One Child Policy, Marriage Distortion, Welfare Loss

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What do OCP and Soda Tax have in Common?

- Both of them are some kind of consumption tax.
- Marriage can be regarded as a bundle of commodities, and the quantity of children is among them.
- Can we use the welfare-analysis tools in the economics of taxation to study marriage?

Framework

- Introduction
- Background
- Theoretical Framework
- Data
- Econometric Framework and Empirical Results
- Concluding Remarks

Introduction

Rationale:

- **How does OCP affect marriage behaviors:** if the government impose a tax on gasoline, what would happen to auto sales.
- **Identification opportunity:** Different policy implementation by ethnicities, regions and periods;
  - e. g. In some regions, Han-Minorities couples have the rights to give birth to one more child.
  - e.g. the monetary penalty is different across regions and changes over time.

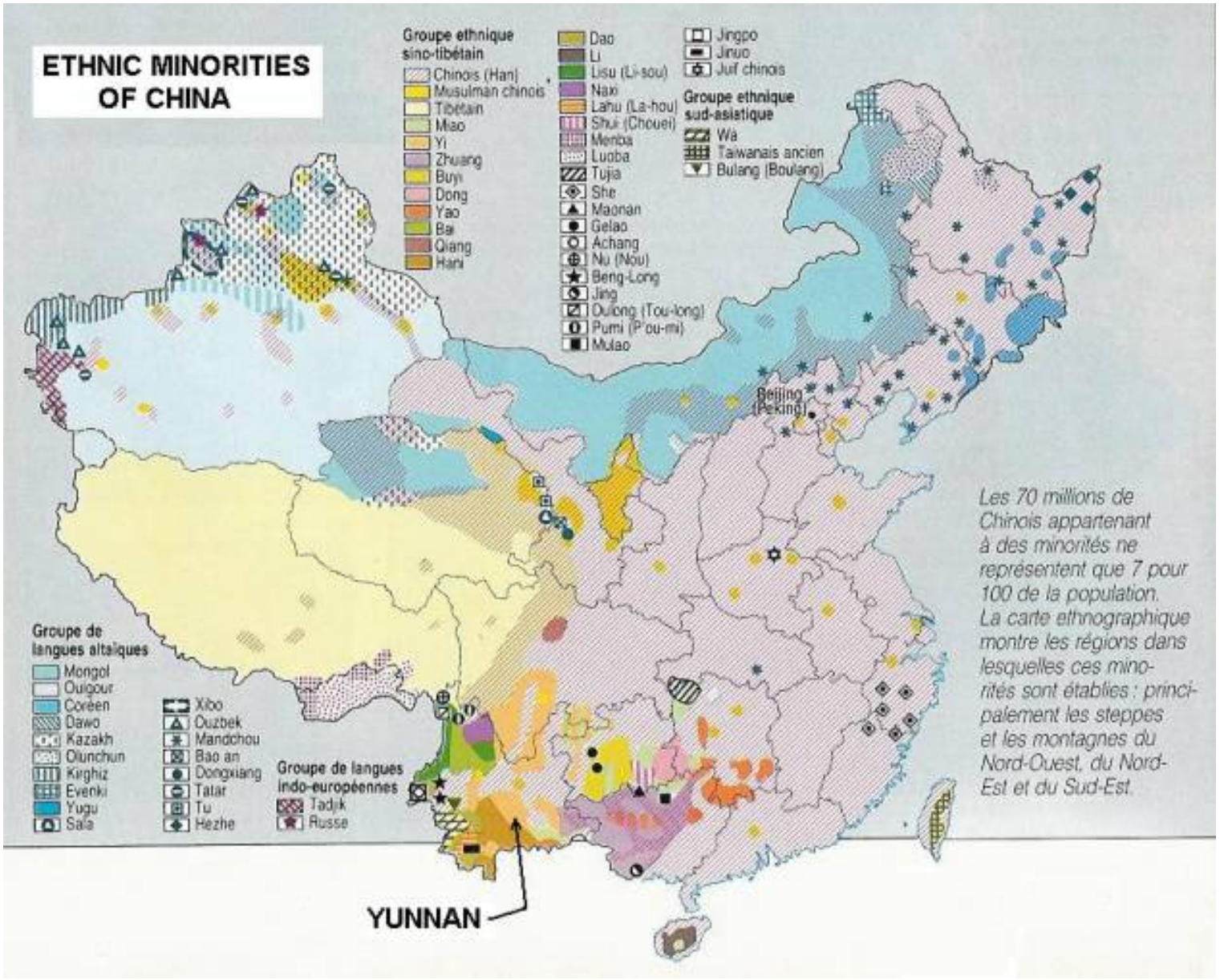
Methodology:

- **Theory:** Transferable Utility Model of Marriage Market (Choo and Siow 2006), which is originated from Becker (1973, 1974).
- **Empirical:** use the regional & temporal variation in monetary penalty rate to estimate the impact of OCP on **unmarried rate** and **interethnic marriages.**

Background: Ethnicities in China

- China has officially 56 ethnicities and about 92% of its population are Han people
  - A monumental project of ethnic identification was initiated by the central government in early 1950s.
  - More than 400 groups applied for national minority status in the 1953 population census (Fei, 1979).
- Every newborn's ethnicity should be registered in the hukou system within the first month after Birth (*Regulations on Household Registration of PRC*).
- The current geographic pattern of ethnic distribution is formed with the Chinese migration history (Poston Jr. and Shu 1987)

