Marriage and Misallocation: Evidence from 70 Years of US History

Jay Eui-Jung Lee

London School of Economics

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Motivation

- Once married, women often shift their time from the labor market to home production

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- Once married, women often shift their time from the labor market to home production
- Is this shift optimal for productivity?
  - Specialization à la Becker
- Or does it lead to misallocation?
  - Traditional gender roles make labor allocation deviate from productivity-maximizing choice

Research question

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- Compare marrieds & singles in structural model matched to US data

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- **Empirical facts motivating focus on marriage**
- **Build & calibrate structural model**
- **Reduced form exercise to validate model & explore dynamics**

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  - Measure by how much gender roles affect marrieds' LFP choice
    - Women: 40% "norms tax" on market wage in 1940 $\rightarrow$ 20% in 2000
    - Men: 45% "norms tax" on home prod value in 1940 $\rightarrow$ 10% in 2000
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    - Men: 45% "norms tax" on home prod value in 1940 $\rightarrow$ 10% in 2000
  - Perform counterfactuals to quantify the effects of the norms taxes
    - If constrained at 1940 level, married women of 2000 would work 17% less and earn 13% less
    - Aggregate market and non-market output drops by 2%
- **Reduced form exercise to validate model & explore dynamics**

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  - Long-run effects of casualties consistent with model predictions, in a story of cultural change

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  - WW2 casualties as a temporary shock to female labor supply
  - Long-run effects of casualties consistent with model predictions, in a story of cultural change
  - How do norms change? Exploring the dynamic evolution of norms using WW2 results

Contributions

1. **Aggregate implications of misallocation**
   - Restuccia and Rogerson (2008), Hsieh and Klenow (2009), Hsieh et al (2019), Erosa et al (2017)

   → Misallocation due to gender norms associated with marriage

2. **Rising Female LFP due to cultural change**
   - Fernandez and Wong (2014), Fernandez, Fogli, Olivetti (2004), Fernandez (2013), Fogli and Veldkamp (2011)

   → Quantify the effect of weakening gender roles on female LFP

3. **Gender identity & Economics of the family**
   - Akerlof and Kranton (2000), Bertrand, Kamenica and Pan (2015)
   - Chiappori, Salanie and Weiss (2017), Chiappori, Iyigun, and Weiss (2009)

   → Embed gender identity into model of household decision-making

4. **How gender roles change**
   - Kuziemko, Pan, Shen, Washington (2017), Fernandez (2013), Fogli and Veldkamp (2011)

   → Use natural experiment to explore how norms change

Roadmap

1. Motivating facts
2. Model
3. Parameter inference
4. Counterfactuals
5. Reduced form exercise
6. Conclusions

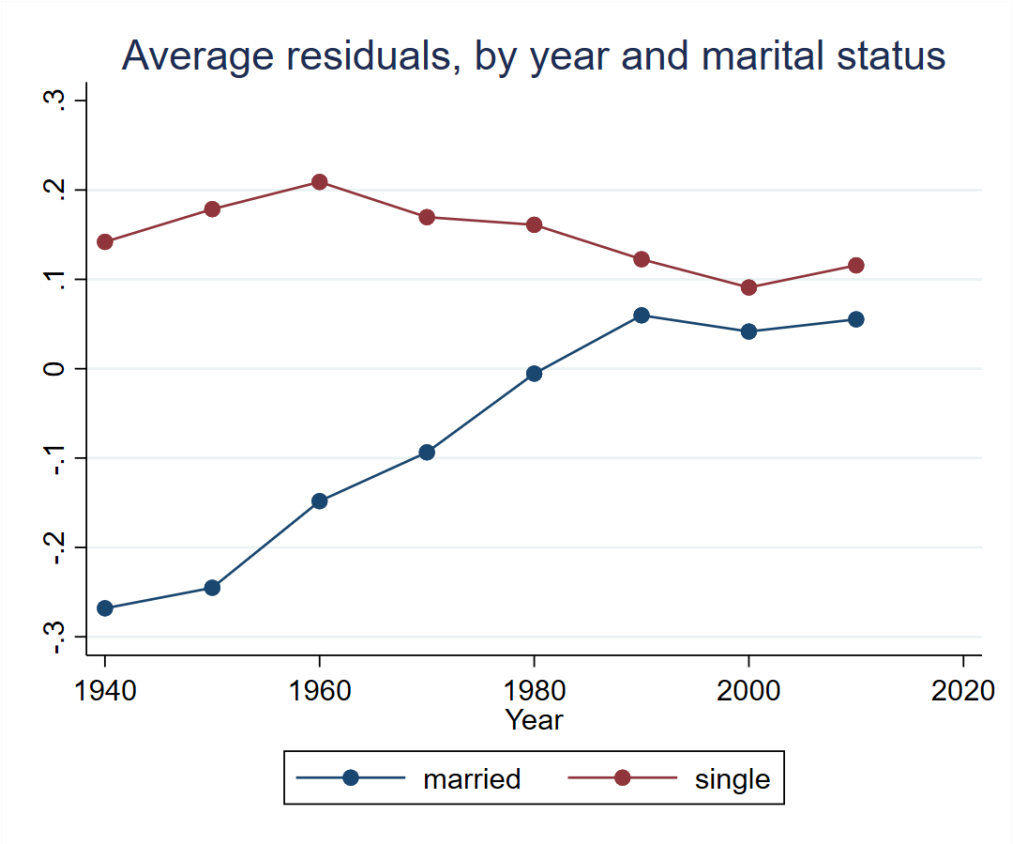
Motivating facts

1. "Unexplained" LFP rose for married women

Residuals from:

$$LFP_{it} = X_{it}\beta + \epsilon_{it}$$

X_{it}: dummies for age, education, race, # of children



Source: US Census

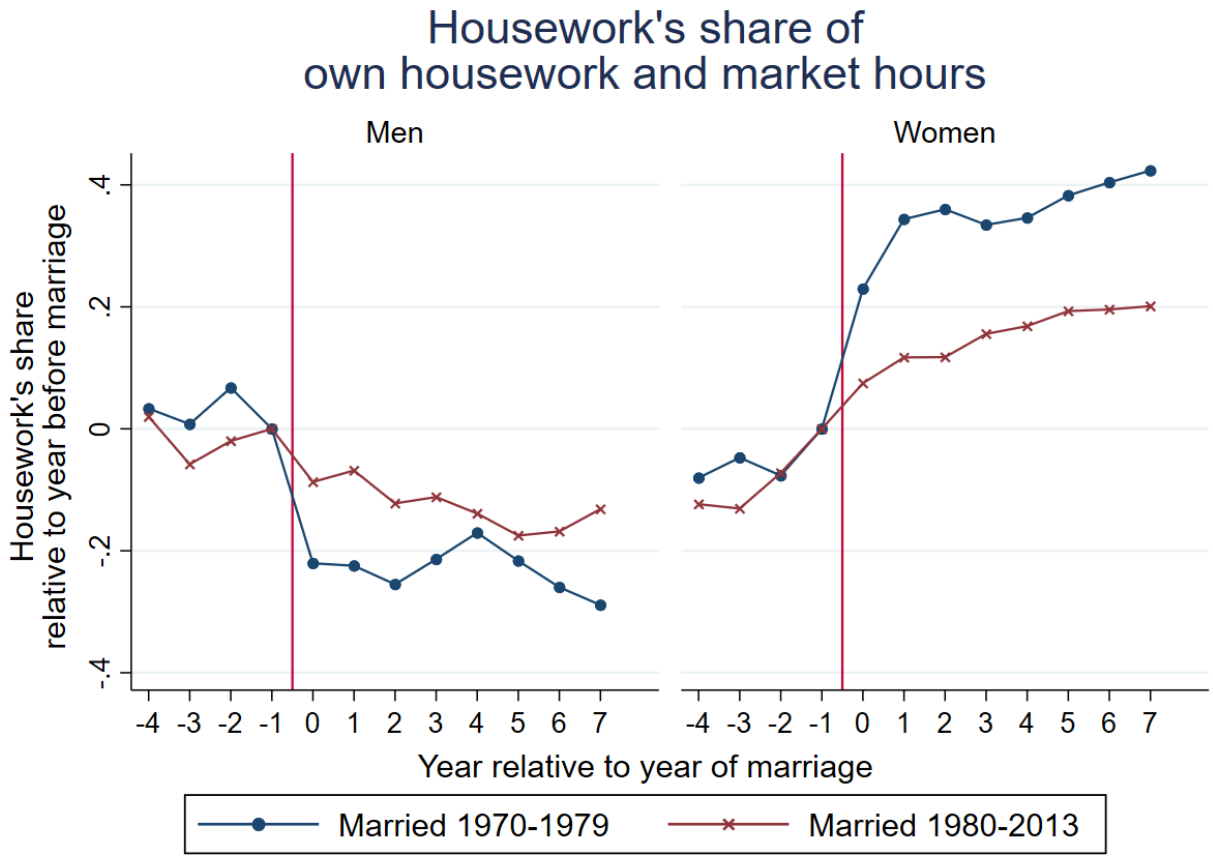
→ LFP trend for married and single women different. Maybe culture?

2. Once married, time use skewed towards traditional roles

Individual i of age a in year y at event time t:

$$housework_{iayt} = \sum_{j \neq -1} \alpha_j \cdot \mathbb{1}(j = t) + \beta_a + \gamma_y + \nu_{ist}$$

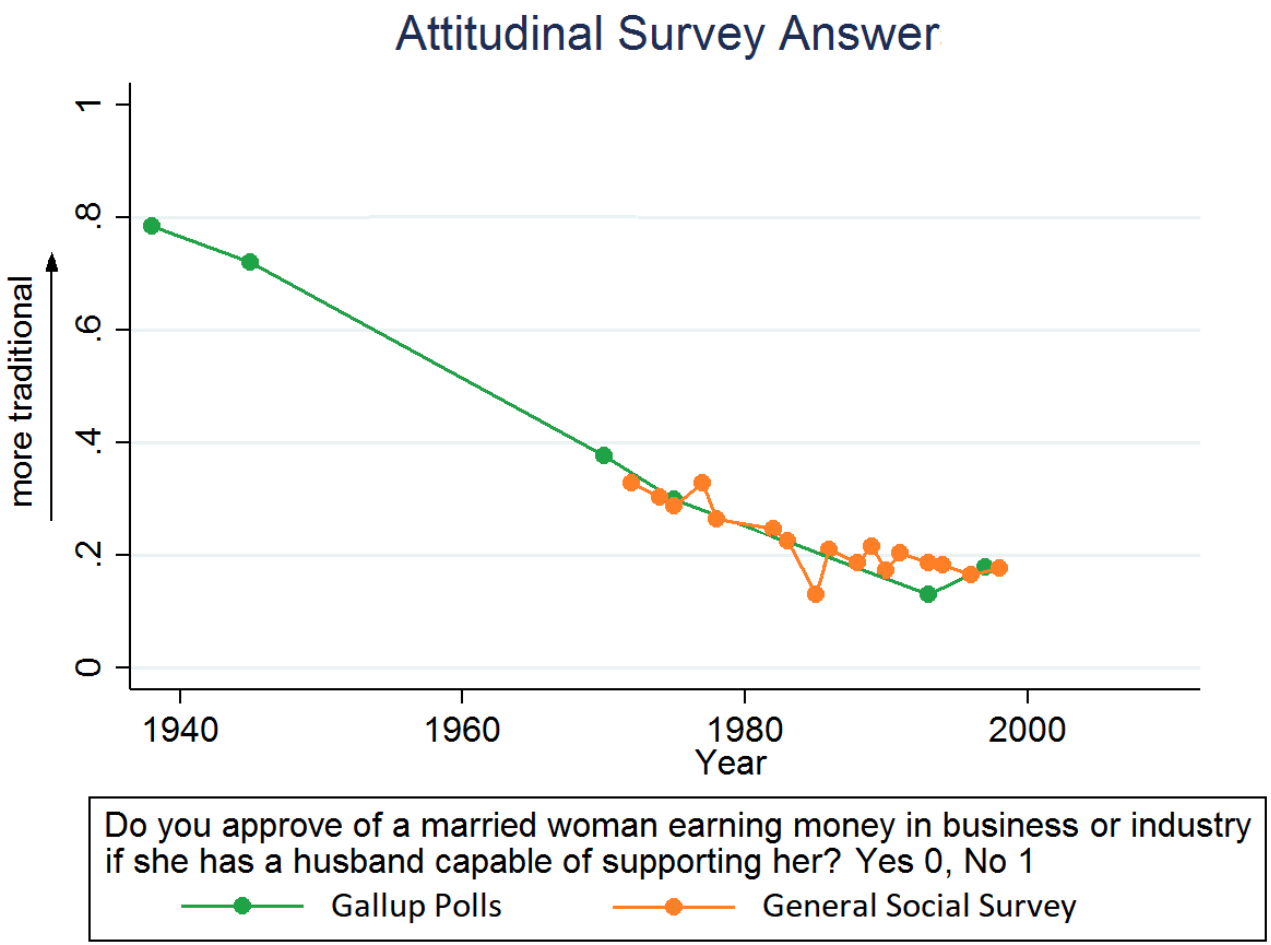
$$\frac{\hat{\alpha}_t}{\mathbb{E}[\hat{\beta}_a + \hat{\gamma}_y | t]}$$



Source: Panel Survey of Income Dynamics, 1968-2015

Absolute diff-men | Absolute diff-women

3. Less traditional attitudes on gender roles over time



Other questions World

The Need for a Model

- Measure by how much gender roles affect marrieds' LFP choice
- Account for selection into marriage and labor supply
- Explore general equilibrium effects
- Conduct counterfactuals $\rightarrow$ quantify agg importance of gender roles

Model

Three-period model with three choices

t=1: **Education** as forward-looking investment choice Why education?

- Returns to edu: marriage market & labor market

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t=2: **Marriage matching** à la Becker

- Gains: public goods, risk sharing, marital bliss
- Costs: subject to gender roles

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t=3: **Labor supply**: market work vs. home production

- Married couples get disutility (a.k.a. "norms tax", τ) from wives working in the market, and husbands working at home

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Solve model backwards.

