Fertility Decline:

Tracing it back to Changes in Marriage Patterns

Very, Very Preliminary

Alexander Ludwig
EUI, GUF, CEPR

José-Víctor Ríos-Rull
Penn, CAERP, UCL

Lina Segers
EUI

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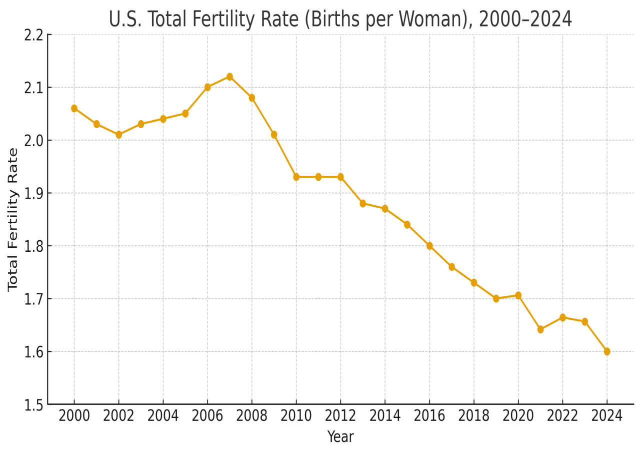
The Dramatic Fall in US Birth Rates



Key facts:

- TFR peaked at 2.12 in 2007
- Fell to 1.60 by 2024 (25% decline)
- Decline persists beyond Great Recession
- What about completed fertility?

Is the Decline Real? Period vs. Cohort Evidence

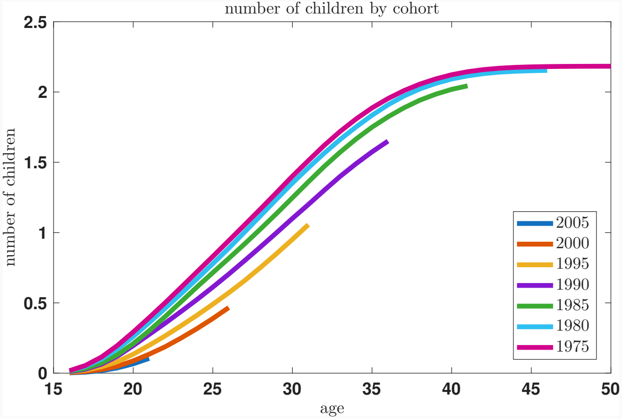
Two measures:

- **TFR:** Period (headline, timing-sensitive)
- **CCF:** Cohort (realized lifetime fertility)

Key question:
Is TFR decline real or delayed childbearing?

Answer: 1985 cohort shows **no catch-up** by ages 38–40

⇒ Real decline, not just postponement



Source: CPS data

Education is not The Driver

- Educated women *used to* have fewer children
- But their fertility rate increased since cohort of 1960s
- Educated women are **not** the source for current decrease

Key observation:
College graduate fertility has been *rising* while overall fertility falls

- **But it may be closely related for other reasons**

CCF by Education (White)

Cohort Born in	1940	1979
High School	2.8	2.0
Some College	2.5	1.9
College Grad	2.0	2.1

College women's fertility rose's

Female Employment Has Stabilized

The traditional story: Rising female employment $\Rightarrow$ lower fertility

But this channel is exhausted (Lifshitz, 2025):

- Female labor force participation rose dramatically for the Baby Boom generation
- But it stabilized from the ∼1965 cohort onward
- Married mothers' employment: flat since 1990s
- Yet fertility continued to decline after 2007