Figure 1. Background: Ethnicities in China



Background: One-Child Policy

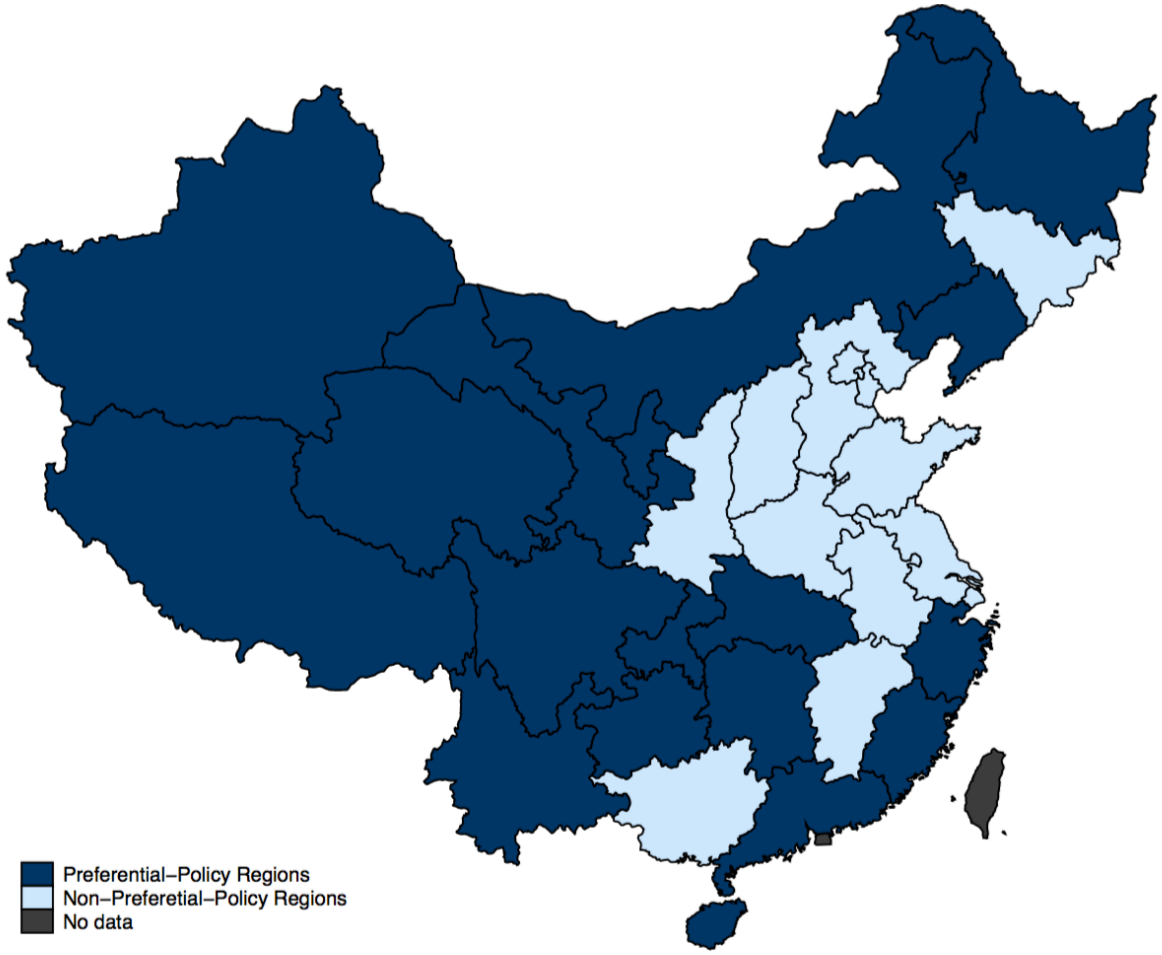
- It was first announced in 1978 and then appeared in the amended Constitution in 1982.

- Specific Regulations should be made in accordance with local conditions by provincial governments and approved by provincial standing committees of People's Congress. (*Document 11* of 1982 and *Document 7* of 1984)

- Two goals for local officials: "inter-ethnic harmony (or national unity)" vs. "birth control"

- In almost all regions, both-minority couples were legally permitted to have more births. In some regions, such an exemption also applied to Han-Minority (H-M) couples.

Figure 2a. Preferential-Policy Regions vs. Non-Preferential-Policy Regions



Qinghai: "Families can have one more birth, if one or both sides of the couple are from minority groups." H-M favoring policy. (Not time-varying)

Background: The Monetary Penalty of OCP (1)

- Chen Muhua (vice prime-minister): it would be necessary to pass new legislation imposing an extra child "tax" on excess children.

- Greenhalgh and Winckler (2005): "Addressing governors in spring 1989 Li Peng (prime minister) said that population remained in a race with grain, the outcome of which would affect the survival of the Chinese race. To achieve subnational compliance, policy must be supplemented with management by objectives. At a meeting on birth policy in the premier's office, Li Peng explained that such target should be evaluative."

- The central government established a link from the OCP performance to the promotion of local officials.

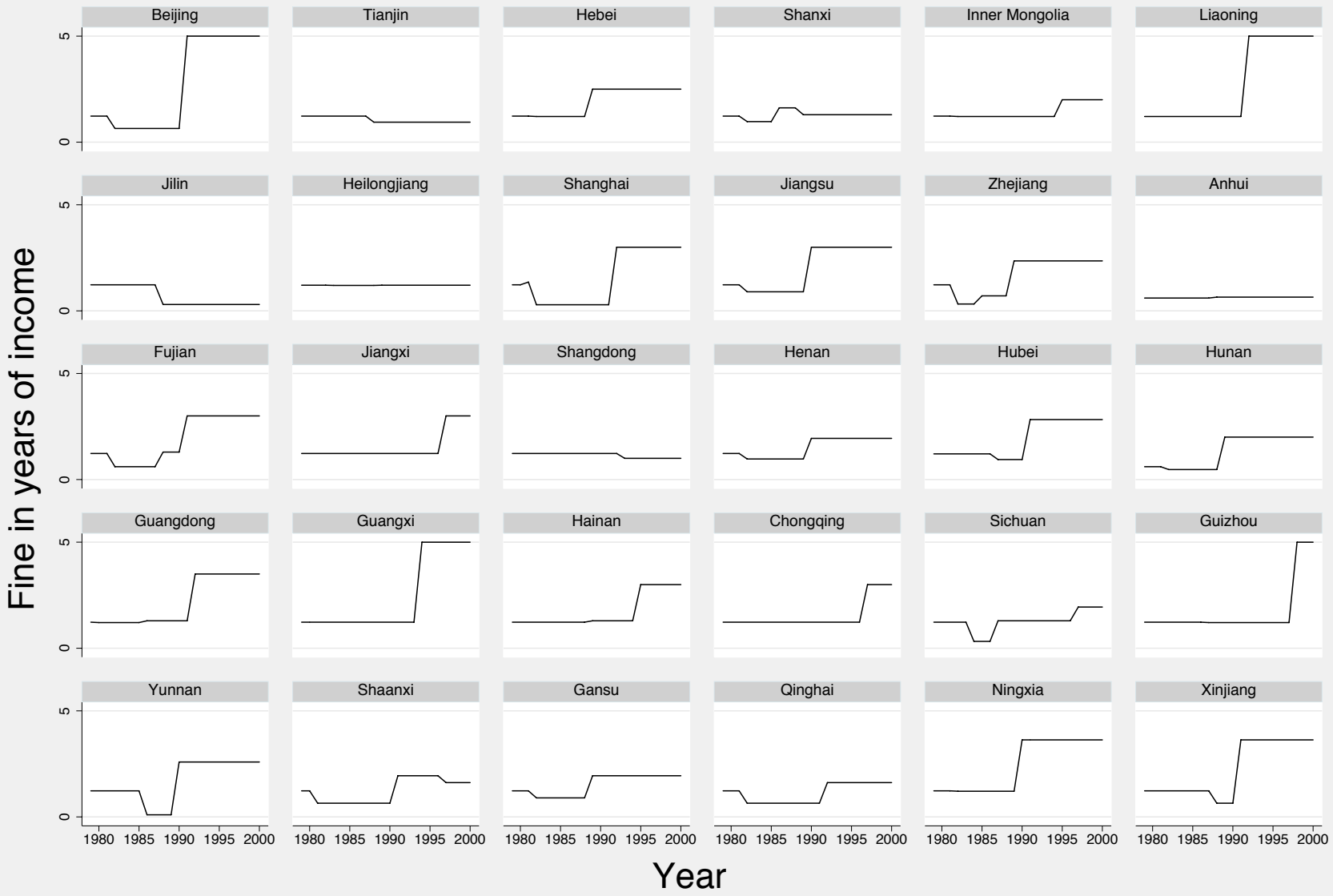
Background: The Monetary Penalty of OCP (2)

- Family planning was listed among the three basic state policies in the Eighth Five-Year Plan in March 1991.