$[t = 3]$ Economic utilities (Adaptation of Chiappori et al, 2017)

Marrieds

- Husband m and wife f. $i \in \{m, f\}$ gets

$$u_i(Q, C_i, L_f, L_m) = u\left(Q \cdot \left[C_i - \tau_{Fi} w_f L_f - \tau_{Mi} h_m (1 - L_m)\right]\right)$$

- Q: public consumption
- C_i: i's private consumption
- L_i: i's LFP indicator
- w_i: i's market wage
- h_i: i's home productivity
- τ_F: disutility from $L_f = 1$
- τ_M: disutility from $L_m = 0$

Singles

- Not subject to gender roles. i gets

$$\hat{u}_i(\hat{Q}_i, \hat{C}_i) = u\left(\hat{Q}_i \cdot \hat{C}_i\right)$$

general form

$[t = 3]$ Economic utilities (Adaptation of Chiappori et al, 2017)

Marrieds

- Husband m and wife f. $i \in \{m, f\}$ gets

$$u_i(Q, C_i, L_f, L_m) = \ln(Q) + \ln\left(C_i - \tau_{Fi} w_f L_f - \tau_{Mi} h_m (1 - L_m)\right)$$

- Pareto efficiency $\Rightarrow$ couple maximizes joint output together UMP

➜ Indirect utilities denoted v_i

Singles

- Not subject to gender roles. i gets

$$\hat{u}_i(\hat{Q}_i, \hat{C}_i) = \ln(\hat{Q}_i) + \ln(\hat{C}_i)$$

➜ Indirect utilities denoted $\hat{v}_i$

Extra 1

- Because of TU, couple maximizes joint marital output for Pareto efficiency.
- The set of Pareto efficient allocations is an ordinal concept, so any cardinalization of u can be used for defining joint marital output

$$\max_{Q,C_f,C_m} Q\big(C_f + C_m - \tau_F w_f L_f - \tau_M h_m(1-L_m)\big)$$

$$\text{s.t.} \quad pQ + C_f + C_m = w_m L_m + w_f L_f + h_m(1-L_m) + h_f(1-L_f)$$

$$\Rightarrow C^* \equiv (C_m + C_f)^* = pQ^* + \tau_F w_f L_f + \tau_M h_m(1-L_m)$$

$$Q^* = \frac{w_m L_m + (1-\tau_F) w_f L_f + (1-\tau_M) h_m(1-L_m) + h_f(1-L_f)}{2p}$$

Extra 2

- How is C split? Efficient risk sharing implies

$$\frac{\partial u_m}{\partial C_m} = \mu \frac{\partial u_f}{\partial C_f}$$

$$\Rightarrow C_m^* = \frac{1}{1+\mu} pQ + \tau_{Fm} w_f L_f + \tau_{Mm} h_m (1 - L_m)$$

$$C_f^* = \frac{\mu}{1+\mu} pQ + \tau_{Ff} w_f L_f + \tau_{Mf} h_m (1 - L_m)$$

- Then the indirect utilities are

$$v_m = 2 \ln Q + \ln p + \ln \frac{1}{1+\mu}$$

$$v_f = 2 \ln Q + \ln p + \ln \frac{\mu}{1+\mu}$$

- So the couple maximizes Q, hence the optimal labor supply decisions

$[t = 3]$ Optimal labor supply choice: market vs. home

- **Singles** (person i)

$$\widehat{L}_i^* = \mathbb{1}(w_i \geq h_i)$$

- **Marrieds** (husband m, wife f)

$$L_f^* = \mathbb{1}[(1 - \tau_F) \cdot w_f \geq h_f]$$

$$L_m^* = \mathbb{1}[w_m \geq (1 - \tau_M) \cdot h_m]$$

- Wages and home productivities
  1. group (G) component: (gender $\times$ schooling pair $\times$ family composition)
  2. idiosyncratic abilities: $\varepsilon_i^w, \varepsilon_i^h \overset{i.i.d.}{\sim}$ Fréchet(θ)

$$w_i = \bar{w}_G \cdot \varepsilon_i^w, \quad h_i = \bar{h}_G \cdot \varepsilon_i^h$$

Firms in the labor market

- A representative firm in this economy produces the aggregate market output Y^{mkt} from male and female labor:

$$Y^{mkt} = AL = A(L_M + L_F)$$

  - L_g: total efficiency units of labor of gender g

$[t = 2]$ Marriage market choice (Building on Choo and Siow, 2006)

- S types of men and women, defined by their edu level
- Idiosyncratic preference for each spousal type $\overset{i.i.d.}{\sim}$ type I extreme-value
- In equilibrium (Supply = Demand),

$$\frac{n^{qr}}{\sqrt{n^{q0}n^{0r}}} = \frac{\mathbb{E}(v_m^{qr}) + \mathbb{E}(v_f^{qr}) - \mathbb{E}(\hat{v}_m^{q}) - \mathbb{E}(\hat{v}_f^{r})}{2} + \psi^{qr}$$

  - $\mathbb{E}(v_m^{qr})$: expected economic utility of type-q man married to type-r woman
  - ψ^{qr}: noneconomic gains to (q, r) match

Extra

$$\begin{aligned}\frac{n^{qr}}{\sqrt{n^{q0}n^{0r}}} &= \frac{\mathbb{E}(v_m^{qr})+\mathbb{E}(v_f^{qr})-\mathbb{E}(\hat{v}_m^{q})-\mathbb{E}(\hat{v}_f^{r})}{2}+\psi^{qr} \\ &= 2A^{qr}-\hat{A}_m^q-\hat{A}_f^r+\Psi^{qr}\end{aligned}$$

where

$$\mathrm{A}^{qr} \equiv \mathbb{E}\left[\ln\left(w_m L_m^* + (1-\tau_F^{qr})w_f L_f^* + (1-\tau_M^{qr})h_m(1-L_m^*) + h_f(1-L_f^*)\right)\right]$$

$$\sum_{\mathcal{K}} d_t^{qr}(\mathcal{K})\mathbb{E}\left[\ln\right.$$

- ▶

$[t = 1]$ Educational choice

- Idiosyncratic preference for each edu level $\overset{i.i.d.}{\sim}$ type I extreme-value
- Women's educational choice:

$$\mathbb{P}(\text{edu } r) = \frac{\exp\{U_F^r\}}{\sum_{s=1}^{S} \exp\{U_F^s\}}$$

where

$$U_F^r = \sum_{q=0}^{S} \left[\frac{n^{qr}}{F^r} \mathbb{E}(v_F^{qr}) \right] - c_F^r$$

  - c_F^r: cost of attaining edu level r for women

Intuition: How agg productivity is affected

When gender norms tax (τ_F) $\downarrow$,

1. **Labor supply**: Marrieds' sorting across work and home better aligned with productivity $\Rightarrow$ productivity $\uparrow$
2. **Marriage**: Marriage becomes more attractive
   - Face norms tax as married $\Rightarrow$ productivity $\downarrow$
   - Receive married wage and home productivity $\Rightarrow$ productivity ?
3. **Education**: More likely to marry & women more likely to work in future
   - If assortative matching on edu, edu $\uparrow$ to match with better partner $\Rightarrow$ productivity $\uparrow$
   - If edu increases market productivity by more than home productivity, women's edu $\uparrow$ $\Rightarrow$ productivity $\uparrow$

Parameter inference

Taking the model to the data

- Model is fitted to
  - US decennial census, 1940-2010
  - Men & women aged 25-54, household heads or spouses of heads
    Economically active age
  - Model matched to data, decade by decade
  - Assume data reflects model steady state
  - **Parameters to be inferred**:
    dispersion of market and home abilities (θ), market productivity ($\bar{w}$), home productivity ($\bar{h}$), norms taxes (τ_F, τ_M), noneconomic gains to each marriage match (ψ), cost of schooling (c)
  - **Variables needed**: market wage, LFP, marital status, education, children
- Cross-validation
  - Various attitudinal surveys (1938-2017) in Roper Polls database

Parameter inference: steps & results

1. θ: MLE based on the distribution of real hourly wages, adjusting for selection into labor market results

   $\rightarrow$ Close to similar estimates in literature (Hsieh et al, 2019)

2. ψ: num of (q,r) matches relative to num of q singles and r singles results

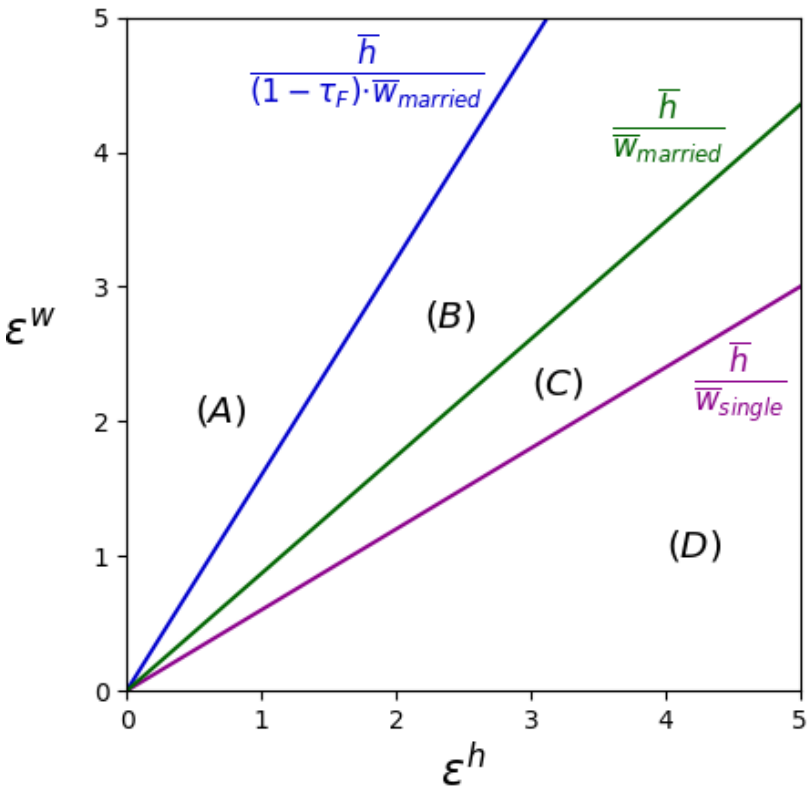
   $\rightarrow$ Higher the closer the spousal education levels are

3. c: frac of men & women with each edu level

   $\rightarrow$ The cost of attaining the highest edu level was larger for women 1940-1990, and overturned in 2000

4. $\bar{w}, \bar{h}, \tau_F, \tau_M$: next slide results

Optimal labor supply decision: market vs home



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$$L_f^* = \mathbb{1}[(1-\tau_F)\cdot w_f \geq h_f]$$

$$L_m^* = \mathbb{1}[w_m \geq (1-\tau_M)\cdot h_m]$$

- **Average wage**

$$\text{avrwage}_G = \overline{w}_G \left(\frac{1}{\text{LFP}_G}\right)^{\frac{1}{\theta}} \Gamma\left(1-\frac{1}{\theta}\right)$$

$$\tau_F = 1 - \frac{\text{avrwage}_{single}}{\text{avrwage}_{married}} \left(\frac{1-\text{LFP}_{single}}{1-\text{LFP}_{married}}\right)^{\frac{1}{\theta}}, \quad \tau_M = 1 - \frac{\text{avrwage}_{married}}{\text{avrwage}_{single}} \left(\frac{1-\text{LFP}_{married}}{1-\text{LFP}_{single}}\right)^{\frac{1}{\theta}}$$

What τ captures

τ: by how much LFP choice of marrieds differ from similar singles, not explained by wage differentials

Includes

- Preference to conform with traditional identity as wife/husband
- Differential preference for home prod for marrieds relative to singles
- Differential non-wage treatment by firms
- Preference for more home-productive women as wife
- Cross-elasticity between husband & wife's LFP spousal dependence
  - Imperfect substitutability of market & home-produced goods
  - Complementarity in leisure

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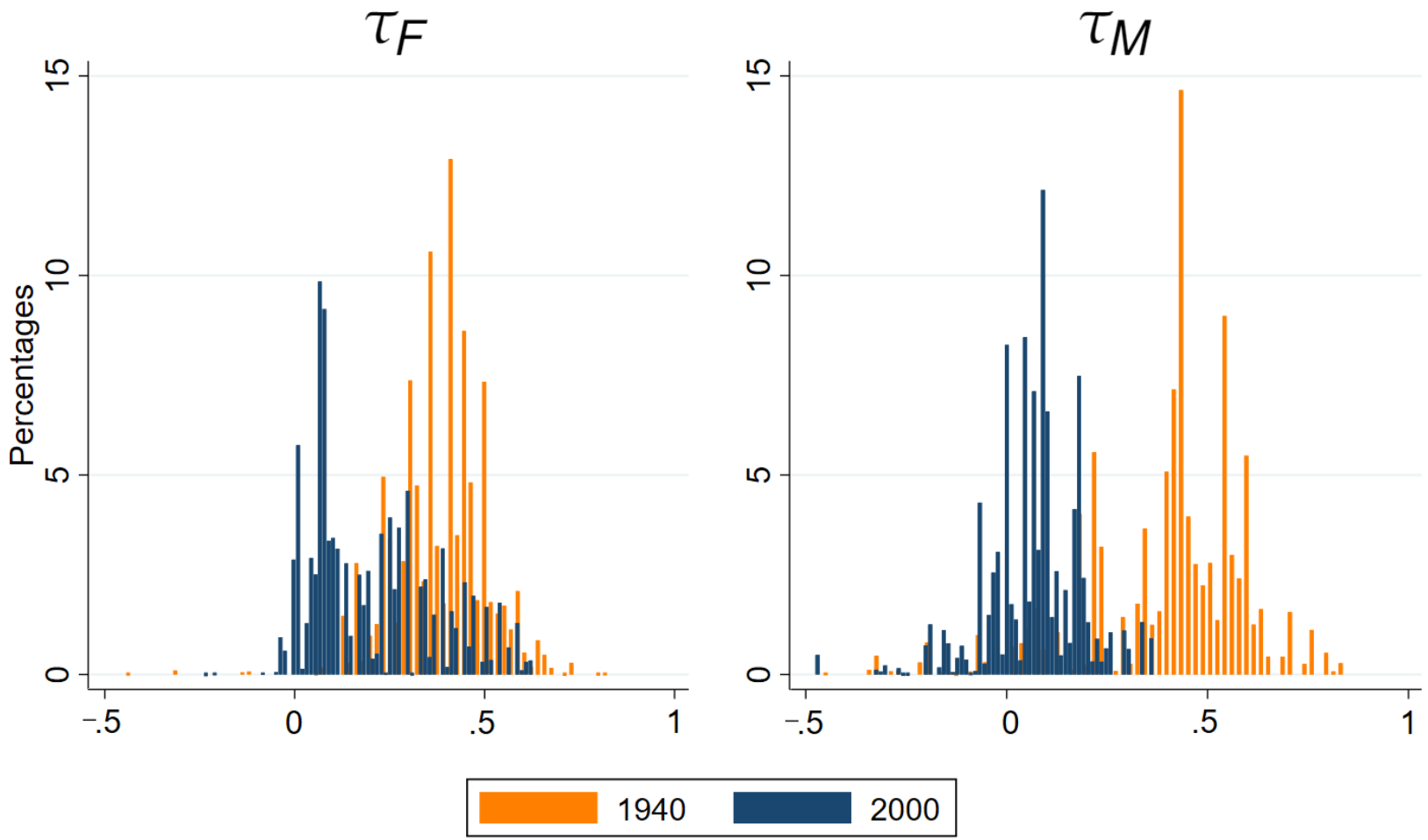
→ Arguably "gender roles"