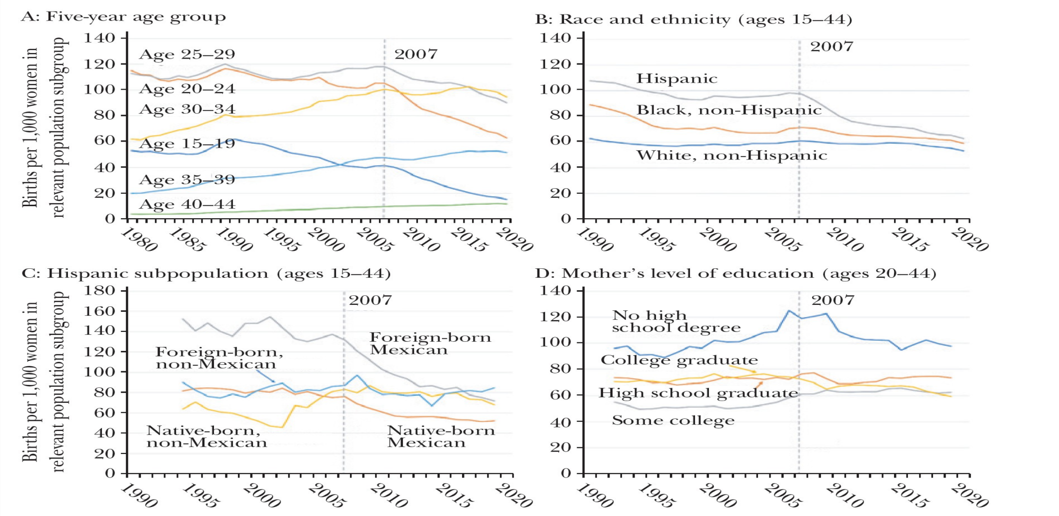
Cohort patterns:

Cohort	Mothers' LFP
1945	Rising
1965	Stabilized
1985	Stable

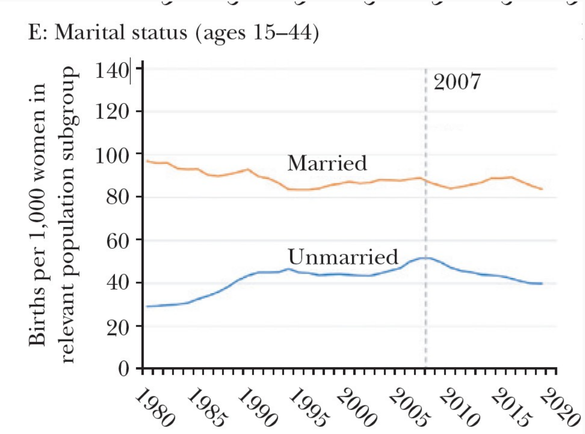
Implication: Continued increases in women's work cannot explain the post-2007 fertility decline.

$\Rightarrow$ We need to look elsewhere: partnership formation

Fertility Decline Across All Groups (but one)



Marriage = The Driver: Stable Gap, Falling Rates



Key observation:

- Birth rates by marital status: stable
- Married: ∼90 per 1,000
- Unmarried: ∼40 per 1,000

⇒ Composition effects (marriage, education) appear to play a large role in the fertility decline.

Mechanism Evidence: Union Type Affects Fertility

- **Hayford (2013, *Demography*):** Marriage (still) matters—demographic change in partnership explains trends in childlessness
- **Perelli-Harris et al. (2012):** Cohabiting unions show lower second-birth rates; lower stability affects completed fertility
- **Musick et al. (2014):** Declines in marriage-after-birth rates; union instability suppresses higher parity
- **Lichter et al.:** U.S. has high share of births to single (not cohabiting) mothers; serial cohabitation depresses progression to additional births
- **Beaujouan & Berghammer (2019):** Gap between fertility *intentions* and *realizations*—partnership disruption is key

Key insight:

- Young women's *desired* fertility has not declined "for the most part"
- But *realized* fertility has—the gap is explained by partnership, not preferences for children "of sorts"

Our Contribution: Bridging decomposition and mechanism approaches

1. An Equilibrium model of marriage and cohabitation with endogenous matching
2. Separation of supply vs. demand forces:
   - Asymmetric Education (exogenous, from data)
   - Partnership preferences (estimated)
3. Identification strategy: Compare two cohorts (1965, 1985) that face different education composition but potentially different partnership behavior

Our focus: Clean identification of preference shifts vs. educational change in partnership formation

Related work: Lifshitz (2025): Models employment, marriage, and fertility jointly; emphasizes educational mismatch as "shortage of suitable spouses"

Key question: Did changes in partnership *preferences*—rather than demographics or preferences for children—drive observed fertility declines?

Why a Structural Model?