- The national average fine rate increased from 0.82 to 2.99 yearly household incomes during 1989-1992.16 out of all the 21 significant increases occurred in this period.
  - 12 out of these 16 significant changes exactly happened in the first two years of new provincial governors' tenures.
  - The average age of these 16 provincial governors was 56, which was lower than that of other provincial governors.

- Other aspects of OCP punishment: hukou registration, losing parent's job position in government-related institutions, or even worse (Shaoyang case in Hunan).

Figure 2a. OCP penalty Rates over Time, By Province



Note: Data source is Ebenstein (2010).

Theoretical Framework

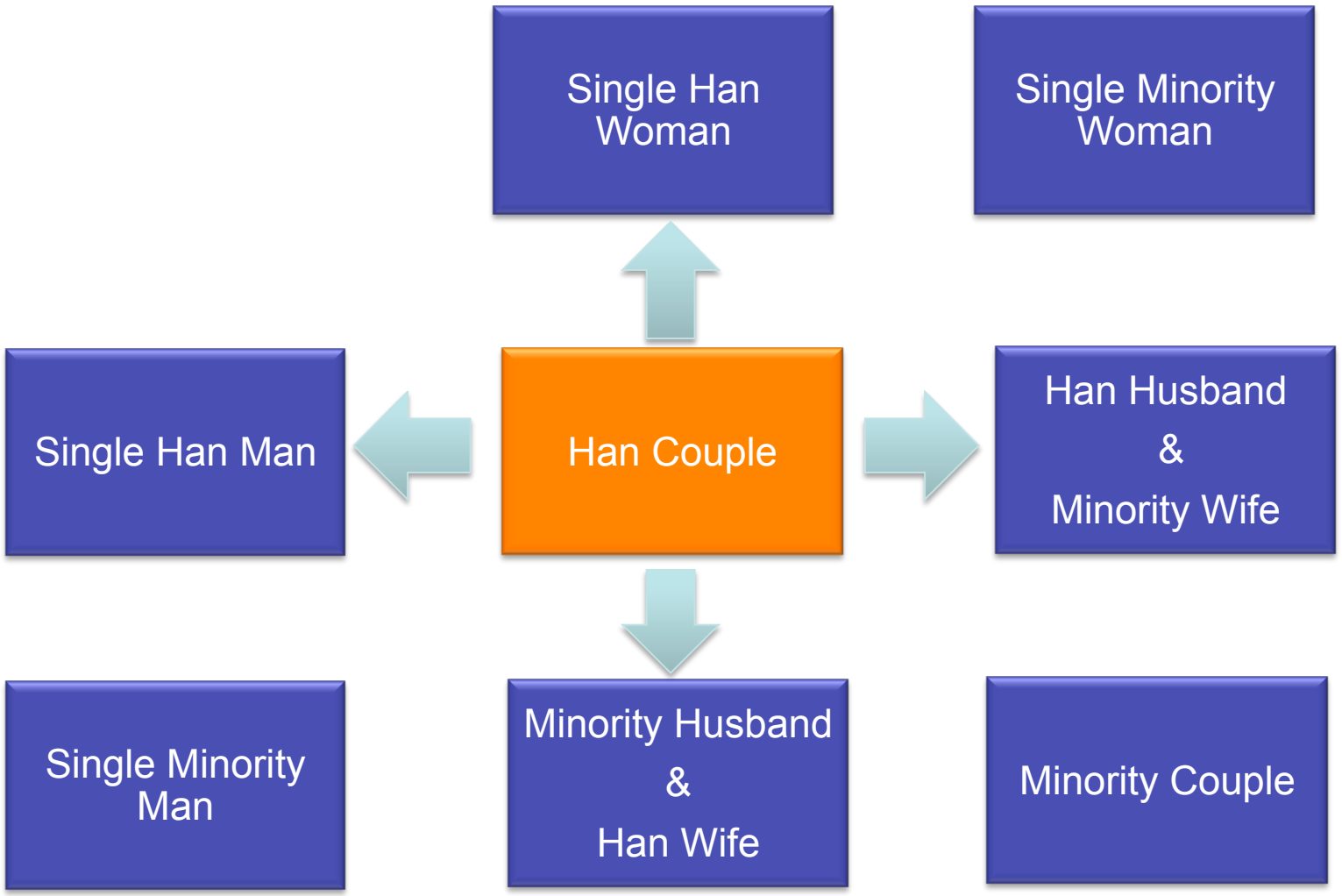
- Fertility Choice under the OCP:

$$\max_{n_{ij}} u(n_{ij}) + y_{ij} - n_{ij}C - \delta_{n_{ij} \geq \bar{n}_{ij}}(n_{ij} - \bar{n}_{ij})f$$

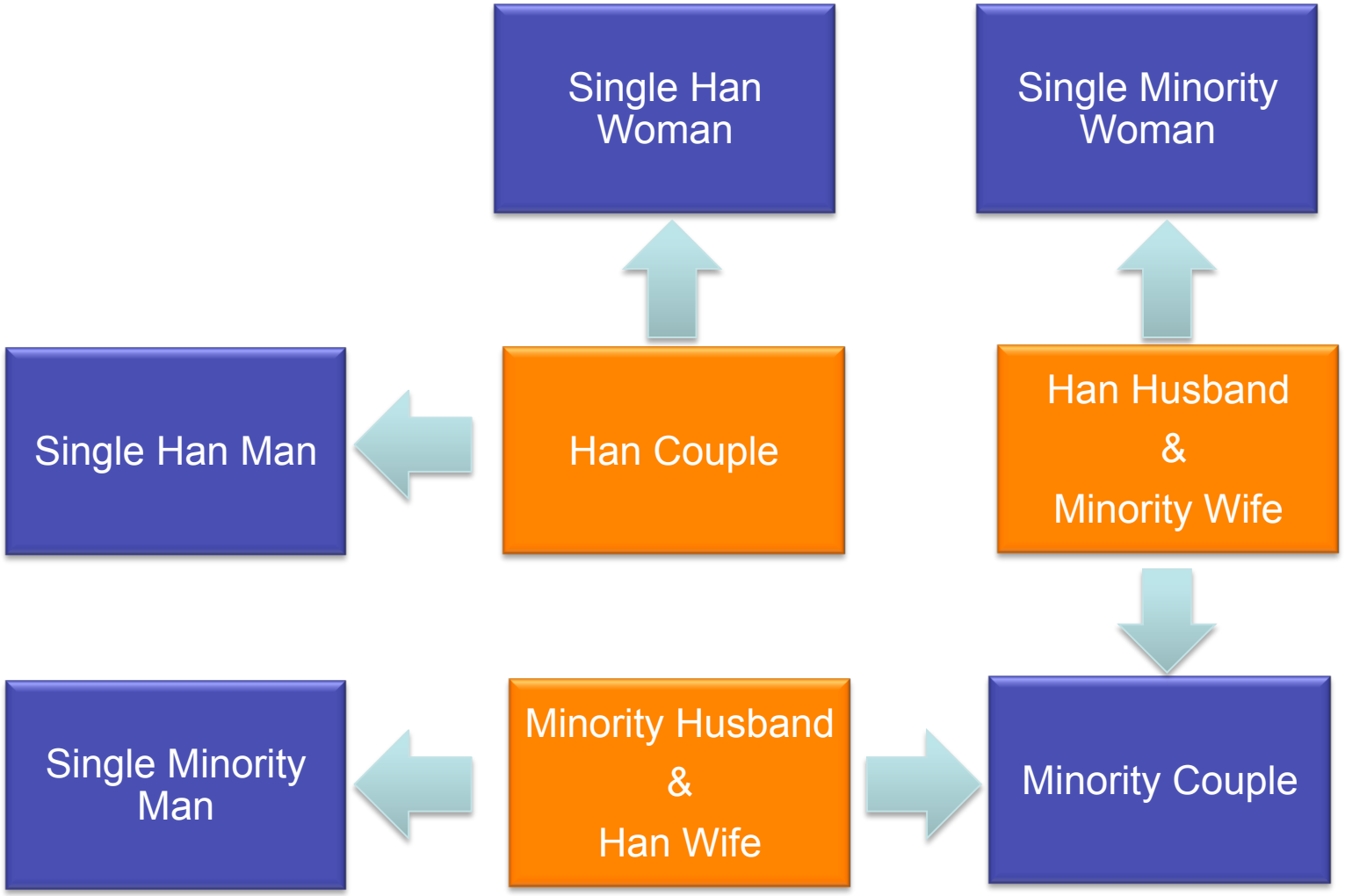
- The Transferable-Utility Model by Choo and Siow (2006):
  - There are *I* types of men and *J* types of women. For a type *i* man to marry a type *j* woman, he must transfer τ_{ij} amount of income to her.
  - Let the utility of type *i* man *g* who marries a type *j* woman be like: $V_{ijg} = \alpha_{ij} - \tau_{ij} + \varepsilon_{ijg}$
  - If individual *g* is unmarried: $V_{i0g} = \alpha_{i0} + \varepsilon_{i0g}$