τ_F, τ_M: gender norms taxes (by group)



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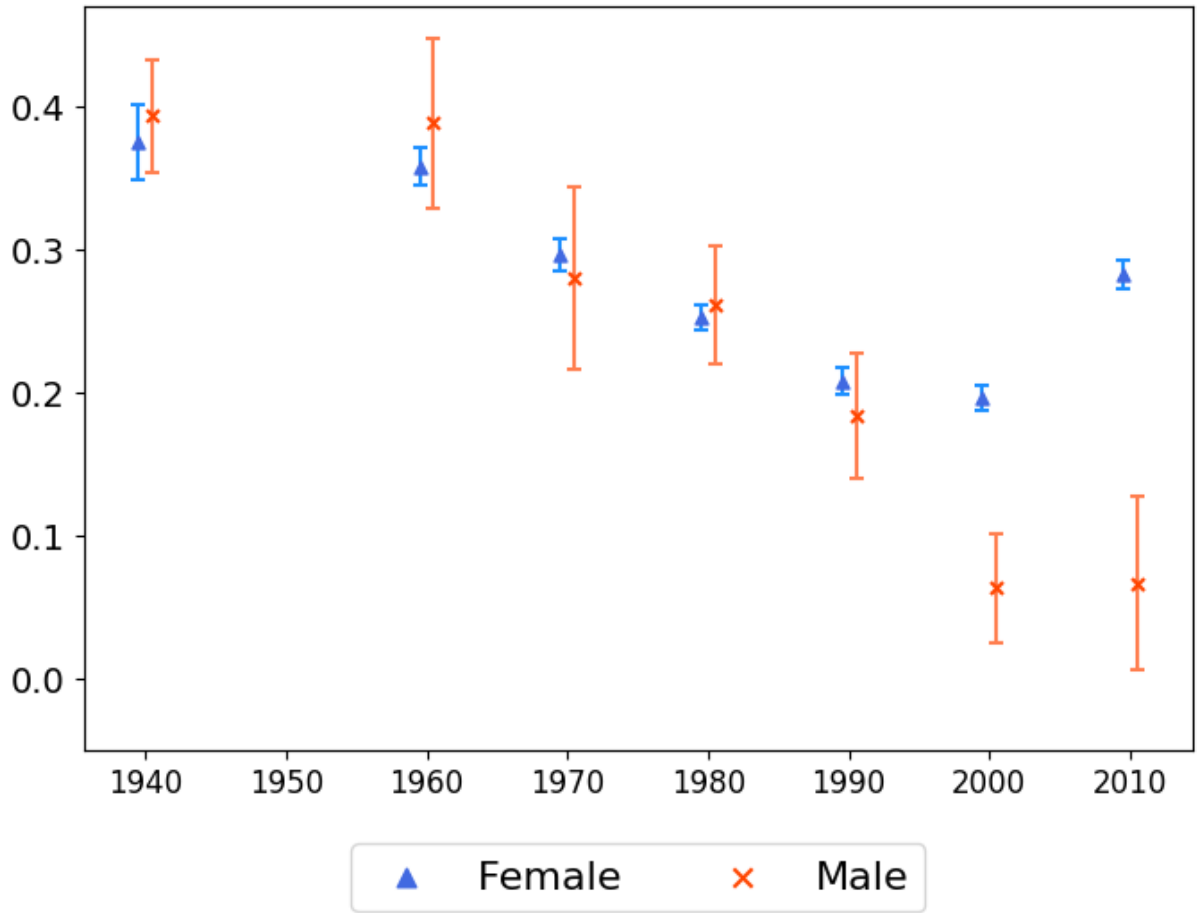


Matches the answers to various attitudinal survey questions on gender roles in marriage becoming less traditional over time

Attitude trend

Cross-check: τ_F correlated with attitudes (state-level)

	Dependent variable			
	τ_F		τ_M	
	average	median	average	median
Regressed on:				
Fraction disapproving of married women working	0.249**	0.282**	0.066	0.024
	(2.21)	(2.21)	(0.26)	(0.09)
Regressed on:				
Composite attitudinal index	0.450***	0.439**	0.097	-0.049
	(2.94)	(2.50)	(0.29)	(-0.18)
N	51	51	51	51

* $p < 0.10$, ** $p < 0.05$,*** $p < 0.01$

t statistics in parentheses; robust standard errors

Higher values of the composite attitudinal index correspond to more traditional attitudes

Each group gets weight equal to empirical probability in computing the average & the median

Corr between attitude & time use | Attitudinal index

Counterfactual simulations

Quantifying the importance of norms

selection into marr

What would have happened in 2000 with female norms tax (τ_F) at 1940 level (% change)?

	Adjustment margins	
	Labor supply	Labor supply, marriage, and education
Education		
Women's years of schooling	-	-1.2
Men's years of schooling	-	-0.6
Selection into marriage		
Marriage rate	-	-18.8
Married women's edu/single women's edu	-	-4.3
Married men's edu/single men's edu	-	-2.3

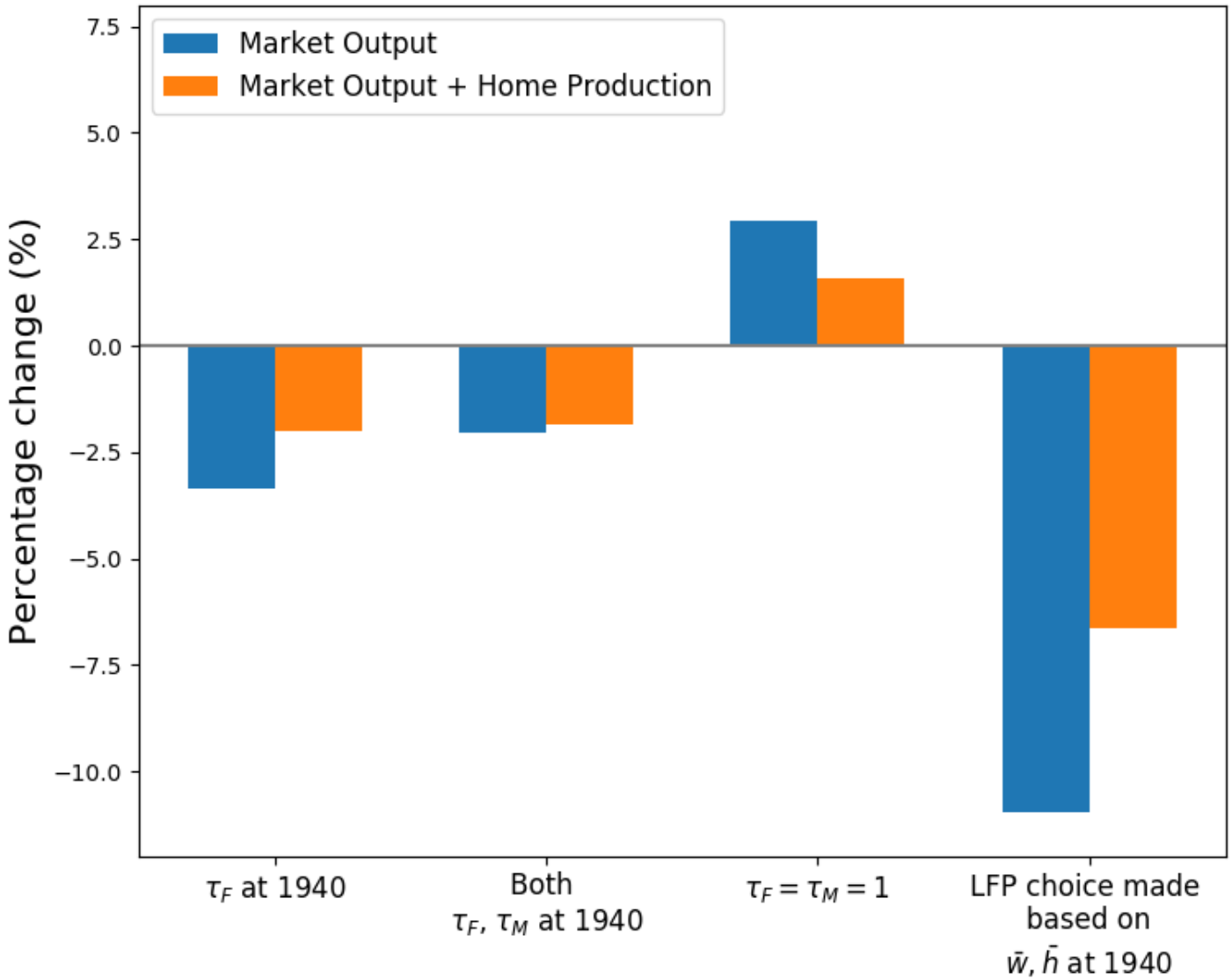
Quantifying the importance of norms

selection into marr

What would have happened in 2000 with female norms tax (τ_F) at 1940 level (% change)?

	Adjustment margins	
	Labor supply	Labor supply, marriage, and education
Labor Force Participation		
Married women's LFP	-13.3	-16.6
Married men's LFP	-	-0.5
Single women's LFP	-	0.3
Single men's LFP	-	0.8
Output per head		
Married women's market output	-6.1	-12.6
Married women's total output	-1.4	-5.6
Married men's market output	-	-2.1
Married men's total output	-	-1.7
Aggregate market output	-1.7	-3.4
Aggregate markt & home output	-0.4	-2.0
Within-household gender earnings gap		
Wife's share of household market income	-5.0	-13.5

Output effects of different counterfactuals $\bar{w}, \bar{h}$



Reduced form exercise

Reduced form exercise to validate model

- Want to verify model predictions when norms change
- BUT, difficult to find *direct* exogenous shock to norms
- Alternative approach: explore effects of a shock that *indirectly* affects norms & check that other variables change in the expected direction

  $\rightarrow$ Suggestive evidence for model validation

WW2 casualties as an indirect shock to gender norms

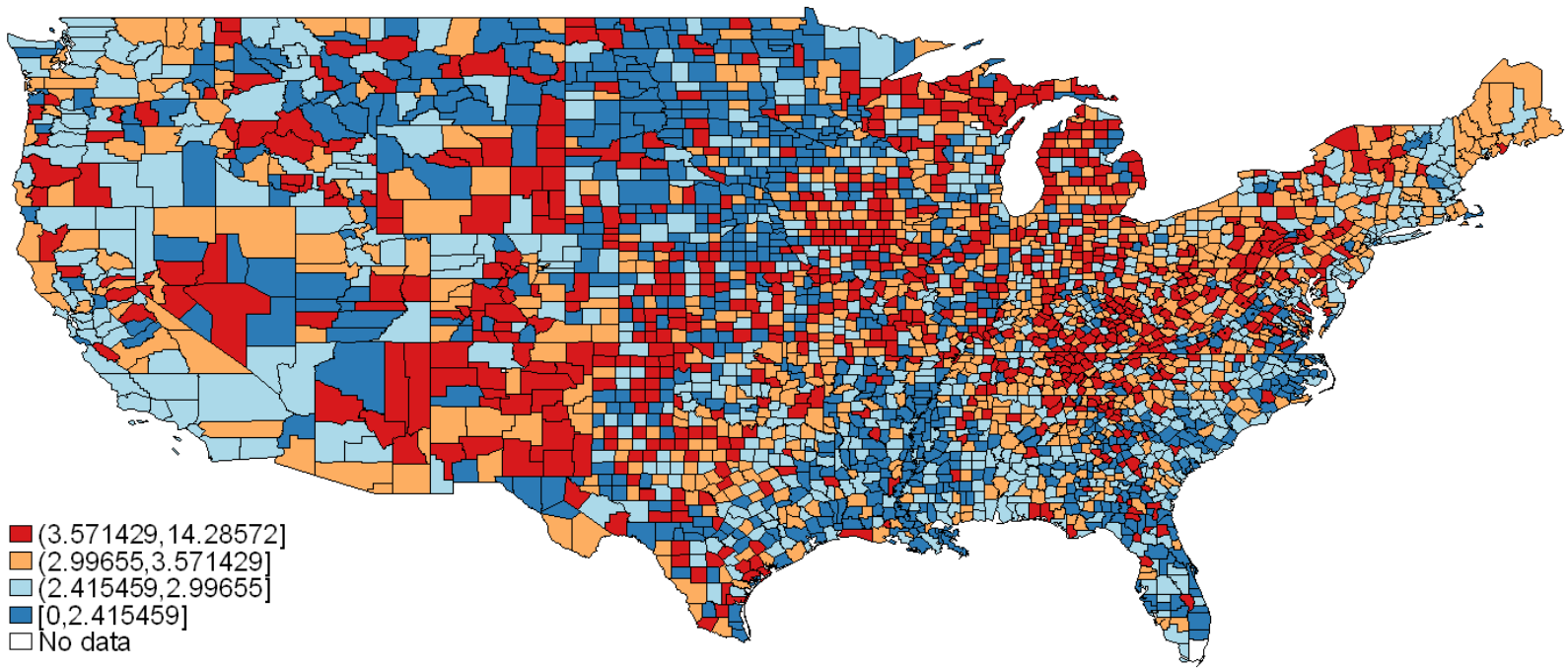
- WW2 induced change in gender norms via temporarily higher FLFP
  (Fernandez, Fogli, and Olivetti, 2004)
- High draftee casualties have two direct effects:
  - labor market: male labor supply $\downarrow$
  - marriage market: widows $\uparrow$