Goal: Estimate preference parameters that account for:

- Marriage *patterns* within each cohort
- *Changes* in patterns across cohorts

Supply-side (demographics):

- College sex ratio changed
- Fewer "suitable" partners available
- Mechanical effect on matching

Demand-side (preferences):

- Value of marriage changed
- Willingness to partner changed
- Standards/selectivity changed

Identification challenge: Need a model to separate "can't find partner" from "don't want partner"

Our approach: Hold preferences fixed, vary only demographics $\Rightarrow$ if fit relative to flexible model worsens, preferences changed

Model Overview

A stationary equilibrium model of marriage markets

Key features:

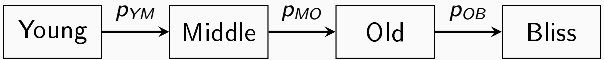
- Stationary population (constant inflows/outflows)
- Search frictions (meeting rate λ)
- Endogenous marital choice (bilateral)
- Discrete time (1 period = 1 year)

Agents characterized by:

- g = **Gender**: $g \in \{M, F\}$
- e = **Education**: $e \in \{C, NC\}$
- i = **Age**: $i \in \{Y, M, O, B\}$

Individual state: $s = (i, e, g)$

Life cycle with stochastic aging:



Bliss = terminal absorbing state; mortality rates $\pi(i, e, g)$ are age- and education-specific

Unions and Match Quality

Two types of unions:

- **Cohabitation** — less committed, easier to dissolve
- **Marriage** — more committed, costlier to dissolve

Match quality $q \in \{1, 2, 3\}$ (Low, Medium, High):

- Drawn randomly upon first meeting
- Evolves stochastically over time within union
- Transition matrix $\Lambda(q, q')$ of quality

State space for partnered agent:

$$\text{State} = (\underbrace{i, e, g}_{\text{own}}, \underbrace{u, q, i_j, e_j}_{\text{union}})$$

where $u \in \{C, M\}$ is union type, and (i_j, e_j) are partner's characteristics.

Preferences

Flow utility when single:

$$u^{\text{single}}(i, e, g) = \underbrace{u^s_{\text{base}}}_{\substack{=0 \\ \text{(normalized)}}} + u^s_{\text{age}}(i)$$

Flow utility when in a union:

$$u^{\text{union}}(i, e, g, u, q, i_j, e_j) = \underbrace{u^g_{\text{base}}}_{\substack{\text{gender-} \\ \text{specific}}} + \underbrace{u_{\text{mar}} \cdot 1_{u=M}}_{\substack{\text{marriage} \\ \text{premium}}} + \underbrace{u_q(q)}_{\substack{\text{match} \\ \text{quality}}} + \underbrace{u_{\text{college}} \cdot 1_{e_j=C}}_{\substack{\text{college} \\ \text{partner}}} + \underbrace{u_{\text{age}}(i_j)}_{\substack{\text{partner} \\ \text{age}}}$$

One-time transition costs:

- τ_{form}: cost to form cohabitation from single
- τ_{upgrade}: cost to upgrade cohabitation to marriage

Key feature: Gender-specific baseline $\Rightarrow u^m_{\text{base}} \neq u^f_{\text{base}}$

Define: $\delta_f \equiv u^f_{\text{base}} - u^m_{\text{base}}$ (female–male gap in union value)

Timing Within a Period

Each period:

1. **Aging**: Biological age may transition ($Y \to M \to O \to B$)
2. **Mortality**: Agent survives with probability $\pi(i, e, g)$
3. **If single**:
    - Meet potential partner with probability $\psi(i)$
    - If meeting: observe partner type (i_j, e_j) and match quality q
    - Both simultaneously choose: Single (S), Cohabit (C), or Marry (M)
4. **If coupled**:
    - Match quality q may transition
    - Both decide: stay, upgrade (C→M), or separate

Key tradeoff: Continue searching (option value) vs. form union now (bird in hand)

Meeting Technology and Bilateral Matching

Meeting probability: $$\psi(i) = A \cdot \lambda(i) \cdot \frac{\text{mass of opposite-gender singles}}{\text{total population}}$$

where $\lambda_{\text{young}} = 1$ (normalized), $\lambda_{\text{middle}}, \lambda_{\text{old}}$ estimated

Formation requires mutual consent:

Female \ Male	**S**	**C**	**M**
S	Single	Single	Single
C	Single	Cohabit	Cohabit*
M	Single	Cohabit*	Marry

* If the M-chooser prefers C > S

Dissolution is unilateral: Either partner can end the relationship (no transferable utility).

Value Functions: Notation

Two value objects per arrangement $j \in \{S, C, M\}$:

- $V^j(s)$ — value at the **beginning of the period** for an agent who *starts* the period in arrangement j with state s.
- $\Omega^j(\cdot)$ — value of **being in arrangement** j this period, *after* paying any adjustment cost to enter j, and *excluding* the realized Gumbel taste shock.