- Suppose: α_{ij}=0.5*u(n_{ij})+a_{ij}. That is, the utility gained from the number of children are divided equally between men and women.

OCP in regions with favoring policy



OCP in regions without favoring policy



Theoretical Predictions

- **Prediction 1:** The fertility penalties increase the unmarried rate of Han people, especially in non-preferential-policy regions.
- **Prediction 2:** In preferential-policy regions, the fertility penalties increase the H-M marriage rate.
- **Prediction 3:** In preferential-policy regions, the fertility penalties increase the marriage transfer from Han to minorities.

Welfare Implications

- The social welfare is the summation of the expected utilities of men and women, and the fertility penalties collected by the government:

$$\Pi = \sum_i \overline{m}_i ln(\sum_j exp(\tilde{\alpha}_{ij})) + \sum_j \overline{n}_j ln(\sum_i exp(\tilde{\gamma}_{ij})) + \sum_{i,j\neq 0} \mu_{ij} c_{ij} f$$

  - where μ_{ij} is the number of (i, j) couples and c_{ij} is the number of unauthorized children born by the couple (i, j).
- By taking the derivatives with respect to the penalty rate, we have the welfare loss equation:

$$\frac{d\pi}{df} = \sum_{i\in\{H,M\}} P_i \Big(\sum_{j\in\{H,M\}} r^i_m r^i_{ij} c_{ij} (e^i_m + e^i_{ij} + e^c_{ij}) \Big)$$

  - where e^i_m, e^i_{ij} and e^C_{ij} are the elasticities of r^i_m, r^i_{ij} and c_{ij} with respect to the penalties f.
- Similar to Chetty (2009), the welfare loss depends on the basic statistics and behavioral responses.

Data: Census

- 2000 Census and 2005 Population Survey
  - Demographics: gender, year of birth, education, ethnicity, marital status, year of marriage, relationship to the household head.
- Match the fine rate according to hukou province.
  - Fine rate at age 18-25: ages that most likely to be married.
  - Note that age of marriage could be endogenous.
- Sample Restriction:
  - Aged 26-55 in the sample. Born in 1945 – 1979, before OCP.
  - Single (Never Married) and First Marriages;
    - Missing in key variables. (<1%)
  - For the married ones, we keep those with complete information about spouse's ethnicity. (89%)
    - Including the rest 11% does not influence the results.

Data: Summary Statistics

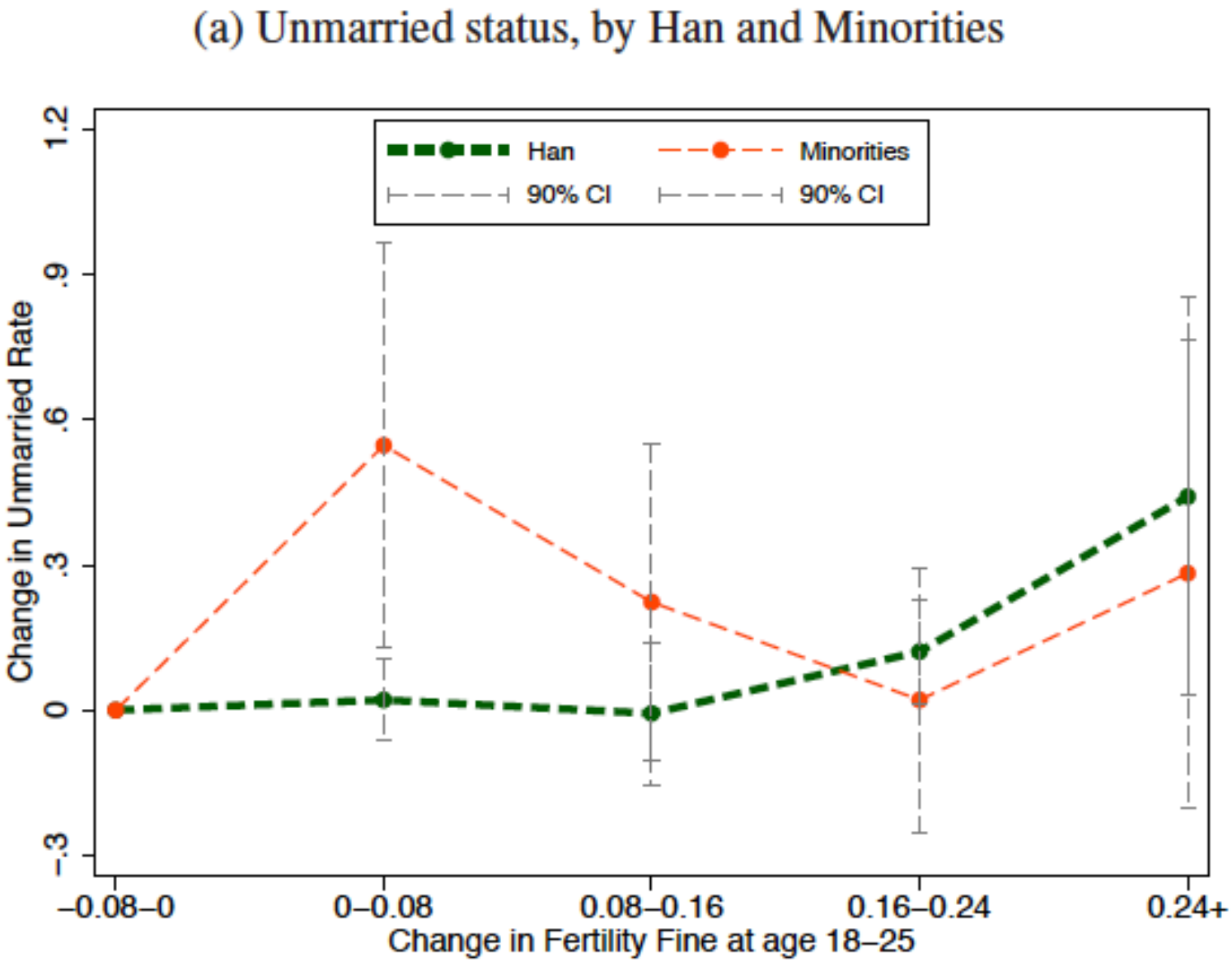
Sample	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample			Married sample		
	Full	Han	Minority	Full	Han	Minority
Panel A: Marriage outcomes						
Unmarried (%)	4.62	4.44	6.57			
	(21.00)	(20.59)	(24.78)			
H-M marriage (%)				2.94	1.61	17.38
				(16.88)	(12.58)	(37.89)
H-H marriage (%)				90.10	98.39	
				(29.86)	(12.58)	
M-M marriage (%)				6.96		82.62
				(25.45)		(37.89)
Panel B: Demographics and Education levels						
Minority (%)	8.64			8.42		
	(28.10)			(27.78)		
Male (Yes = 1)	0.50	0.50	0.51	0.49	0.49	0.49
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
Urban (Yes = 1)	0.41	0.43	0.26	0.41	0.42	0.26
	(0.49)	(0.49)	(0.44)	(0.49)	(0.49)	(0.44)
Age	39.40	39.49	38.42	39.82	39.91	38.89
	(8.21)	(8.21)	(8.21)	(8.03)	(8.02)	(8.04)
Observations	5,677,311	5,223,157	454,154	4,692,977	4,330,059	362,918