  $\rightarrow$ Through these effects, induce one-off increase in FLFP.
- Gender norms evolve as more women work
  (Fernandez, Fogli, and Olivetti, 2004; Fogli and Veldkamp, 2011; Fernandez, 2013; Bisin and Verdier, 2000 & 2011)
- One-off shock may propagate over the long-term via cultural change

Reduced form empirical specification

- County-level casualty measure:

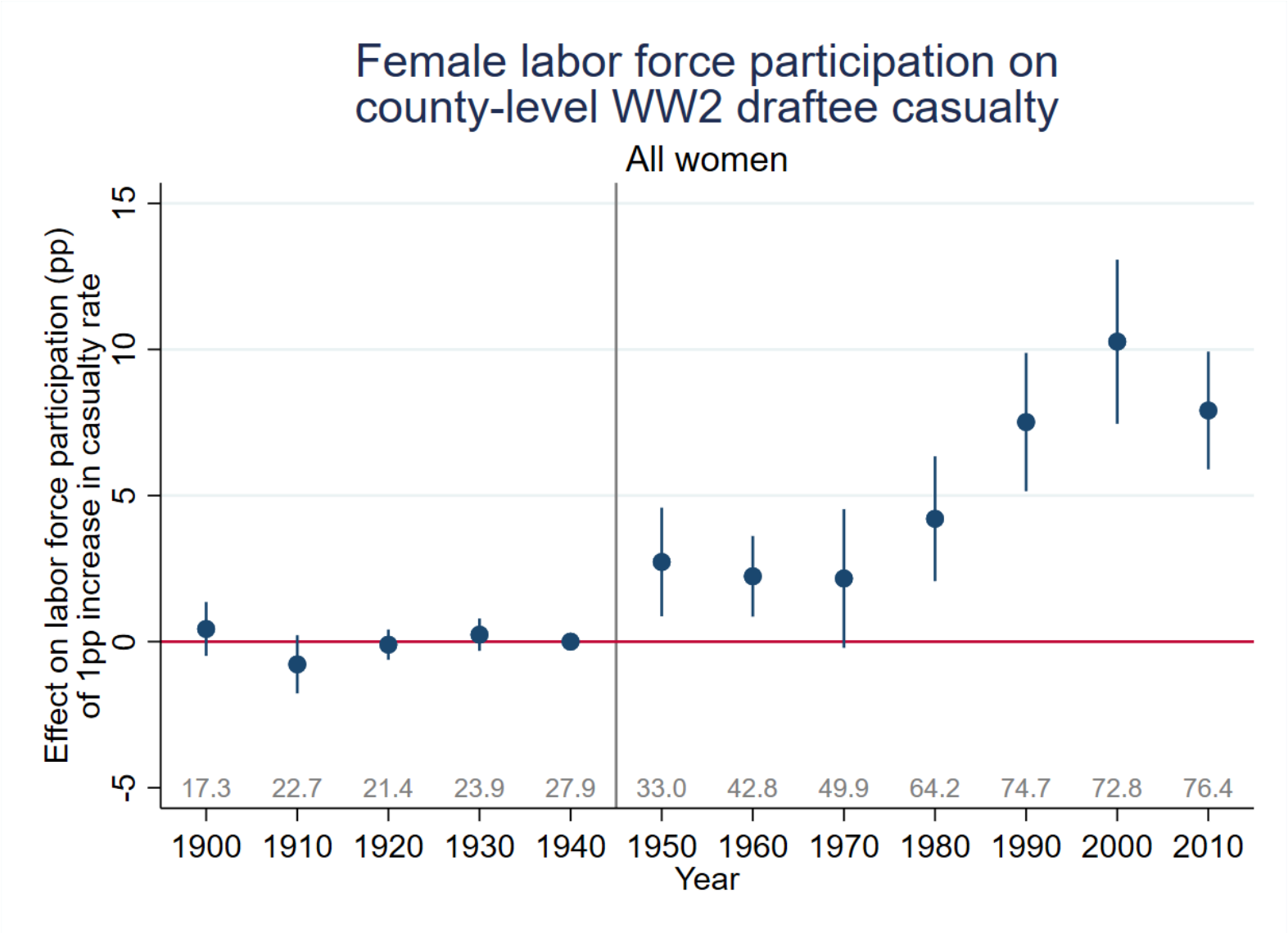
$$casualty_c = \frac{\text{drafted and killed}}{\text{drafted}}$$



- Difference-in-differences framework

$$Y_{ict} = \alpha_c + \lambda_t + \sum_{t \neq 1940} \beta_t \times casualty_c + X_{ict}\gamma + \epsilon_{ict}$$

Female LFP gradually increases



Source: US Decennial Census, 1900-2010

Story of one-off shock to FLFP → long-term cultural change

alternative channels

- Attitudes
  - Attitude index less traditional
- Women's work
  - Gradual ↑ in married women's market work
  - Within household, gradual ↑ in wife's share of hours & income
  - Temporary ↑ in single women's market work

  Only married women affected in the long term
- Men's work
  - Men's employment barely affected
- Marriage
  - Marriage rate ↑
  - Gradual ↑ in average edu of married women

  Gender norm as cost to marriage, stronger for higher ability women
- Wages
  - Female wage ↓

  As more women work, working women less positively selected

Back to model - adding dynamics, using WW2 results

- Dynamics: norms respond to past female labor supply
- Approach: estimate the evolution process of τ_F

$$\begin{aligned} & \underline{\Delta}\tau_{Ft} = f(\underline{\Delta}FLFP_{t-1}, FLFP_{t-1}) + \nu_t \\ \approx \quad & \alpha_0 + \alpha_1 \underline{\Delta}FLFP_{t-1} + \alpha_2 FLFP_{t-1} + \alpha_3 \underline{\Delta}FLFP_{t-1} \cdot FLFP_{t-1} + \nu_t \end{aligned}$$

- Assumptions:
  - Casualties changed FLFP in 1950 and nothing else
  - Effect only propagates via changes in norms
- Estimatimation strategy:
  - α_0-α_3 that minimize

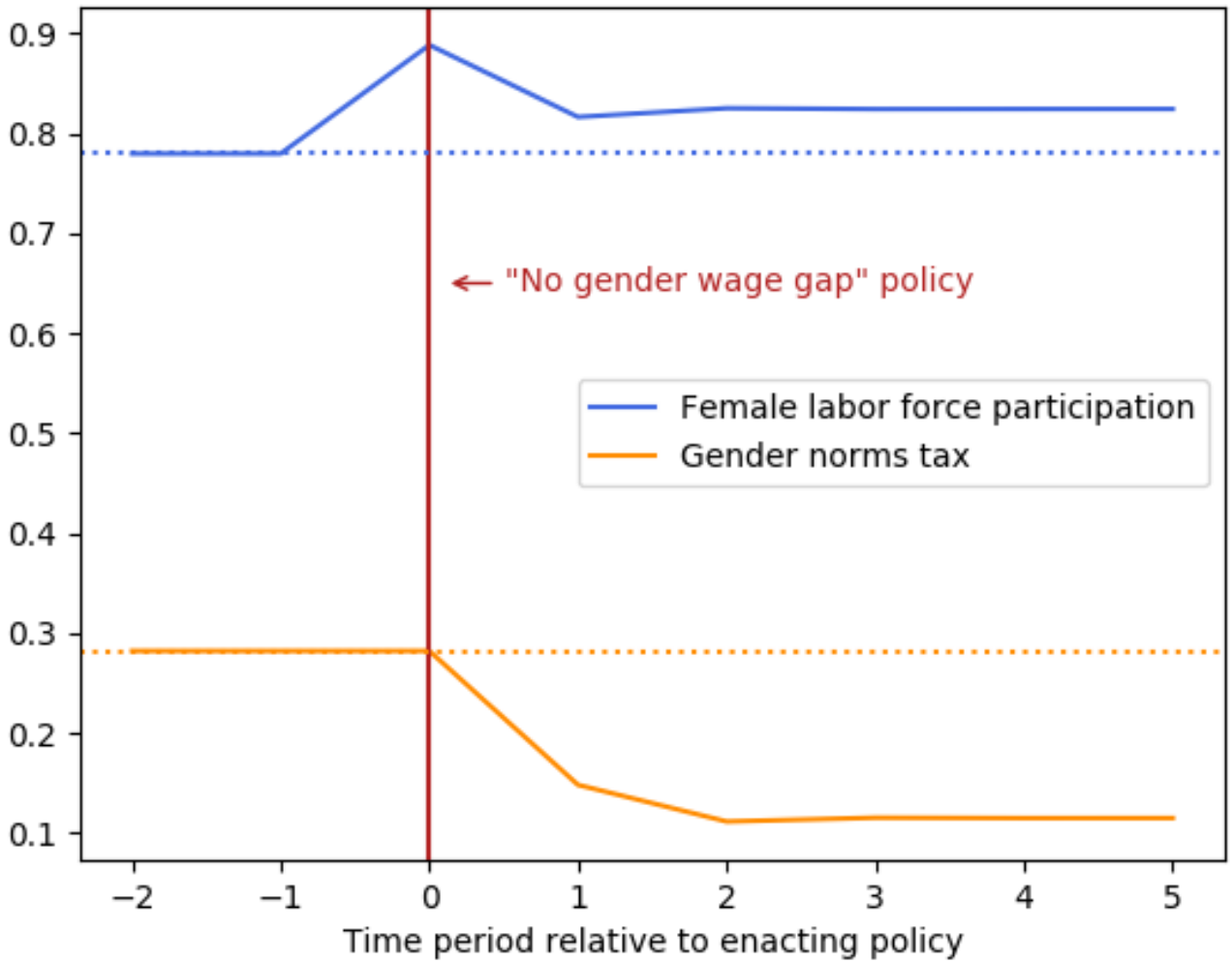
$$\sum_t (\text{DiD coeff, FLFP}_t - \text{change in FLFP}_t \text{ in model due to } \underline{\Delta}\tau_{Ft})^2$$

- Result:

$$\underset{}{\hat{\alpha}_0 = -0.102}, \quad \underset{(0.126)}{\hat{\alpha}_1 = 0.368}, \quad \underset{(0.185)}{\hat{\alpha}_2 = 0.242}, \quad \underset{(5.892)}{\hat{\alpha}_3 = -1.209}, \quad \underset{(7.199)}{}$$

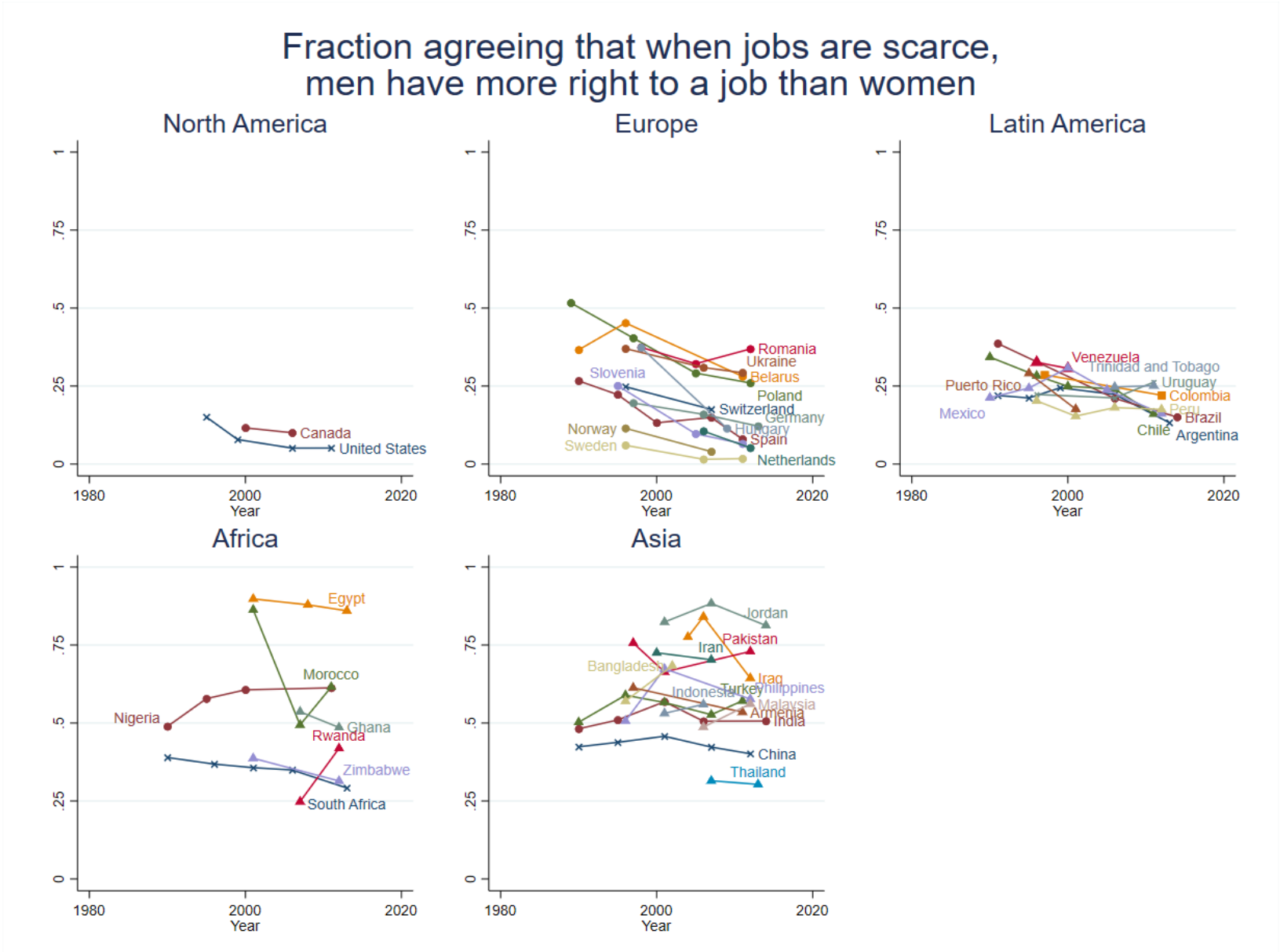
Dynamic counterfactuals

What would happen in 2010 if women were paid male wages, one-off?