Choice-specific value (used in every discrete choice):

$$W^j \;=\; \Omega^j + \varepsilon^j, \qquad \varepsilon^j \overset{\text{iid}}{\sim} \text{Gumbel}(0,1) \quad (\sigma = 1 \text{ normalization}).$$

States: Single $s_S = (i, e, g)$; Coupled $s_U = (i, e, g, u, q, i_p, e_p)$ with $u \in \{C, M\}$.

Adjustment costs (paid at the transition): τ_{form} for $S \to C$ or $S \to M$; τ_{upgrade} for $C \to M$; τ_{break} for $C \to S$; τ_{div} for $M \to S$.

Continuation Values Ω^j on Each Transition Path

Staying paths (no adjustment cost):

$$\begin{aligned}
\Omega^{S\leftarrow S}(s) &= u^S(s) + \beta\,\mathbb{E}\big[\,V^S(s')\,|\,s\,\big] \\
\Omega^{C\leftarrow C}(s_U) &= u^C(s_U) + \beta\,\mathbb{E}\big[\,V^C(s'_U)\,|\,s_U\,\big] \\
\Omega^{M\leftarrow M}(s_U) &= u^M(s_U) + \beta\,\mathbb{E}\big[\,V^M(s'_U)\,|\,s_U\,\big]
\end{aligned}$$

Transition paths (adjustment cost subtracted):

$$\begin{aligned}
\Omega^{C\leftarrow S}(\cdot) &= \Omega^{C\leftarrow C}(\cdot) - \tau_{\text{form}} \\
\Omega^{M\leftarrow S}(\cdot) &= \Omega^{M\leftarrow M}(\cdot) - \tau_{\text{form}} - \tau_{\text{upgrade}} \\
\Omega^{M\leftarrow C}(\cdot) &= \Omega^{M\leftarrow M}(\cdot) - \tau_{\text{upgrade}} \\
\Omega^{S\leftarrow C}(\cdot) &= \Omega^{S\leftarrow S}(s') - \tau_{\text{break}} \quad \text{(cohabitation breakup)} \\
\Omega^{S\leftarrow M}(\cdot) &= \Omega^{S\leftarrow S}(s') - \tau_{\text{div}} \quad \text{(divorce)}
\end{aligned}$$

Expectations integrate over aging, mortality, and partner aging/mortality where relevant. Within an agent's choice problem starting in j_0, we write Ω^j as shorthand for $\Omega^{j\leftarrow j_0}$.

Begin-of-Period Value: Single Agent

State $s = (i, e, g)$. The within-period meeting event resolves first.

No meeting (probability $1 - \psi(i)$): agent stays single this period; value is $\Omega^{S \leftarrow S}(s)$.

Meeting (probability $\psi(i)$): draw partner type $(i_p, e_p) \sim \nu(\cdot \mid i, e, g)$ and initial quality $q \sim Q_0$; both agents then play the bilateral choice game over $\{S, C, M\}$ (next slide).

Let $\mathcal{V}^{\text{meet}}(s, s_p, q)$ denote the agent's pre-game value.

Begin-of-period value of a single:

$$\boxed{V^S(s) \; = \; (1 - \psi(i))\,\Omega^{S \leftarrow S}(s) \; + \; \psi(i)\,\mathbb{E}_{(i_p, e_p, q)}\left[\,\mathcal{V}^{\text{meet}}(s, s_p, q)\,\right]}$$

Bilateral Choice Game: Outcomes and Acceptance

Each agent picks $a \in \{S, C, M\}$ given iid Gumbel shocks. The realized arrangement is $j^\star = f(a^g, a^{-g})$ by mutual consent (slide 14): my offer materializes only if the partner consents.

Outcome probability given my action a, under partner's strategy $\sigma^{-g}(a' \mid s_p, s, q)$:

$$P^{-g}(j^\star \mid a, s, s_p, q) \;=\; \sum_{a' \in \{S,C,M\}:\, f(a,a')=j^\star} \sigma^{-g}(a' \mid s_p, s, q).$$

Acceptance probability of my offer (the event $j^\star = a$):

- $a = S$: $\quad P^{-g}(S \mid S) = 1 \quad$ (no consent needed; outcome is single).
- $a = C$: $\quad P^{-g}(C \mid C) = \sigma^{-g}(C \mid \cdot) \;+\; \sigma^{-g}(M \mid \cdot)\,1\{M\text{-chooser consents to } C\}$.
- $a = M$: $\quad P^{-g}(M \mid M) = \sigma^{-g}(M \mid \cdot) \quad$ (marriage requires both to choose M).