NOTE: *The data source is Census 2000 and 2005 Population Study sample.* Sampling weights applied. Standard deviations are in parentheses.

Behavioral Responses to the OCP (1)

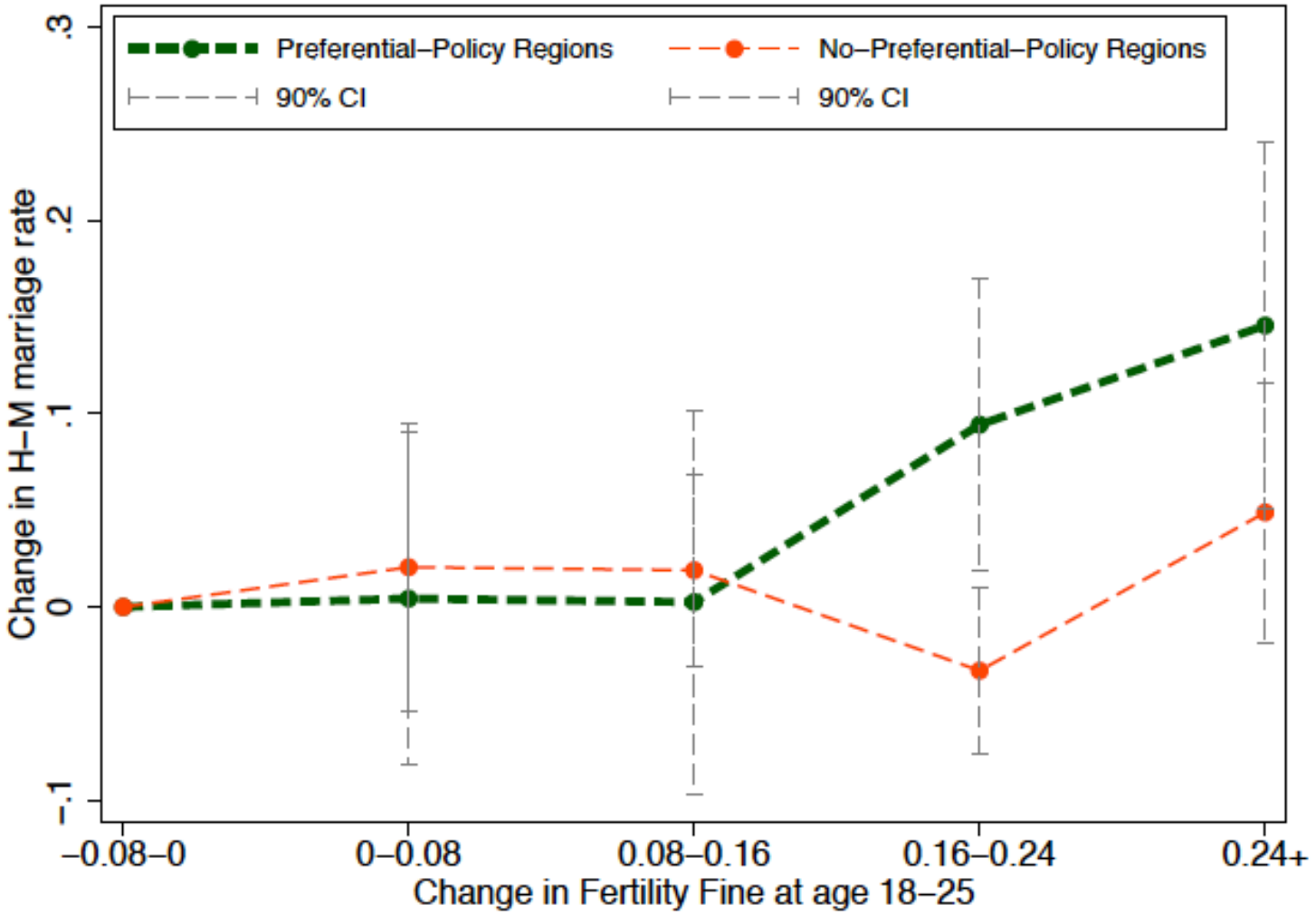
- We divide the sample into 248 groups, based on the region, ethnicity group and census year.
- Within each group, we calculate the changes in the OCP penalties at ages 18-25 in two consecutive birth cohorts, as well as the changes in marriage market outcomes.
- We then plot the changes in the marriage outcomes against the changes in the fertility penalties.

Behavioral Responses to the OCP (2)



Behavioral Responses to the OCP (3)

(b) H-M marriage, by Preferential-Policy or No-Preferential Policy Regions



Econometric Model

- Estimate the impact of OCP fines on the outcomes :

$$Y_{ipbt} = \beta_0 + \beta_1 Fine_{pb}^{18-25} + Edu_i + \delta_{gbt} + \delta_{ph} + T_{ph} + \varepsilon_i$$