Conclusions

Relevance of changing norms around the world



Source: IPUMS International

Conclusion

- We do not learn about development *only* from developing countries
- Rather, we can also learn from a developed country that has undergone large historical changes
  - Gender norms taxes declined significantly in US, 1940-2000
  - Gender norms matter for aggregate productivity
  - One-off policy inducing a large rise in female LFP may bring economy to a new equilibrium with higher female LFP
- 1 in 10 countries of the world have female LFP lower than 1940 US

APPENDIX

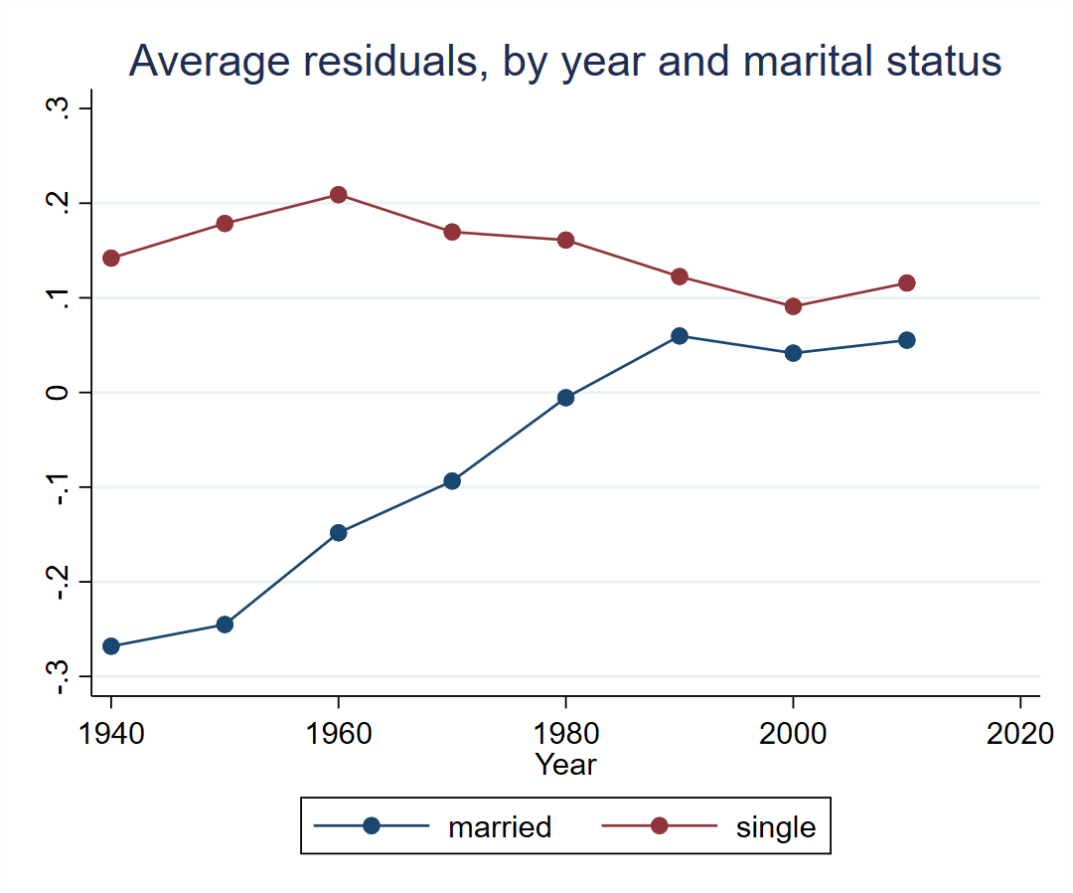
"Unexplained" female LFP, married vs. single

return

Residuals from:

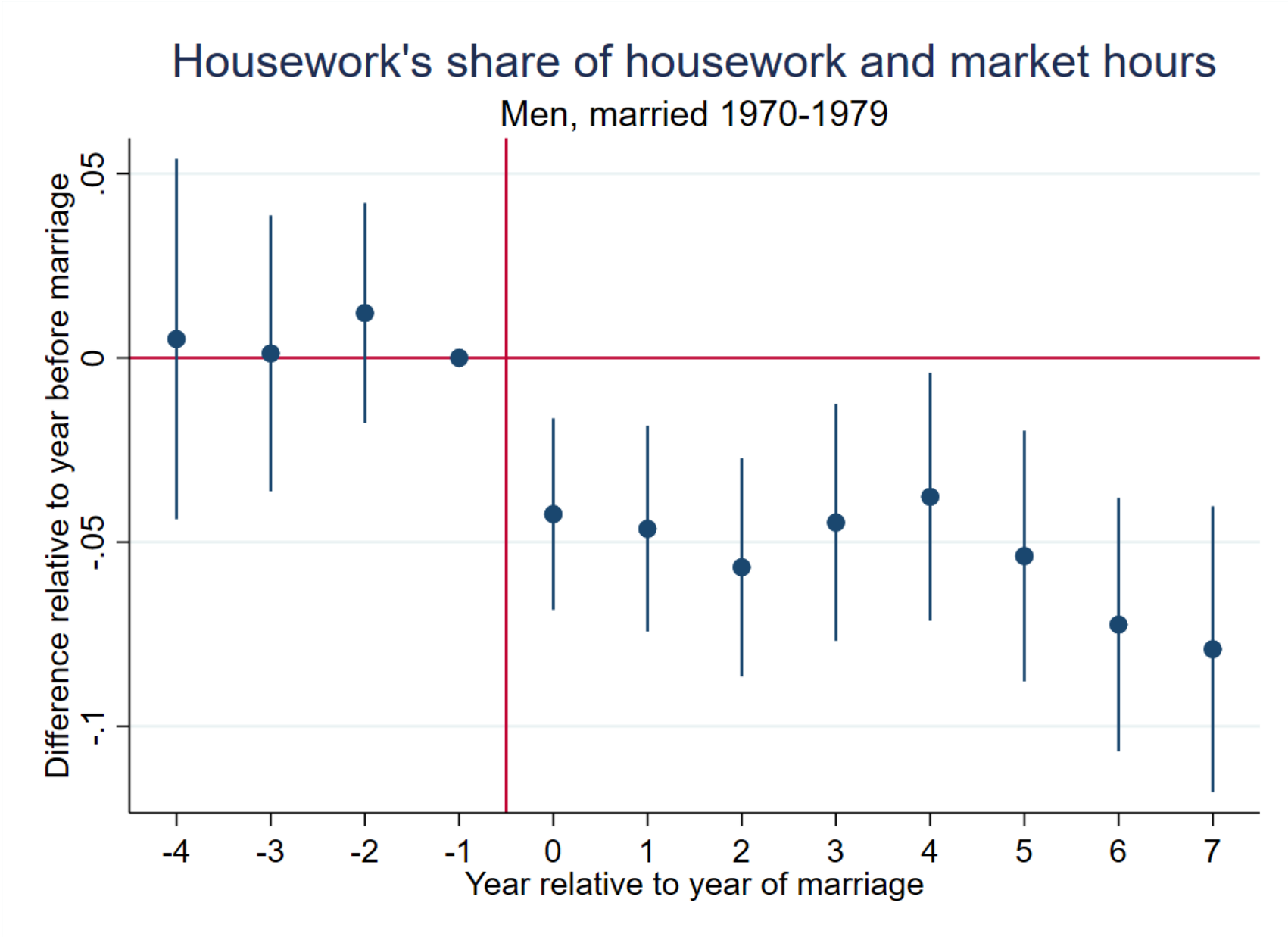
$$LFP_{it} = X_{it}\beta + \epsilon_{it}$$

