More risky to encounter the right man, she will be choosy.)
  - H: Ambiguous

Hazard estimates



Survival estimates



Parametric model

A hazard

$$\lambda(t|\mathbf{z}) = \lim_{dt \to 0} \frac{P(t \leq T < t + dt | T \geq t, \mathbf{z})}{dt}$$

If T has a log logistic hazard function, we specify

$$\lambda(t|z) = \frac{\gamma \alpha t^{\alpha - 1}}{1 + \gamma t^{\alpha}}$$

where $\gamma = \exp(-\mathbf{z}'\beta)$.

The Survivor function

$$S(t|\mathbf{z}) = (1 + \gamma t^{\alpha})^{-1}$$

cdf

$$F(t|\mathbf{z}) = 1 - (1 + \gamma t^{\alpha})^{-1}, t \geq 0$$

Since the distribution of $\log(t_i^*)$ given $\mathbf{z}_i$ is logistic with mean $-\alpha \log \exp(-\mathbf{z}'\beta) = \alpha^{-1}\mathbf{z}'\beta$ and variance $\frac{\pi^2}{(3\alpha^2)}$.

Parametric model

AFT form

$$\log(t_i^*) = \mathbf{z}_i\delta + e_i$$

where

$$e_i = \mathbf{c}_i\upsilon + \eta_i$$

Capture unobserved heterogeneity term $\mathbf{c}_i\upsilon$ and η_i has a zero mean logistic distribution and is independent of $\mathbf{z}_i$ and $\delta = \beta\alpha^{-1}$.

$$\log(t_i^*) = \frac{\mathbf{z}_i\beta}{\alpha} + \mathbf{c}_i\upsilon + \eta_i$$

Specification

What do we want to test?

- Arrival rate: $\alpha \ominus$
  - Metropolitan(13 big cities), City(30-1m), Town(10-30)
- Utility of being single: $b \oplus$
  - Employment status:Full time, Part time, Not working
  - Education level: University, College, High school, Junior high school
- Discount rate: $r \ominus$
  - Unemployment rate at the time of graduation/one year before marriage

Specification

- Mean of distribution of men $\ominus$
  - Growth rate of average wage of men
- Variance of distribution of men ?
  - Unemployment rate of men
- Unobserved heterogeneity(Unobserved reservation utility)
  - Age cohort1(59-61), 2(62-64), 3(65-67), 4(68-70), 5(71-73)

Estimation results

Duration of left single	(1) Coef.	(Std.Error)	(2) Coef.	(Std. Error)	(3) Coef.	(Std. Error)
Agecohort1						
Agecohort2	0.067	(.033)**	0.038	(.033)	-0.049	(.030)*
Agecohort3	0.085	(.033)***	0.109	(.035)**	0.010	(.032)
Agecohort4	0.108	(.034)***	0.024	(.037)	-0.082	(.034)**
Agecohort5	0.157	(.041)***	-0.085	(.046)*	-0.185	(.042)***
Unempmar(F)			0.211	(.016)***	0.003	(.019)
Unempgrad(F)			0.004	(.011)	-0.006	(.009)
Fulltime(F)	0.010	(.036)	0.044	(.033)	0.045	(.030)*
Parttime(F)	0.047	(.043)	0.078	(.040)**	0.064	(.036)*
Notworking(F)						
JuniorHigh(F)						
Highschool(F)	0.030	(.072)	-0.011	(.065)	-0.029	(.059)
College(F)	0.189	(.072)***	0.107	(.065)*	0.055	(.059)
University(F)	0.369	(.077)***	0.267	(.069)***	0.205	(.063)***
Town(F)						
City(F)	0.138	(.027)***	0.123	(.025)***	0.108	(.024)***
Metro(F)	0.195	(.033)***	0.168	(.030)***	0.141	(.028)***
Variance(M)	-0.044	(.013)***	-0.089	(.012)***	-0.090	(.011)***
Mean(M)					-0.140	(.009)***
Constant	2.155	(.087)***	1.400	(.101)***	2.934	(.135)***
α^{-1}	0.244	(.006)	0.224	(.005)	0.204	(.005)
Observations	1633		1617		1617	
Censored	369		369		369	
Log likelihood	-1045.7		-934.8		-832.0	
LR χ^2	197.3		374.6		580.2	

Result of 1

Arrival rate

- Metro***, City*** $\oplus$
  - Bigger the size of the city, longer the duration

Utility of being single

- Full time, Part time $\oplus$
  - If she is working longer the duration
- University***, College***, High school $\oplus$
  - Higher the education level, longer the duration

Distribution of men

- Variance*** $\ominus$
  - Greater the variance of men, she will marry earlier

Unobserved reservation utility

- Age cohort2**, 3***, 4***, 5*** $\oplus$
  - Younger the generation, longer the duration

Result of 2

Arrival rate

- Metro***, City*** $\oplus$

Utility of being single

- Full time, Part time** $\oplus$
- University***, College* $\oplus$, High school $\ominus$

Distribution of men

- Variance*** $\ominus$

Unobserved reservation utility

- Age cohort2, 3**, 4 $\oplus$, 5* $\ominus$
  - Including own unemployment rate changes youngest cohort negative

Result of 2

Discount rate: Search costs

- Unemployment rate before marriage*** ⊕
- Unemployment rate at the time of graduation ⊕
  - High unemployment rate before marriage, reduce opportunity cost of search, hence longer duration

Result of 3

Arrival rate

- Metro***, City*** $\oplus$

Utility of being single

- Full time*, Part time* $\oplus$
- University***, College, High school $\oplus$

Discount rate: Search costs

- Unemployment rate before marriage $\oplus$
- Unemployment rate at the time of graduation $\ominus$
  - Including mean changes Unempgrad negative, but not significant.
  - Supply side affects more on women's marriage behavior rather than own labour market condition(unemployment rate).

Result of 3

Distribution of men

- Variance*** $\ominus$
- Mean*** $\ominus$
  - Increase of men's attractiveness on average induce women to marry earlier

Unobserved reservation utility

- Age cohort2*, 4**, 5*** $\ominus$, 3 $\oplus$
  - Including mean changes reservation utility negative(women are not picky)
- Demand side(men's distribution) affects women's marriage behavior

A conclusion

- The women highly educated, working full time or part time, living in a bigger city tend to delay marriage.

A search model explains the effect of supply side

- Increase in men's distribution in terms of mean and variance characterized by wage and unemployment rate decelerates the duration of being single.

Variance : negative

- In a risky situation, a woman tend to get marry earlier in case of Japan.

A conclusion

Women delay marriage NOT because...

- Women become picky.

Women delay marriage because...

- The growth rate of mean wage slowed down or even became negative during economic recession, the effect of decreased mean of men's distribution contributes to the delay marriage.