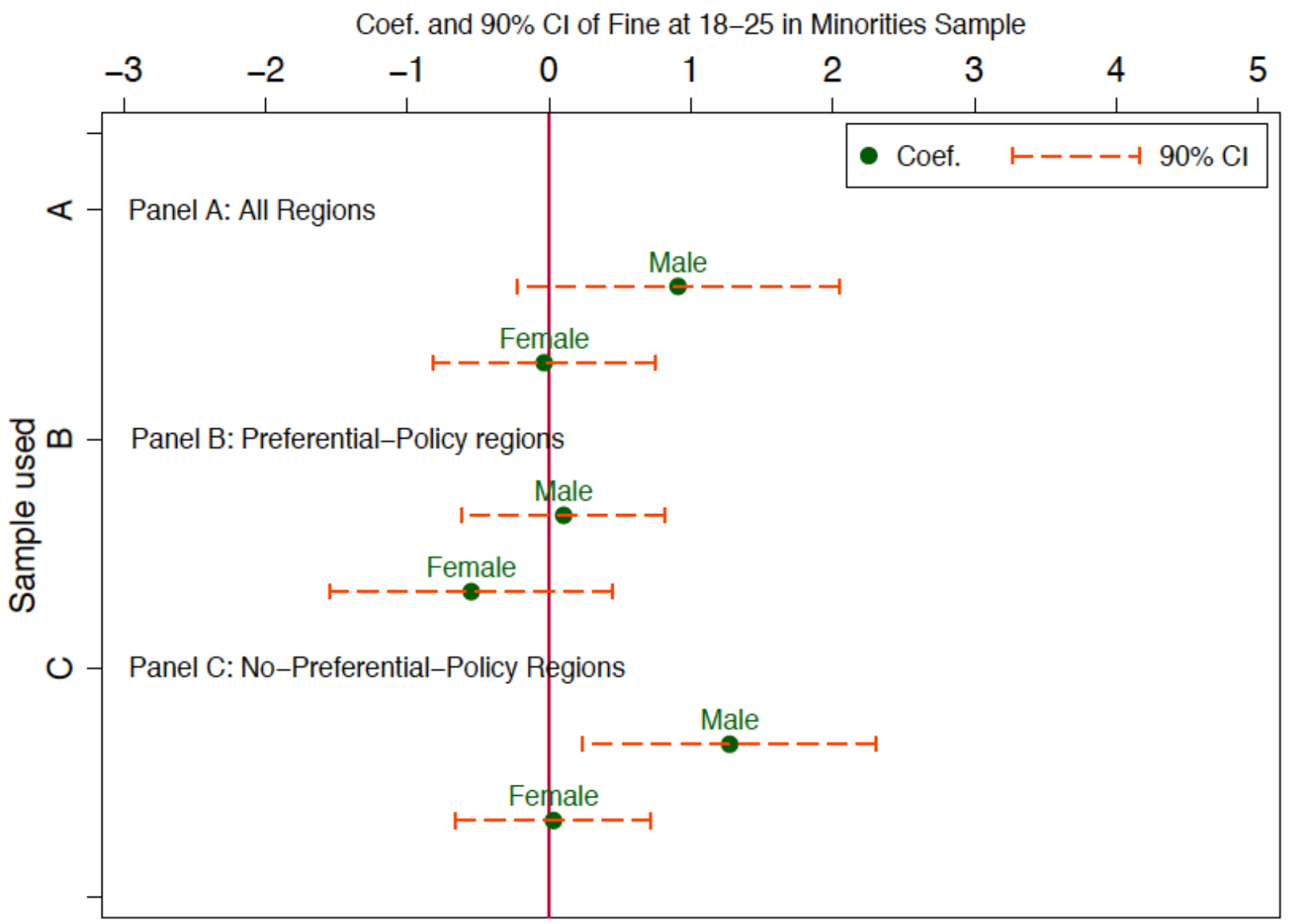
  - The dependent variable, $\boldsymbol{Y_{ipbt}}$, is the marriage outcome variable of an individual *i* of birth cohort *b* in province *p* and census year t.
  - $\boldsymbol{Fine_{pb}^{18\text{-}25}}$: the mean value of the fertility penalties rate in province *p* for birth cohort *b* when aged 18-25.
  - $\boldsymbol{Edu_i}$ are a group of dummies for educational level of individual *i*.
  - $\boldsymbol{\delta_{gbt}}$ are a set of demographic variables, including dummies of gender(*g*), birth cohort(*b*), and survey year(*t*), and all the interactions of these three.
  - $\boldsymbol{\delta_{ph}}$ are a set of regional variables, including the dummies for *hukou* province (*p*), type of hukou (*h*) and the interactions of the two.
  - $\boldsymbol{T_{ph}}$ are other regional time-variant factors: (1) the male and female proportions of minorities of birth cohort *b* in province *p,* and their interactions with regional dummies (δ_{ph}); (2) the regional specific (i.e., province and type of hukou) linear trends in year of birth.

Results: the OPC penalties vs. Unmarried Status

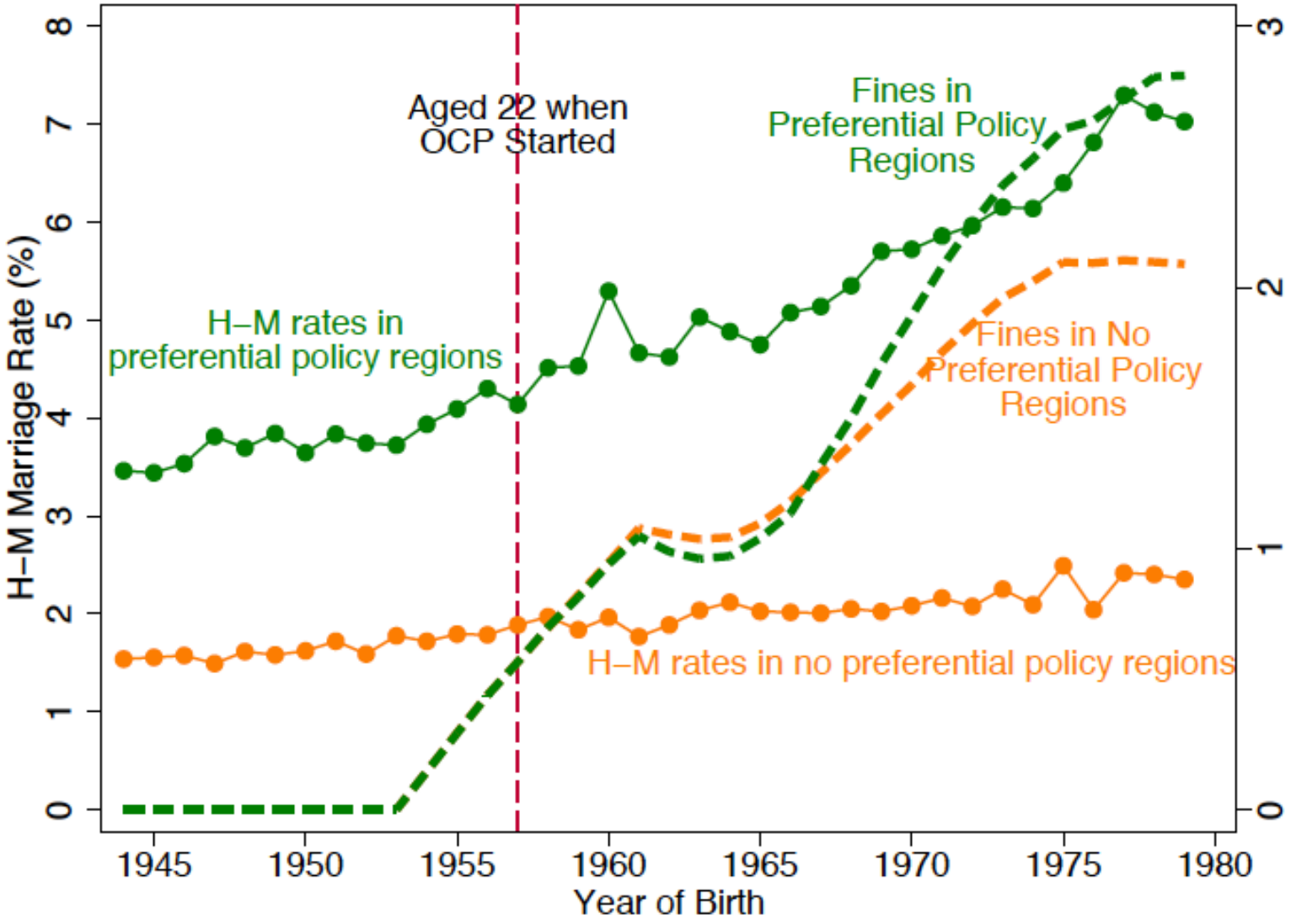
	(1)	(2)	(3)
Dependent variable	Unmarried status (Yes = 100)		
Sample	Full sample	Preferential-policy regions	No-preferential policy regions
Panel A: Han sample			
Mean of Dep. Var.	4.44	4.95	4.21
Fertility penalties	1.702**	0.764**	2.037**
at age 18-25	(0.172)	(0.220)	(0.200)
	[0.511]	[0.541]	[0.572]
Observations	5,223,157	1,622,652	3,600,505
R-squared	0.105	0.107	0.106
Panel B: Minority sample			
Mean of Dep. Var.	6.57	6.61	6.49
Fertility penalties	0.380	-0.283	0.581
at age 18-25	(0.231)	(0.234)	(0.298)
	[0.519]	[0.417]	[0.421]
Observations	454,154	289,864	164,289
R-squared	0.124	0.116	0.145