X_{it}: dummies for age, education, race, # of children



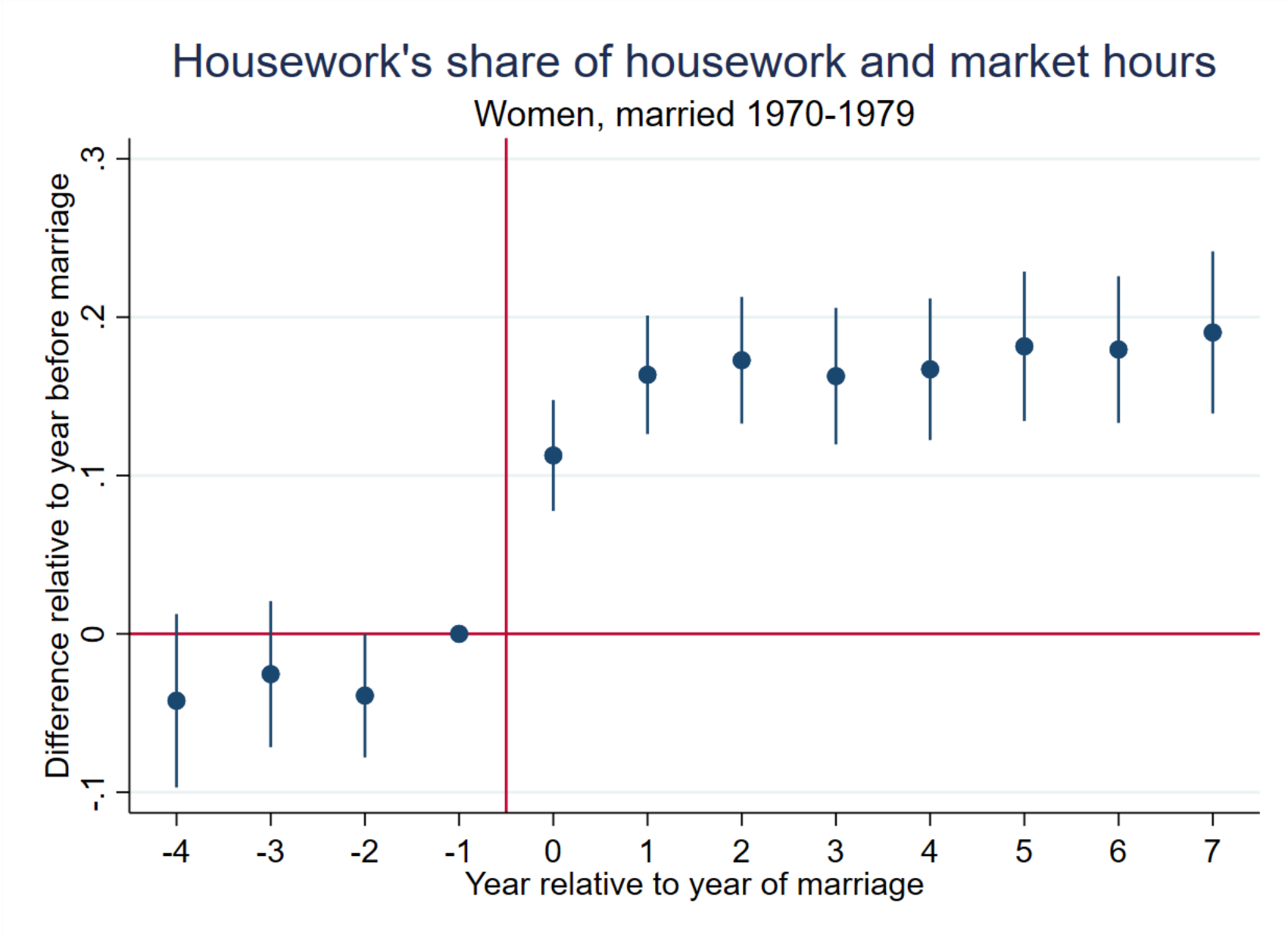
Source: US Census

Division of labor by gender upon marriage



Source: PSID Return

Division of labor by gender upon marriage



Source: PSID Return

2. Corr: traditional attitudes & low married women's LFP

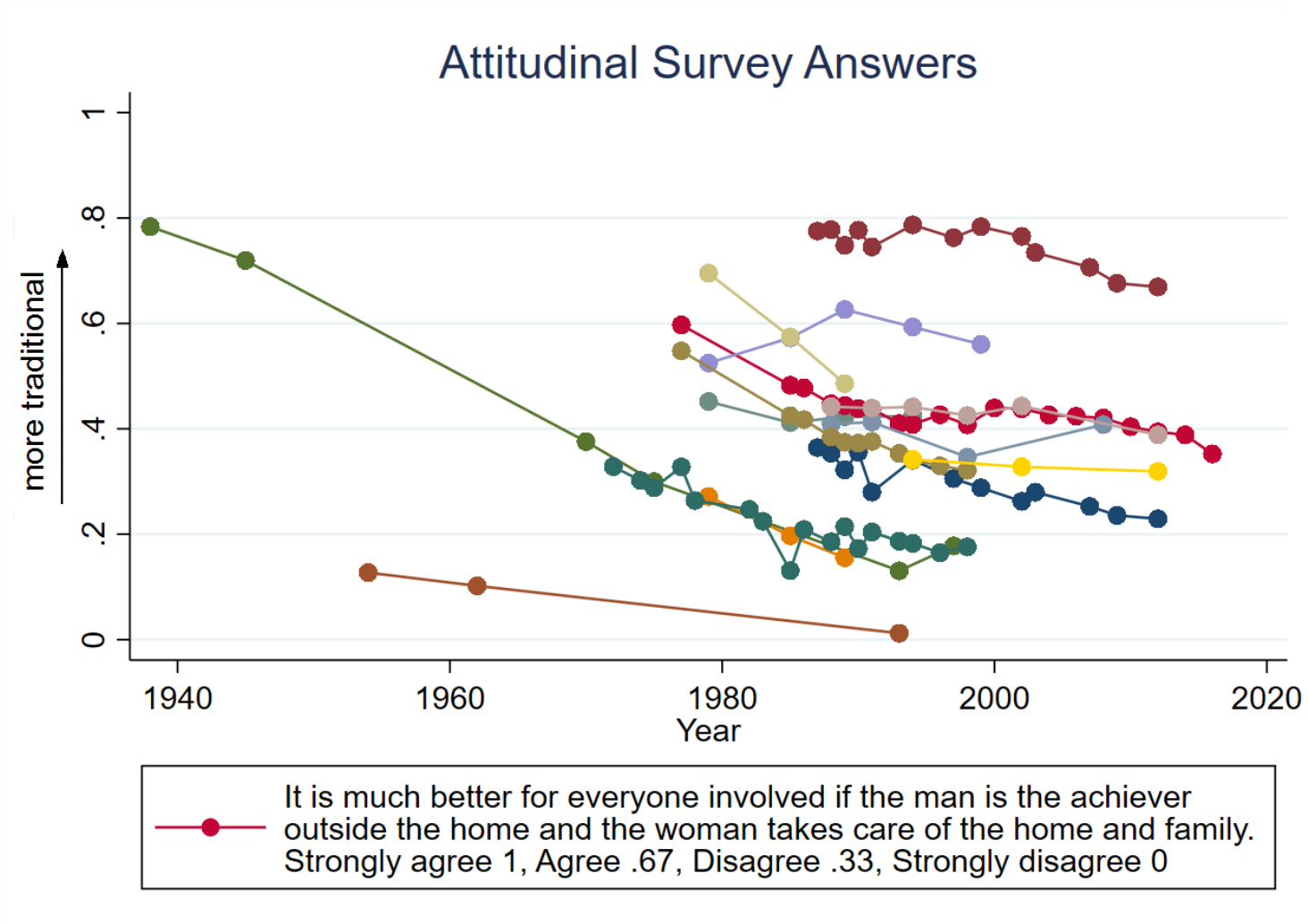
	Dependent variable: Married women's LFP / Single women's LFP	
	(1)	(2)
Fraction agreeing that when jobs are scarce, men have more right to a job than women	-0.436***	-0.959*
	(-3.49)	(-1.75)
Wave in sample	5 (2005-2009)	All (1989-2014)
Wave dummies	-	✓
Country dummies	-	✓
N	41	149

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robust SE for column (1), and SE clustered by country for column (2)

Return

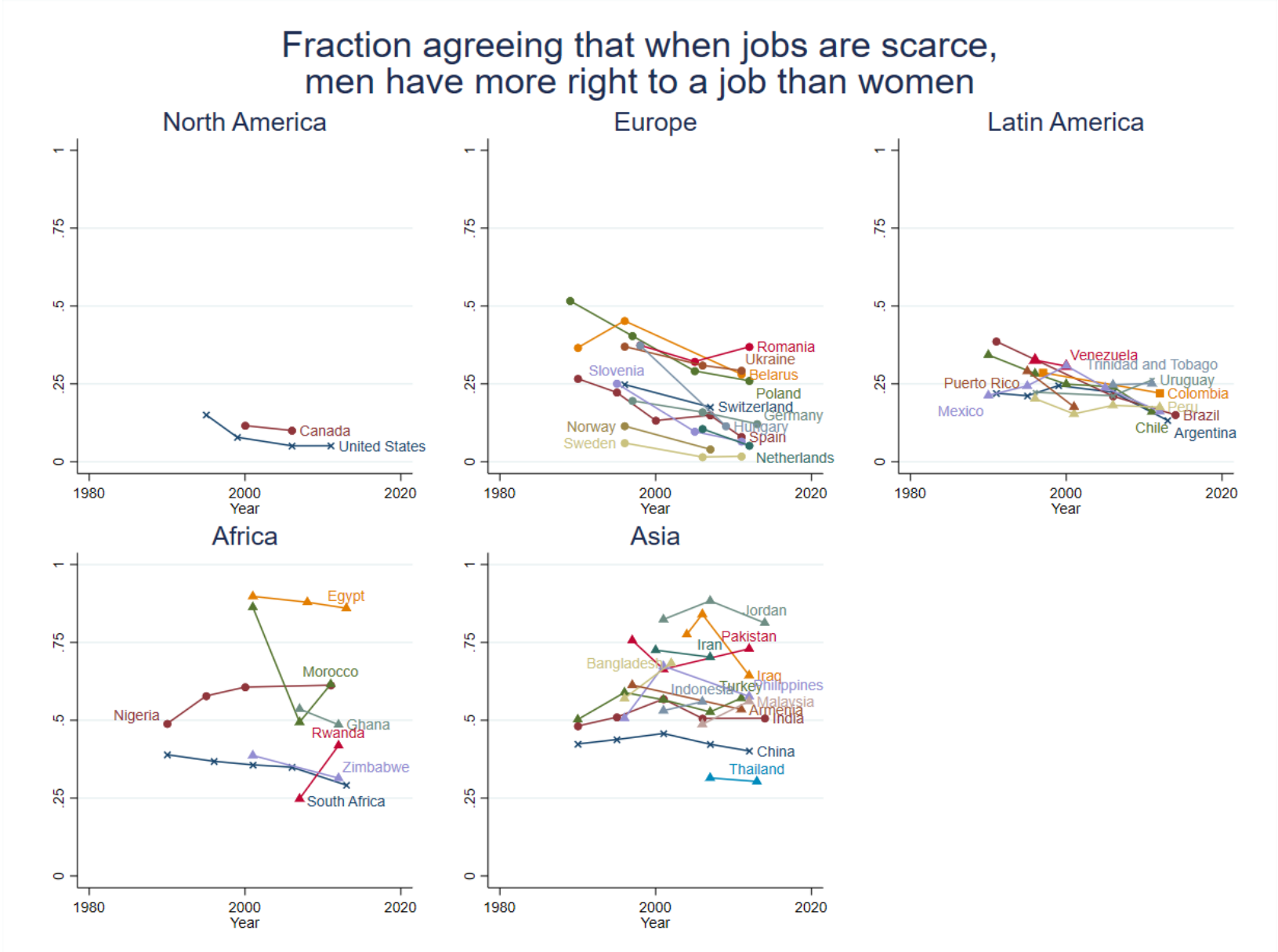
3. Over time: less traditional attitudes on gender roles



Source: Gallup Polls, Virginia Slims Survey, PEW Values Survey, General Social Survey

return

3. Over time: less traditional attitudes on gender roles



Source: World Values Survey

Return

Variation in attitudes by individual characteristics

Do you approve of a married woman working in industry/business if she has a husband capable of supporting her?

	Average	F-statistic	Shapley decomp (%)		Average	F-statistic	Shapley decomp (%)
Year				**Education**			
1930-1939	0.77			Middle school or lower	0.41		
1940-1949	0.71			High school drop-out	0.29		
1970-1979	0.26	6.5	20.1	High school	0.20	88.1	64.6
1980-1989	0.16			College drop-out	0.14		
1990-1999	0.14			College or higher	0.09		
Marital status				**Number of children**			
Married	0.19			0	0.14		
Widowed	0.28			1	0.17		
Divorced	0.18	4.5	3.2	2	0.18	4.0	13.6
Separated	0.19			3	0.21		
Never married	0.15			4 or more	0.27		
Sex				**Age**			
Male	0.20	7.4	0.8	20-29	0.23		
Female	0.18			30-39	0.26	1.0	6.7
Race				40-49	0.29		
White	0.28			50-59	0.33		
Black	0.25	13.5	5.5				
Other	0.21						

Return

Economic utilities Return

Marrieds

- Husband m and wife f. $i \in \{m, f\}$ gets

$$u_i(Q, C_i, L_f, L_m) = \ln(Q) + \ln\left(C_i - \tau_F w_f L_f - \tau_M h_m (1 - L_m)\right)$$

- Q: public consumption
- C_i: i's private consumption
- L_i: i's LFP indicator
- w_i: i's market wage
- h_i: i's home productivity
- τ_{Fi}: i's disutility from $L_f = 1$
- τ_{Mi}: i's disutility from $L_m = 0$

Singles

- Not subject to gender roles. i gets

$$\hat{u}_i(\hat{Q}_i, \hat{C}_i) = \ln(\hat{Q}_i) + \ln(\hat{C}_i)$$

general form public consumption indirect utilities

The general form of the utility function

return

$$u_i = H\Big(f(Q)C_i - r(Q)\left[\tau_F w_f L_f + \tau_M h_m(1-L_m)\right] + g_i(Q)\Big)$$

where the following conditions hold:

Conditions

C1) H is strictly increasing and strictly concave

C2) $(H')^{-1}$ is homogeneous or logarithmically homogeneous

C3) $2p(f')^2 - p{\cdot}f{\cdot}f'' + \left[(1-\tau_F)w_f L_f + (1-\tau_M)h_m(1-L_m)\right](r''f' - r'f'') - f'g'' + g'f'' > 0$, where $g(Q) \equiv g_m(Q) + g_f(Q)$

Married couple's utility maximization problem

return

$$\max_{Q,C_f,C_m} Q\big(C_f + C_m - \tau_F w_f L_f - \tau_M h_m(1 - L_m)\big)$$

$$\text{s.t.} \quad pQ + C_f + C_m = w_m L_m + w_f L_f + h_m(1 - L_m) + h_f(1 - L_f)$$

Optimal public and private consumption

$$
\begin{aligned}
Q &= \frac{w_m L_m + (w_f - \tilde{k}) L_f + (b_m - \tilde{h})(1 - L_m) + b_f (1 - L_f)}{2p} \\
&= \frac{w_m L_m + k w_f L_f + h b_m (1 - L_m) + b_f (1 - L_f)}{2p}
\end{aligned}
$$

$$
C = pQ + \tilde{k} L_f + \tilde{h}(1 - L_m)
$$

return

Intra-household allocation & indirect utilities return

Marrieds

- For Pareto efficiency, couple acts as single decision unit maximizing joint marital output budget constraint

$$\max_{Q,C} Q\big(C - [k_f + k_m]L_f - [h_f + h_m](1 - L_m)\big)$$

$$\text{s.t.} \quad pQ + C = w_m L_m + w_f L_f + b_m(1 - L_m) + b_f(1 - L_f)$$

  - w_i: i's market wage, b_i: i's home productivity
- Efficient risk sharing $\Rightarrow$ ratio of MU of private consumption equals endogenously determined Pareto weight μ

$$\frac{\partial u_m}{\partial C_m} = \mu \frac{\partial u_f}{\partial C_f}$$

- Indirect utilities

$$v_m = 2\ln Q + \ln p + \ln \frac{1}{1+\mu}, \quad v_f = 2\ln Q + \ln p + \ln \frac{\mu}{1+\mu}$$

Singles

Separate budget constraints for market & home-produced goods

The maximization problem is equivalent to solving

$$\max_{Q,C,Y,B} (Q+Y)\left(C+B-\tilde{k}L_f-\tilde{h}(1-L_m)\right)$$

s.t.

$$pQ+C=w_mL_m+w_fL_f$$

$$pY+B=b_m(1-L_m)+b_f(1-L_f)$$

- Y: the non-rival, public component of home production (e.g. cleaning of communal area, or food preparation for children)
- $B \equiv B_m + B_f$: the total consumption of the private component of home production (e.g. cleaning of private space, laundry of clothes)

return

Selection issues in comparing marrieds to singles

- I use singles' labor supply behavior as a benchmark to compare marrieds' labor supply behavior

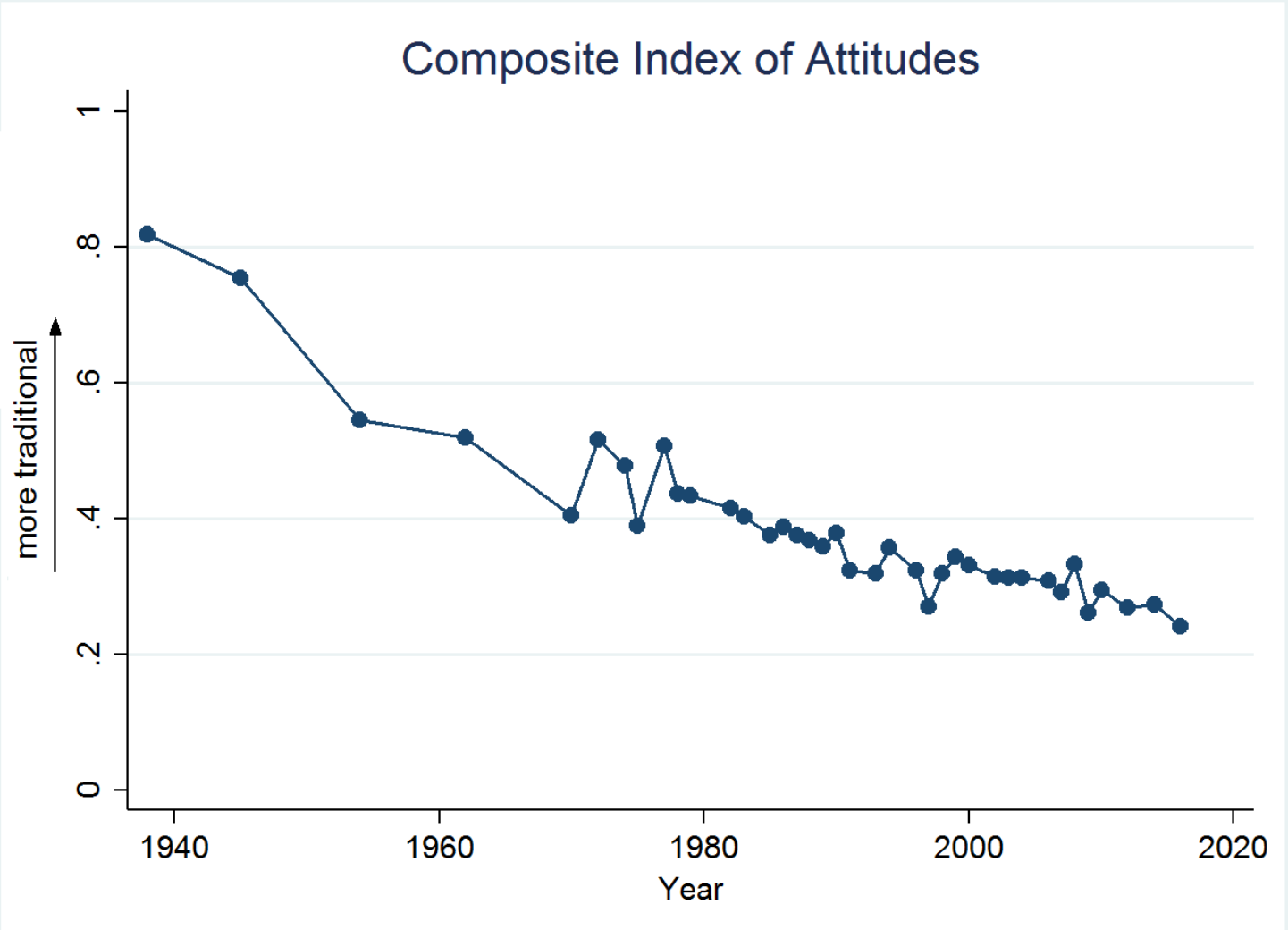
  → Selection problem: marrieds and singles are different