The complementary mass $1 - P^{-g}(a \mid a)$ shifts the realized arrangement to a *lower-commitment fallback*: S when partner says S; C when I offer M and partner offers C.

Bilateral Choice Game: Value of Action and Best Response

Expected pre-Gumbel value of action a, weighted by partner's acceptance:

$$\bar{\Omega}^a(s, s_p, q) \;=\; \sum_{j^\star \in \{S,C,M\}} P^{-g}(j^\star \mid a, s, s_p, q)\, \Omega^{j^\star \leftarrow S}(\cdot).$$

LogSumExp expectation over own taste shocks (γ_e = Euler's constant):

$$\mathcal{V}^{\text{meet}}(s, s_p, q) \;=\; \log \sum_{a \in \{S,C,M\}} \exp(\bar{\Omega}^a(s, s_p, q)) \;+\; \gamma_e.$$

Best response is the standard logit: $\sigma^g(a \mid \cdot) \propto \exp(\bar{\Omega}^a(\cdot))$. P^{-g} depends on σ^{-g} $\Rightarrow$ cross-gender fixed point.

Begin-of-Period Value: Cohabiting Agent ($u = C$)

State $s_U = (i, e, g, C, q, i_p, e_p)$. Quality shock resolves first: $q' \sim \Lambda(\cdot \mid q)$, yielding $\tilde{s}_U$.

Feasible actions: $a \in \{S, C, M\}$. Outcome $f_C(a, a')$: S if either chooses S; M only if both choose M; C otherwise.

Expected pre-Gumbel value of action a:

$$\bar{\Omega}^a_C(\tilde{s}_U) \;=\; \sum_{a' \in \{S,C,M\}} \sigma^{-g}(a' \mid \tilde{s}_U)\, \Omega^{f_C(a,a') \leftarrow C}(\cdot).$$

Begin-of-period value of a cohabitor:

$$V^C(s_U) \;=\; \mathbb{E}_{q'|q}\left[\log \sum_{a \in \{S,C,M\}} \exp(\bar{\Omega}^a_C(\tilde{s}_U)) \;+\; \gamma_e\right].$$

Begin-of-Period Value: Married Agent ($u = M$)

State $s_U = (i, e, g, M, q, i_p, e_p)$. Quality shock resolves first: $q' \sim \Lambda(\cdot \mid q)$, yielding $\tilde{s}_U$.

Feasible actions: $a \in \{S, M\}$ (no demarriage to C). Outcome $f_M(a, a')$: S if either chooses S (*unilateral dissolution*); M only if both choose M.

Expected pre-Gumbel value of action a:

$$\bar{\Omega}^a_M(\tilde{s}_U) \;=\; \sum_{a' \in \{S,M\}} \sigma^{-g}(a' \mid \tilde{s}_U)\, \Omega^{f_M(a,a') \leftarrow M}(\cdot).$$

Begin-of-period value of a married agent:

$$V^M(s_U) \;=\; \mathbb{E}_{q'|q}\left[\log \sum_{a \in \{S,M\}} \exp(\bar{\Omega}^a_M(\tilde{s}_U)) \;+\; \gamma_e\right].$$

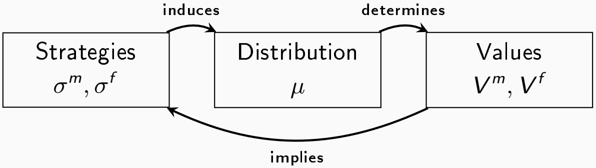
Cross-gender interdependence: every $\bar{\Omega}^a$ above uses σ^{-g}, the partner's best response, closing the system across genders.

Equilibrium: A Fixed Point Problem

Definition: A stationary equilibrium is $\{V^g, \sigma^g, \mu\}_{g\in\{m,f\}}$ such that:

1. **Optimality:** Given σ^{-g} and μ, strategy σ^g solves each agent's problem
2. **Stationarity:** Given strategies (σ^m, σ^f) and demographics, the distribution μ is stationary (inflows = outflows for every state)
3. **Consistency:** Agents' beliefs about: the probability of meeting each type (i_j, e_j) and its strategy $\sigma^{-g}(s_j, s, q)$ are consistent with the actual distribution μ and strategies σ^{-g}

Fixed point structure:



Algorithm: Iterate $\sigma \to \mu \to V \to \sigma'$ until $\sigma' = \sigma$

Parameters to Be Estimated

Union preferences

- u_m^{union} (to be in union)
- u_{marriage} (marriage vs cohabitation)
- u_{college} (college partner premium)

Singlehood utilities

- $u_{\text{middle}}^{\text{single}}$
- $u_{\text{old}}^{\text{single}}$

Gender Specific

- u_f^{union} (female taste for unions)

Search technology

- λ_{middle}
- λ_{old}

Transition costs

- τ_{form} (enter cohabitation)
- τ_{upgrade} (cohabit $\rightarrow$ marry)

Match quality

- $u(q)$ parameters (normalized shape)

Total parameters: 11

Economies to be Estimated

Cohort-specific estimations

- 1965 cohort only
- 1985 cohort only

All 11 parameters are freely estimated, including sex-specific union preferences.

Joint estimations

- Joint with common preferences
- Joint with varying sex gap

Demographics differ by cohort in both joint estimations.

Goal: Assess whether demographic change alone can explain observed differences across cohorts.

Which Parameters Are Restricted Across Cohorts?

Always allowed

- Sex-specific union preferences
- Search, singlehood, and cost parameters
- Assortative mating preferences

Only restriction tested

Joint (common preferences):

$$\delta_f^{1965} = \delta_f^{1985}$$

Joint (varying sex gap):

$$\delta_f^{1965} \neq \delta_f^{1985}$$

where $\delta_f = u_f^{\text{union}} - u_m^{\text{union}}$.

Key point: Sex differences are always allowed; only their stability across cohorts is tested.

Parameter Counts and Nesting

Number of estimated parameters

- Cohort-specific (1965): 11
- Cohort-specific (1985): 11
- Joint (common preferences): 11
- Joint (varying sex gap): 12

Nesting structure

- Joint (common preferences) is nested in Joint (varying sex gap)
- Difference: one cohort-specific parameter
- All other parameters are identical

Interpretation: The fit improvement isolates one margin: changes in the female–male preference gap.

Minimum Distance Estimation

Objective: Find θ minimizing distance between model and data

$$\hat{\theta} = \arg\min_{\theta} \sum_{c \in \{1965,1985\}} \sum_{m=1}^{18} w_m \left(\text{Model}_m(\theta; X_c) - \text{Data}_m^c \right)^2$$

Components:

- X_c: cohort-specific demographics (college shares, sex ratios)
- Data_m^c: 18 target moments per cohort (36 total)
- w_m: (almost equal, 1-2.5) moment weights

Optimization: DFBOLS (derivative-free, bound-constrained)

- Each evaluation: solve for steady-state, compute moments
- Between 700 and 1500 iterations to convergence

Target Moments (18 per cohort)

Moment	1965	1985
Union Status (Ages 35–44)		
Single (F)	0.14	0.22
Single (M)	0.18	0.28
Cohabiting	0.08	0.12
Married (F)	0.74	0.63
Married (M)	0.70	0.58
Single (25–29)	0.35	0.50
Ever Married by Age		
By 25 (F)	0.55	0.28
By 25 (M)	0.41	0.20
By 30 (F)	0.74	0.55

Moment	1965	1985
Ever Married (cont.)		
By 30 (M)	0.65	0.45
By 40 (F)	0.88	0.80
By 40 (M)	0.84	0.75
Assortative Mating		
CC Share	0.10	0.20
NN Share	0.76	0.64
CN Share	0.06	0.08
NC Share	0.08	0.08
P(HC|WC)	0.60	0.70
Homogamy	0.86	0.84

Sources: NCES, Census SIPP 2001, ACS 2015–2020, Schwartz & Mare (2005)

Identification: Intuition

- In the model, individuals who value unions more:
  - enter unions earlier,
  - accept lower match quality,
  - and remain matched longer.
- The timing of union formation by age therefore identifies the relative value of being in a union versus remaining single.
- Differences between men and women in the age profiles of singleness identify relative male and female union preferences.
- Conditioning on education is essential:
  - given the relative supply of college men and women,
  - matching patterns by education reveal how scarcity is traded off against remaining single.

Key implication: Demographics affect who is available to match; observed timing and sorting reveal how much individuals value being in a union.