OCP Penalties vs. Unmarried Status (Han)

OCP Penalties vs. Unmarried Status (Minority)



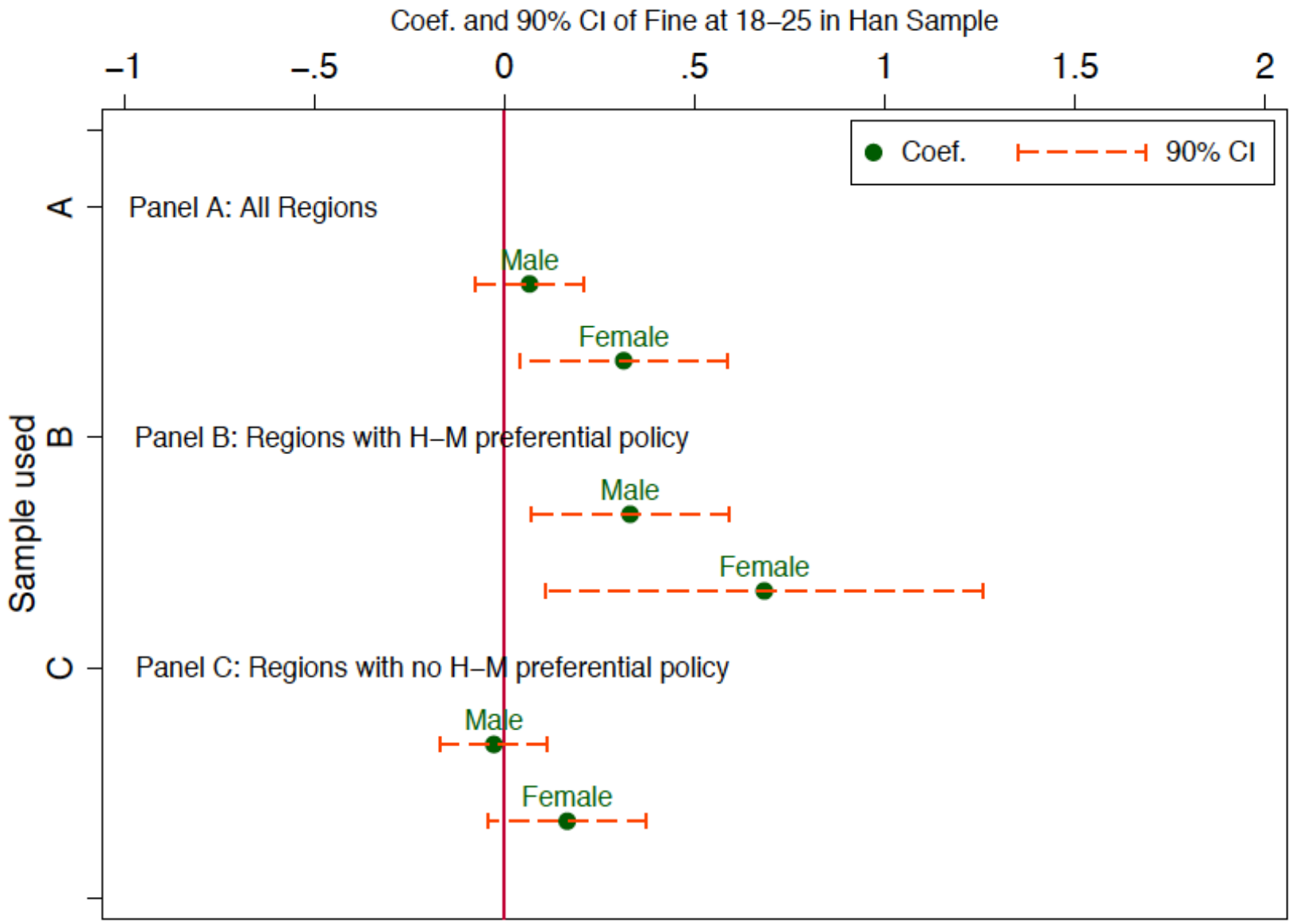
OCP Penalties & H-M Marriage rate



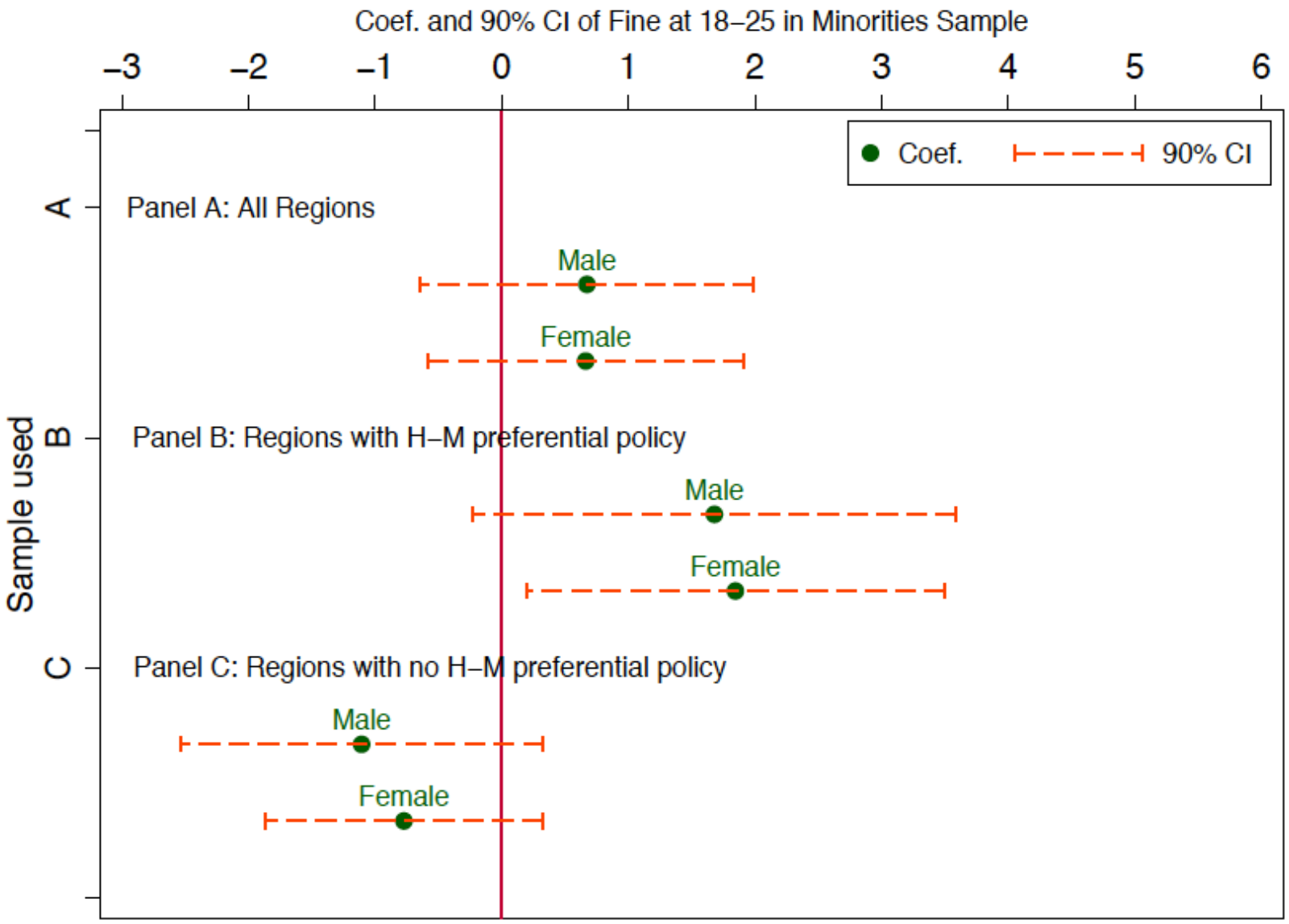
Results: OCP Penalties vs. H-M Marriage

	(1)	(2)	(3)
Dependent variable	Han-Minorities Marriage (Yes = 100)		
Sample	Full sample	Preferential-policy regions	No-Preferential policy regions
Panel A: Han sample			
Mean of Dep. Var.	1.61	3.00	1.01
Fertility penalties	0.189**	0.508**	0.0642
at age 18-25	(0.0512)	(0.112)	(0.0486)
	[0.112]	[0.240]	[0.0539]
Observations	4,330,058	1,320,072	3,009,986
R-squared	0.038	0.037	0.028
Panel B: Minority sample			
Mean of Dep. Var.	17.4	14.3	23.7
Fertility penalties	0.661*	1.753**	-0.913
at age 18-25	(0.317)	(0.429)	(0.511)
	[0.741]	[1.067]	[0.608]
Observations	362,914	231,661	131,252
R-squared	0.153	0.133	0.164

OCP Penalties vs. H-M Marriage (Han)



OCP Penalties vs. H-M Marriage (Minority)



“Transfers” within H-M couples

- The preferential policy for H-M couples could be thought as endowing each minority with a birth quota, which can be only traded with Han spouse in the marriage market. The upper bound of the value of such a “quota” is the OCP penalty rate.

- Education is an pre-marital investment and predicts higher household income (Chiappori et al., 2009).

- We trim the sample to those H-M couples, and conduct the following regression separately by Hans and minorities:

$$Education_{ipbt}^{spouse} = \alpha_0 + \alpha_1 Fine_{pb}^{18-25} + Edu_i + \delta_{gbt} + \delta_{ph} + T_{ph} + \varepsilon_i$$

Results: OCP vs. Education of Han spouse

Dependent variable	(1)	(2)	(3)
	Education Level of Spouse (1-5, larger for higher education)		
Sample	Full sample	Preferential-policy regions	No-Preferential policy regions
Panel A: Minorities in the H-M marriages			
Fertility penalties	0.026**	0.040**	0.013
at age 18-25	(0.010)	(0.015)	(0.014)
	[0.014]	[0.032]	[0.015]
Observations	63,005	34,566	28,439
Panel B: Han people in the H-M marriages			
Fertility penalties	0.002	-0.006	0.018
at age 18-25	(0.011)	(0.015)	(0.017)
	[0.012]	[0.022]	[0.011]
Observations	63,005	34,566	28,439