  1. Market wages → incorporated into the model
  2. Home productivity → fall in τ_F, τ_M over time is underestimated, so my counterfactual computation is a lower bound
  3. Gender role attitudes → fine as long as calibrating the norms wedge applying to marrieds

return

Composite index of attitudes

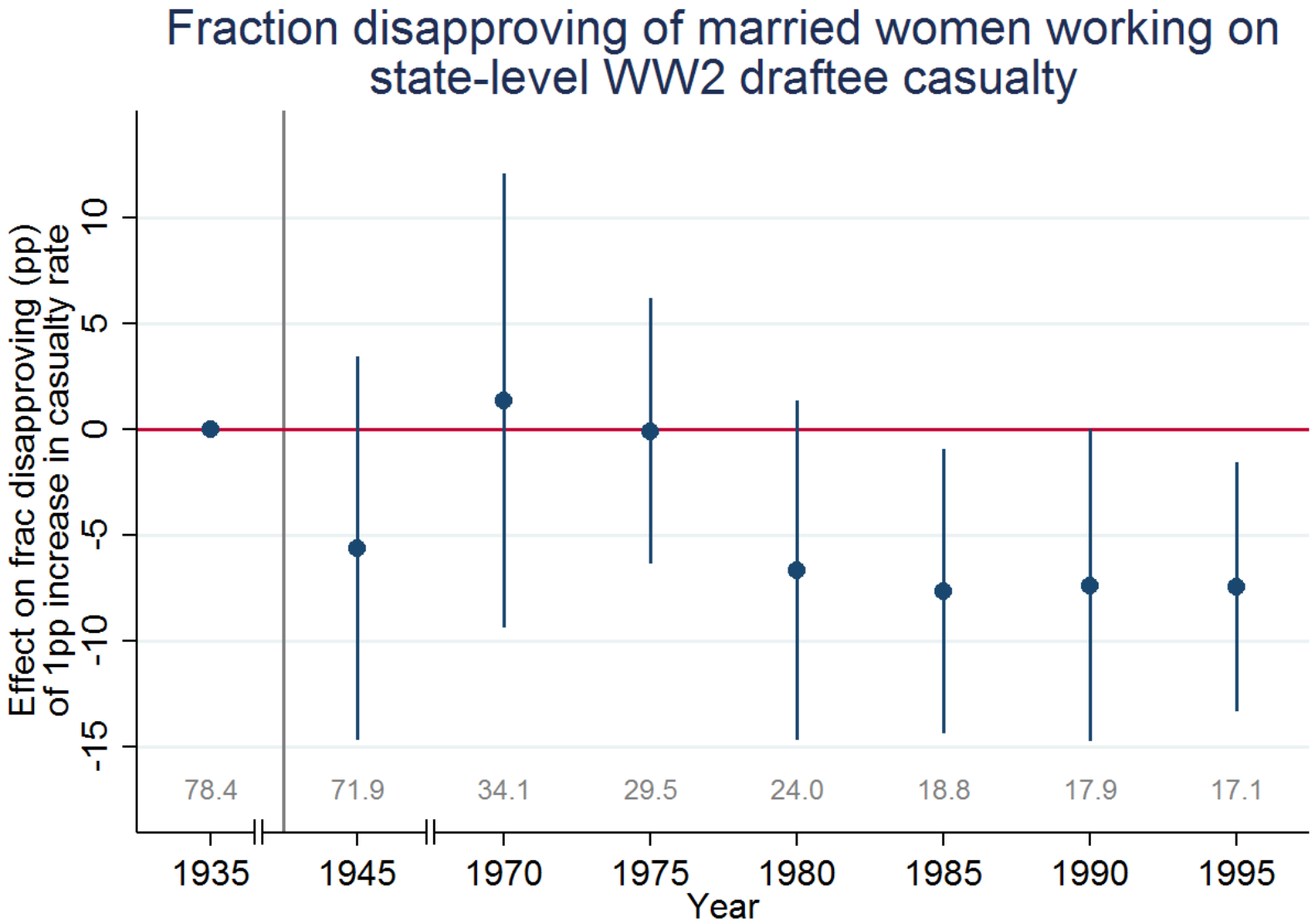
All questions



Source: Gallup Polls, Virginia Slims Survey, PEW Values Survey, General Social Survey

return

WW2 casualties gradually change attitudes



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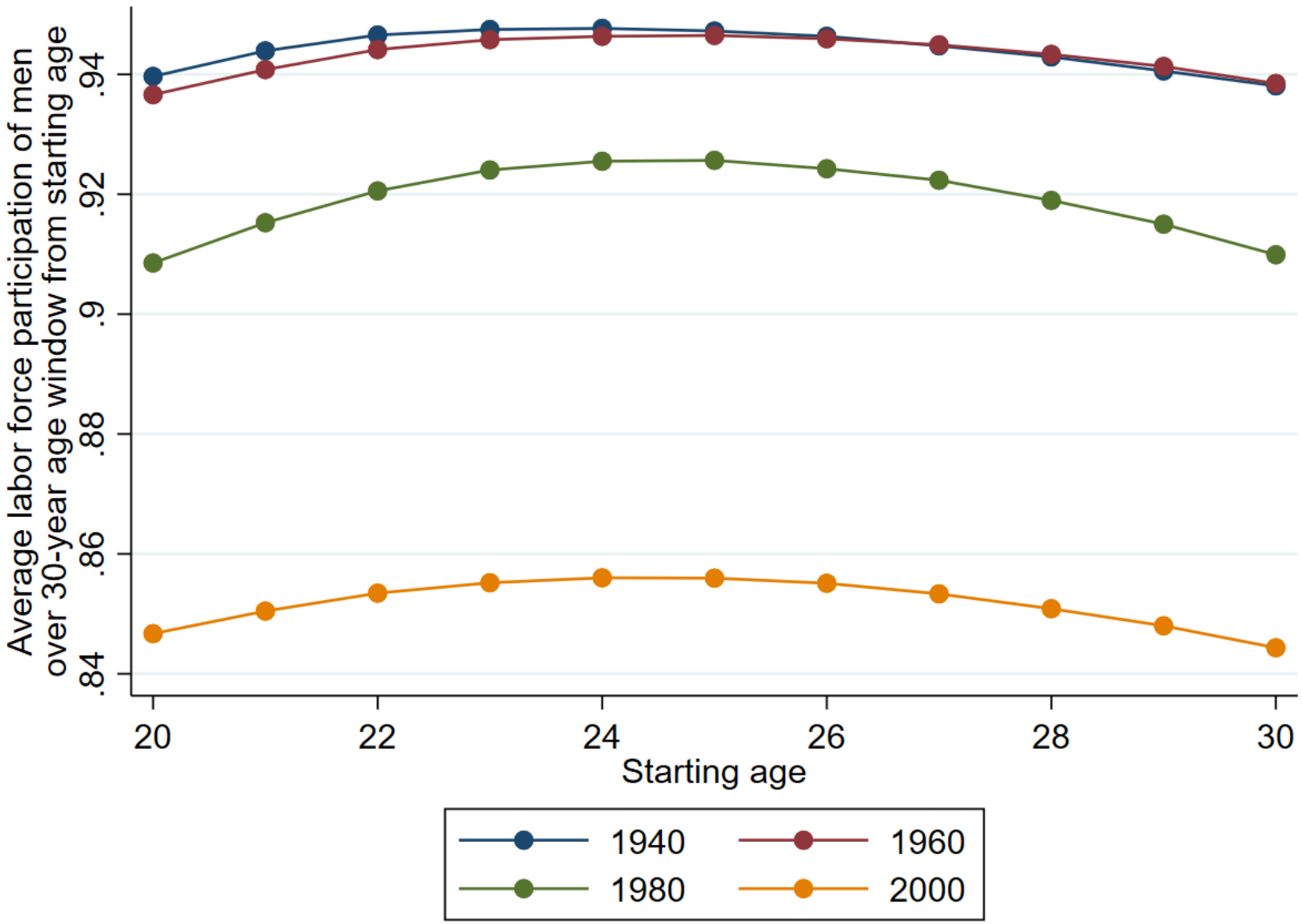
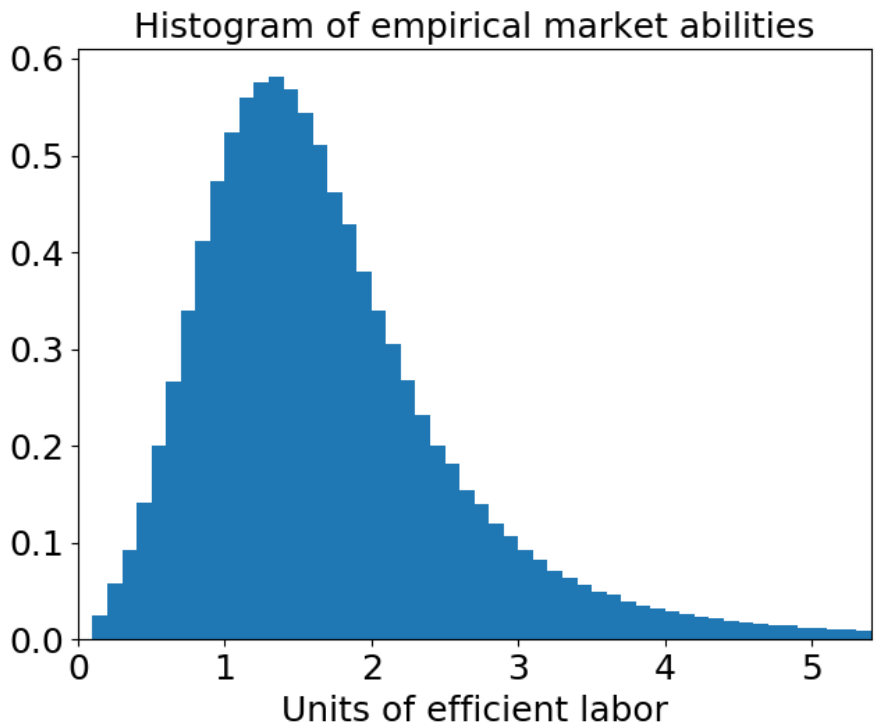
Economically active age range



return

θ: measure of dispersion of market & home abilities return

- MLE based on the distribution of real hourly wages, adjusting for selection into labor market



$\hat{\theta}$	1.837^{***}
	(18.31)
N	3570573

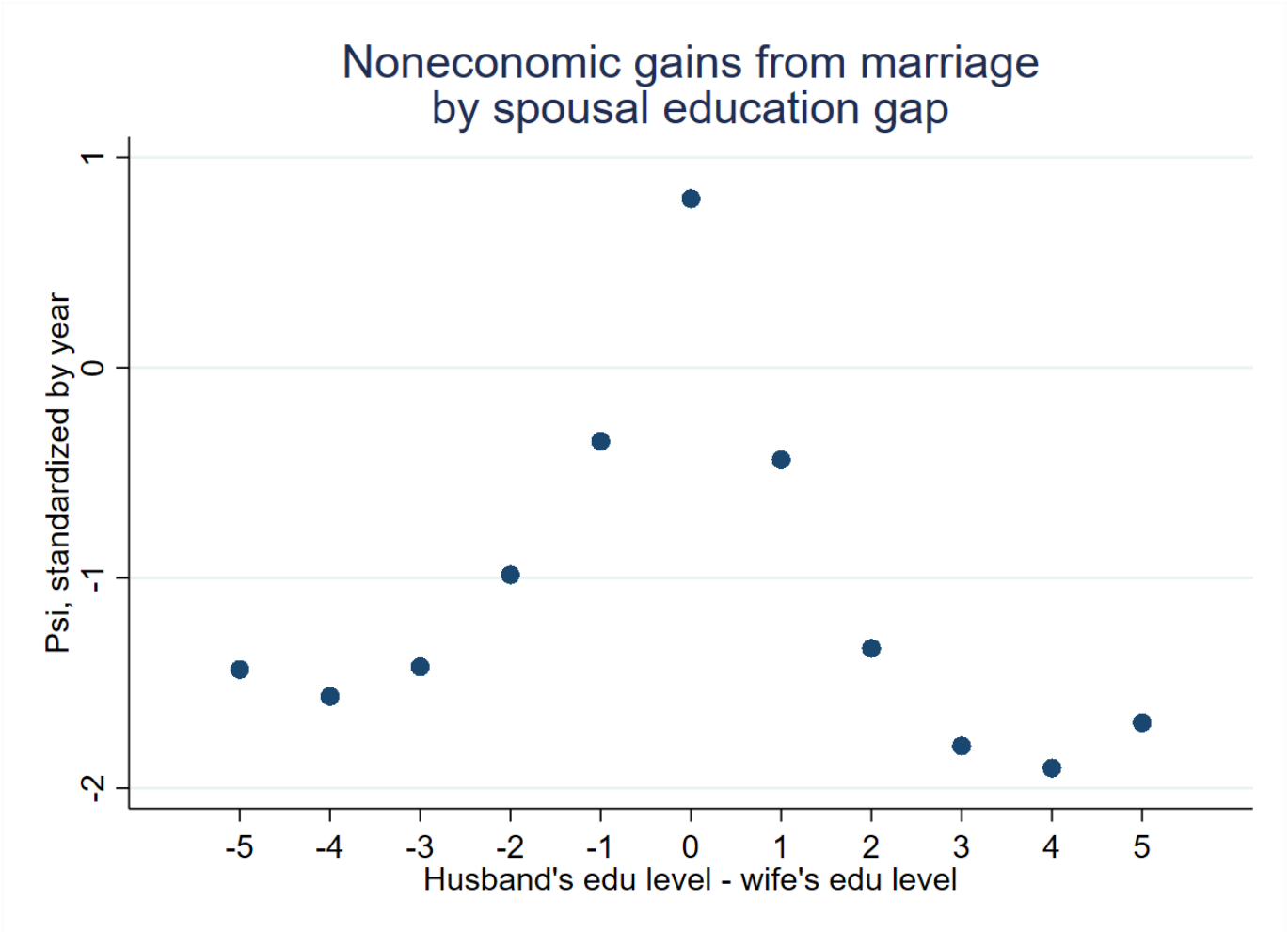
t statistics based on standard errors clustered by sex in parentheses