Identification: Assortative Mating Showcases the Identification Logic

If college women still want unions (demand unchanged):

- Would “marry down” to NC men
- College–Non-college share rises
- Homogamy falls

If college women’s preferences fell (demand shifted):

- Stay single rather than “settle”
- College–Non-college share stays low
- Homogamy stays high

What we observe:

- P(Husband College | Wife College): 60% (1965) $\rightarrow$ 70% (1985)
- College women did *not* marry down despite male shortage

Economic logic (Qian, 2017): When wife is more educated, she typically out-earns husband—college women may prefer singlehood to an unfavorable match.

$\Rightarrow$ Matching patterns suggest preferences shifted, not just supply.

A Dramatic Change: College Expansion

Female college share rose from 24.9% to 43.4%

If preferences were stable:

- College women want college husbands
- But college sex ratio: $0.98 \to 0.78$
- **Prediction**: College women's marriage falls more than non-college

What we observe:

- *All* women's marriage rates fell
- Decline *larger* than supply shortage predicts
- Even non-college women marry less

Identification logic:

$$\underbrace{\text{Total decline}}_{\text{observed}} = \underbrace{\text{Demographic effect}}_{\text{from } X_c} + \underbrace{\text{Preference effect}}_{\text{from } \delta_f}$$

Demographics alone cannot explain the magnitude $\Rightarrow$ preferences changed

Addressing the Accounting Critique

Kearney & Levine (2023):

- Simple reweighting by marital status explains little of the decline
- Conclude composition changes are insufficient

Why our approach differs:

- Accounting holds *behavior* fixed, varies *composition*
- We model *why composition changed*
- Down the road: Union Instability is a Key Fertility Deterrant

Reconcile: $\underbrace{\text{Fertility decline}}_{\text{observed}} = \underbrace{\text{Composition}}_{\text{K\&L: small}} + \underbrace{\text{Partnership preferences}}_{\text{Our mechanism}} + \underbrace{\text{Instability Detterant}}_{\text{Down the Road}}$

The preference shift *caused* the composition shift $\Rightarrow$ mechanism matters

Identification Limitations

What the model <u>cannot</u> separately identify:

1. **Level vs Scale**: Only ratios of utilities are identified
   $\Rightarrow$ Normalize $u_{\text{single}}^{\text{young, NC}} = 0$ and $\sigma = 1$
2. **Absolute preference levels**: We identify changes across cohorts, not absolute welfare
3. **Unobserved heterogeneity**: Model assumes representative agent within (age, education, gender) cells

Key maintained assumption:

Utility differences (not levels) drive choices $\Rightarrow$ focus on *relative* changes

The Marriage Market Mismatch

Key exogenous change: college attainment by gender

	1965	1985
College women (%)	24.9	43.4
College men (%)	24.5	33.7
Gap (F – M)	+0.4	+9.7

Source: NCES, ages 25–29

Marriage-market implications

- College women face a relative shortage of college-educated men
- Non-college men face a relative shortage of non-college women
- Assortative mating amplifies these imbalances
- Fewer feasible matches mechanically reduce marriage rates

Interpretation:

Demographic shifts alter marriage opportunities even without changes in partnership preferences.

First Result: Sex-Specific Model Outperforms Pooled

- Fit measured by the sum of weighted squared residuals (SSR)
- Joint estimation with common preferences: pooled vs sex-specific union utility

Specification	1965 SSR	1985 SSR	Joint SSR
Pooled u^{union} (10 params)	0.034	0.066	0.224
Sex-specific (11 params)	0.030	0.065	0.202
Improvement	12%	2%	10%

- Even with sex-specific preferences, the joint model fits poorly:
  $0.202 \gg 0.030 + 0.065 = 0.095$

Interpretation: Demographic differences alone cannot reconcile both cohorts. The data require opposite movements in women's valuation of unions across cohorts.

Cohort-Specific Estimates: Stable Structure, Changing Preferences

What is stable across cohorts:

- Search intensity declines with age ($\lambda_{\text{middle}} < 1$, $\lambda_{\text{old}} \ll 1$)
- Marriage premium over cohabitation
- Strong educational assortative matching

$\Rightarrow$ Basic marriage market structure unchanged

What changed:

Women's relative valuation of unions

Cohort	$\delta_f = u_f - u_m$
1965	$+0.25$
1985	-0.04

Key fact: Sign reversal!