Welfare Analysis: # of unauthorized children

	(1)	(2)	(3)
Dependent variable	Number of Unauthorized births		
Sample	Han-Han Couples	Han-Minority Couples	Minority-Minority Couples
Fertility penalties at age 18-25	-0.0198*	-0.00254	0.000151
	(0.00917)	(0.00934)	(0.000159)
	[0.0364]	[0.0105]	[0.000185]
Observations	4,263,273	133,372	296,327
R-squared	0.257	0.268	0.049

NOTE: The data source is Census 2000 and 2005 Population Study sample. The covariates are the same as those in Table 2. Sampling weights are applied. Robust standard errors in parentheses are clustered at province-year of birth level. More conservative standard errors in brackets are clustered at province level.

*** p<0.01, * p<0.05*

Welfare Analysis: the calculation of welfare loss

	(1)	(2)	(3)	(4)	(5)
Ethnicity i	Han		Minority		Total welfare
Ethnicity j	Han	Minority	Han	Minority	gain/loss
Panel A: Basic statistics in the data					
(P_i) Prop. of i	0.93		0.07		-
(r_m^i) Married rate of i	0.96	0.96	0.94	0.94	-
(r_{ij}^i) Prop. of i married to j	0.98	0.02	0.17	0.83	-
(c_{ij}) unauthorized births	0.45	0.21	0.21	0.00	-
Panel B: Estimated Elasticities with respect to penalties					
(e_m^i) Married rate of i	-0.018	-0.018	-0.004	-0.004	-
(e_{ij}^i) Marriage $i-j$	-0.002	0.118	0.039	-0.008	-
(e_{ij}^c) unauthorized births	-0.044	-0.012	-0.012	0.000	-
Panel C: Welfare gain/loss of unit change in fine rate (% of yearly household income)					
Marriage Distortion	-0.80		0.12		-0.73
Fertility Reduction	-1.85		-0.04		-1.73
Total	-2.65		0.08		-2.46

Conclusion

- Empirical Findings:
  - The higher the OCP penalties at age 18-25, the higher the unmarried rate is, especially for Han People.
  - An increase in the penalty rate induces more H-M marriages, but only in the preferential-policy regions.
  - The minorities in the interethnic marriages are more likely to marry highly-educated Han spouses when the penalty rate is higher in the presence of preferential policies.

- Welfare Analysis: the OCP distorted the marriage market and caused a welfare loss approximately equal to 0.73% of the yearly household income, which captures about the 30 percent of the total OCP-caused loss.

Thank You!