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Similar to Hsieh et al (2018)'s estimate of 1.52 for the dispersion of abilities across occupations, and their choice to use 2 for conducting counterfactuals

ψ: Noneconomics gains to marriage match

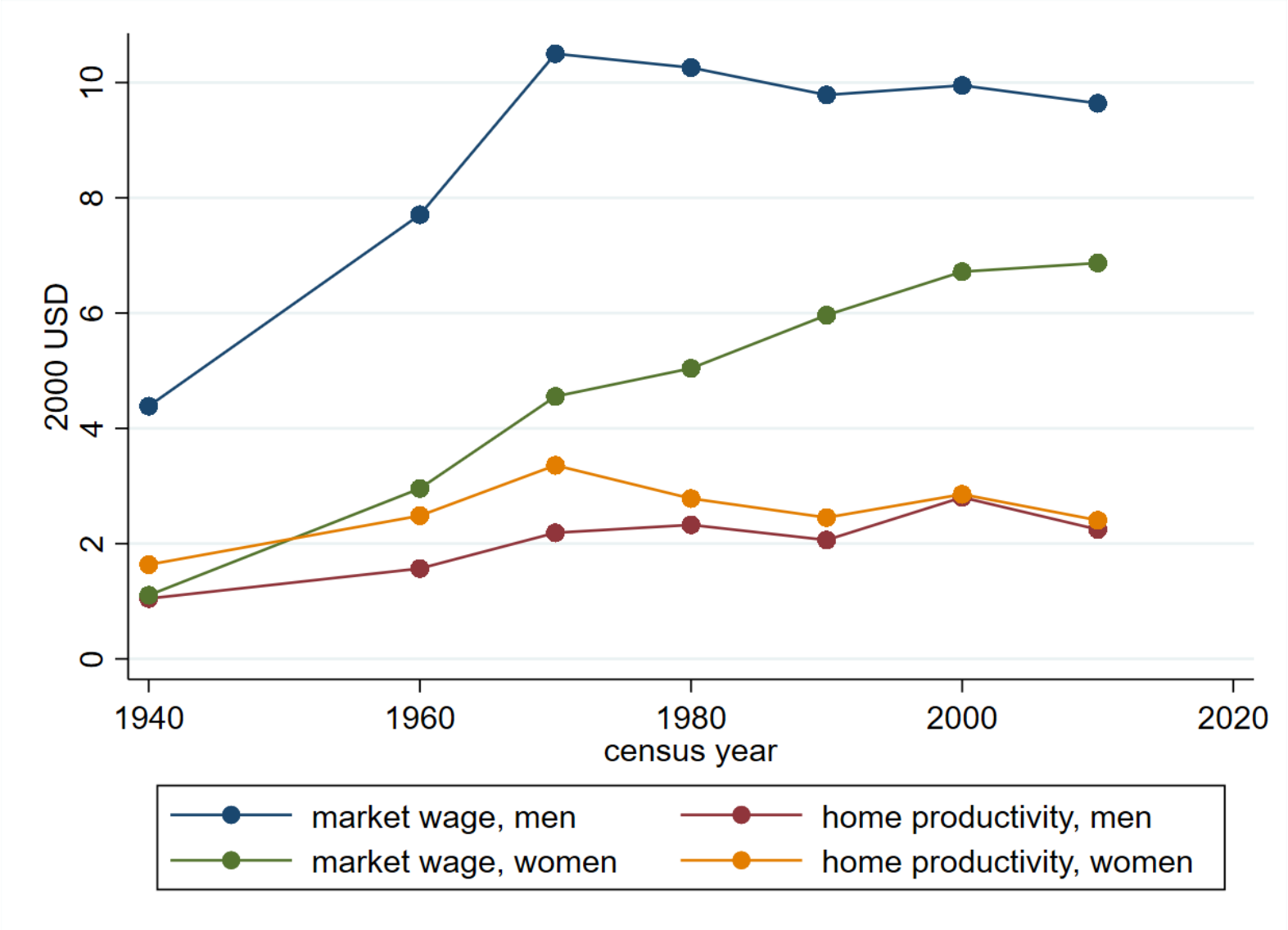
return



Matches the well-documented assortative matching by education

$\bar{w}, \bar{h}$: group component of wage & home productivity

return



Strong corr between attitude index & time allocation

	$\mathbb{1}$(Wife works)	Wife's weekly market hours	Husband's share of housework
	(1)	(2)	(3)
Attitude	-0.217***	-18.44****	-0.144***
	(-2.92)	(-5.08)	(-2.97)
N	4158	4108	1573

t statistics in parentheses; *** $p < 0.01$, **** $p < 0.001$

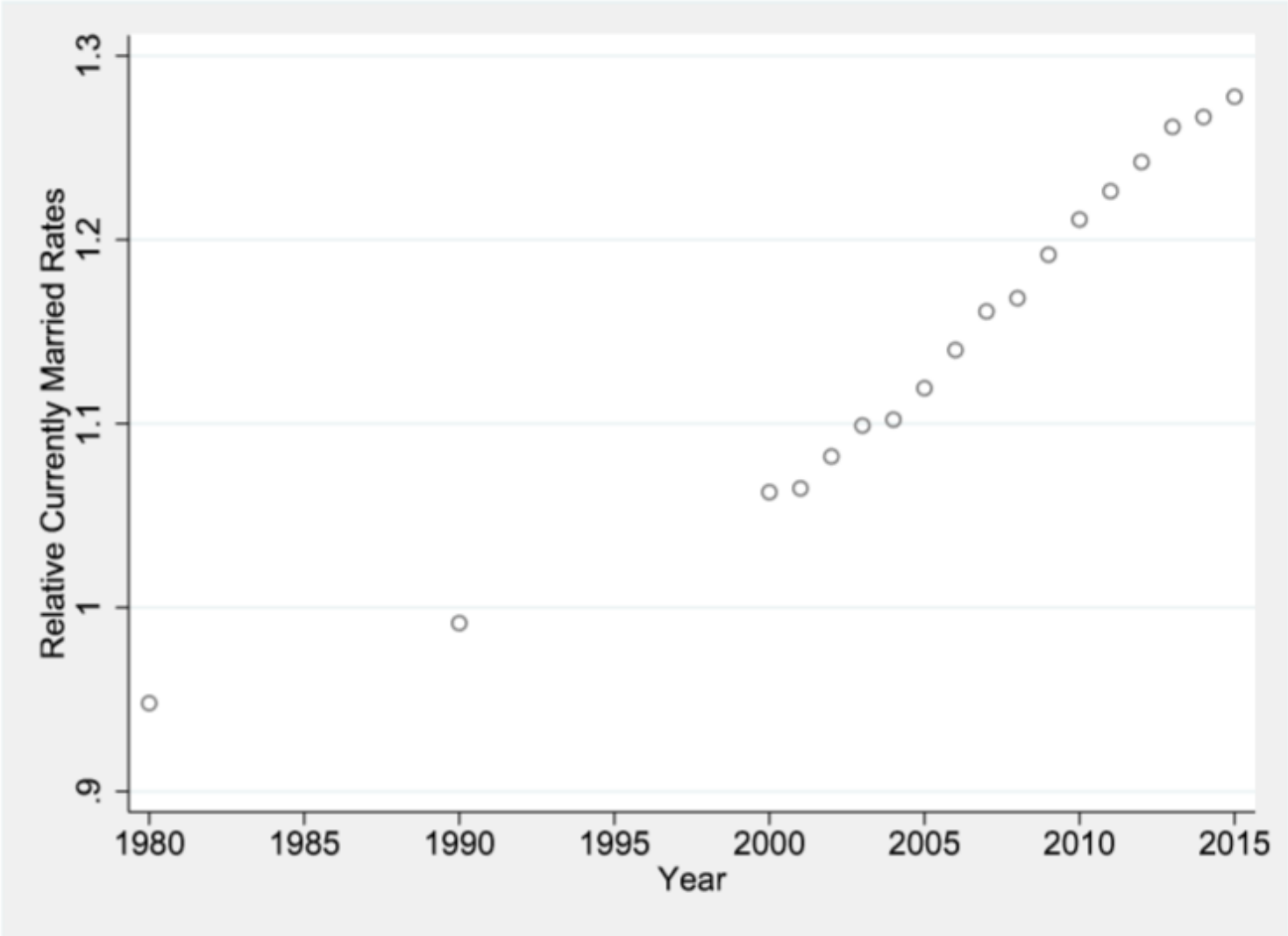
Attitude $\in [0, 1]$, with higher value indicating more traditional gender role attitudes

Includes individual FE, state FE, year FE. SE clustered at the individual level

Results robust to controlling for age, age^2, youngest child's age,
number of children, household size

Data: Work and Family Life Study, 1980-2000 return

Relative marriage rate of educated women increasing

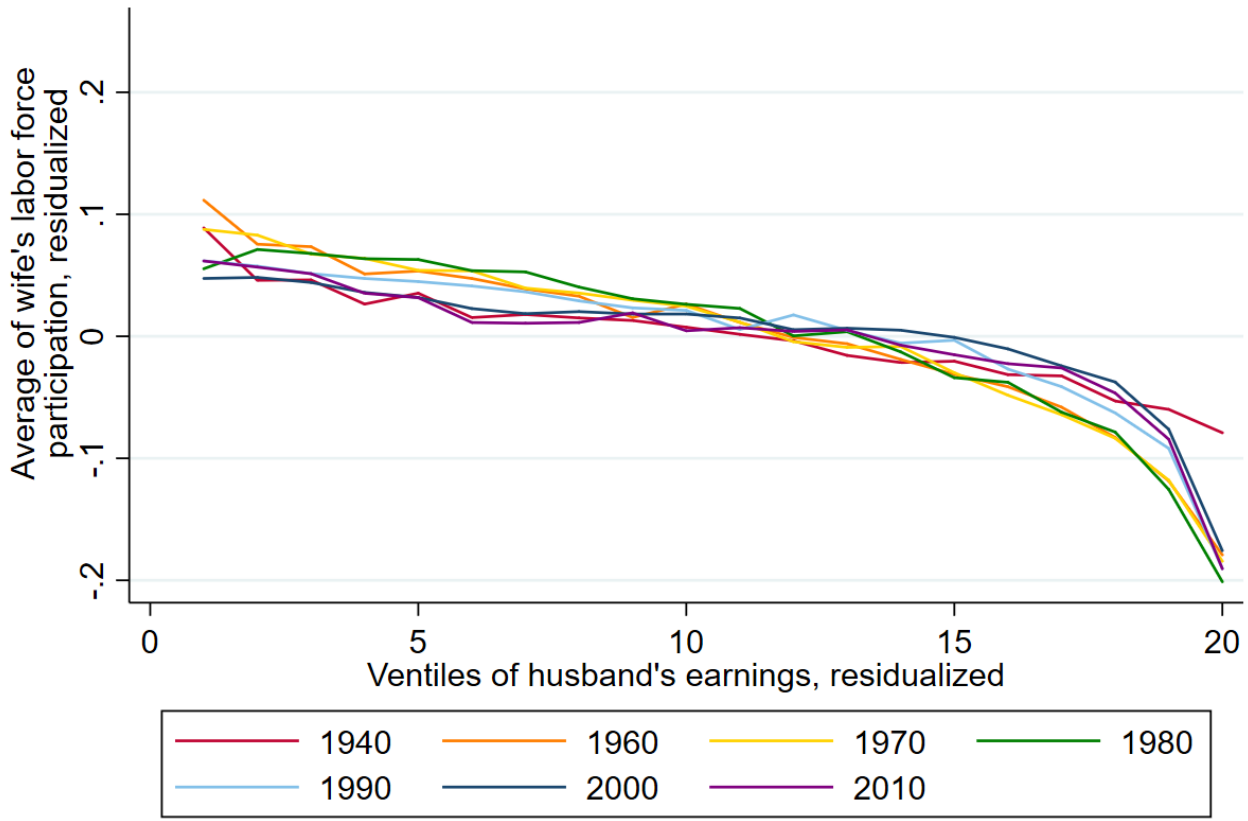


Source: Bar et al (2018)

return

Cross-elasticity between spouses' LFPs likely stable over time

- Elasticity of L_f w.r.t. husband's earnings quite stable over time



Residualized for own and spousal years of schooling, number of children under 18, number of children under 5, family size, age, race, US county dummies

return

Alternative channels of long-term effects of WW2 casualties

return

- Gender ratio fell, increasing husbands' bargaining power
  - But men have more traditional views
- Increased the stigma of remaining single
  - But this would predict a decrease in married women's labor force participation, because it affects the marginal *man*'s marriage choice more
- Female wage increased
  - But female wage did not increase. Could it be that observed female wage did not increase because higher female wage induced lower ability women to start working? It is unlikely that indirect effect dominates the direct effect.
- Increased marketization of home production, which induces higher ability women to get married more (Bar et al, 2018)
  - But the number of children fell
- Birth control pill enabled family planning
  - But availability of birth control pill should not be correlated with casualties