Women went from valuing unions *more* to *less* than men

Estimated Parameters: Key Results

Parameter	1965 Only	1985 Only	Joint (Common)	Joint (Varying)
u_m^{union} (male union)	0.94	-0.48	-0.11	-0.16
u_f^{union} (female union)	1.19	-0.52	0.05	—
$\delta_f = u_f - u_m$	$+0.25$	-0.04	$+0.17$	$+0.56$ / -0.43
u_{marriage} (vs. cohab)	0.13	-0.33	-0.01	-0.26
u_{college} (partner prem.)	9.29	5.95	10.28	6.74
λ_{middle}	0.001	0.023	0.001	0.023
SSR	0.030	0.064	0.190	0.131

Key observation: The sex gap δ_f reverses sign from 1965 to 1985

Allowing this reversal reduces Joint SSR by 31% (0.190 $\rightarrow$ 0.131)

Why the Joint Model with Common Preferences Fails

What the joint model imposes

- Identical partnership preferences across cohorts
- Cohort differences enter only through demographics
- Same matching technology and target moments

Interpretation

- This is a disciplined specification
- It asks a sharp question:

Can demographic change alone reconcile the two cohorts?

Why it fails

The joint–common model cannot accommodate:

- High valuation of unions by women in the 1965 cohort
- Low valuation of unions by women in the 1985 cohort

Core problem

- The female–male preference gap moves in opposite directions
- A single preference vector must compromise between them

Conclusion

Demographic change alone cannot reconcile both cohorts.

The Fix: Allow Female–Male Gap to Vary by Cohort

Relaxation: Allow $\delta_f^{1965} \neq \delta_f^{1985}$ (+1 parameter)

Joint specification	**SSR**	**Improvement**
Common preferences (11 params)	0.190	—
Varying sex gap (12 params)	0.131	**31%**

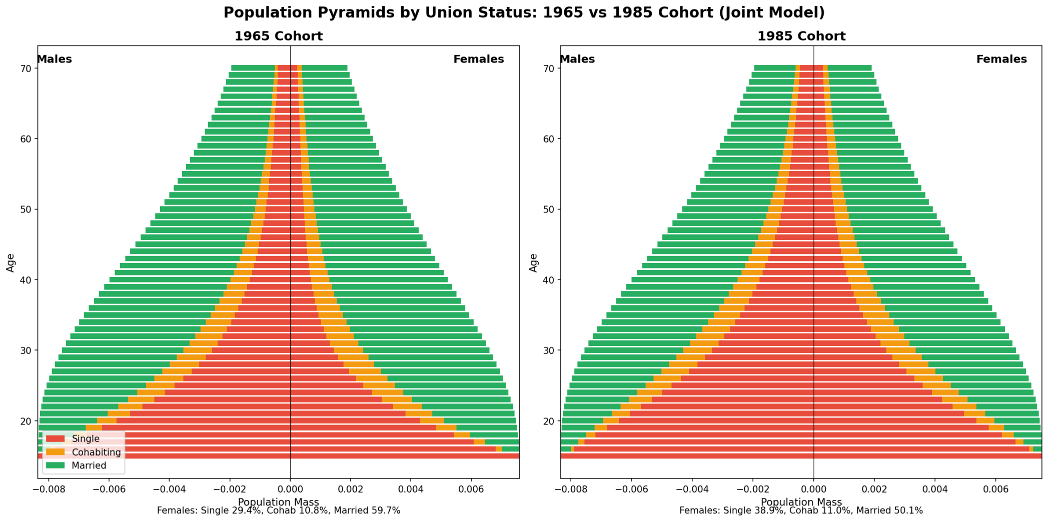
Estimated preference gaps:

$$\delta_f^{1965} = +0.56 \longrightarrow \delta_f^{1985} = -0.43$$

Complete reversal: From women valuing unions more to men valuing unions more

Change of $\sim$1 utility unit explained by one parameter

Model Predictions: 1965 vs 1985 Cohort



Females: Single 29% → 39%, Cohabiting 11% → 11%, Married 60% → 50%

Robustness: Consistent Across Specifications

Approach	δ_f^{1965}	δ_f^{1985}
Cohort-specific (1965 only)	$+0.25$	—
Cohort-specific (1985 only)	—	-0.04
Joint (Varying Sex Gap)	$+0.56$	-0.43

Pattern is robust:

- Cohort-specific: $+0.25 \to -0.04$ (reversal of $\sim$0.29)
- Joint: $+0.56 \to -0.43$ (reversal of $\sim$0.99)

Why larger in joint?

Pooled parameters must fit both cohorts $\Rightarrow$ more weight on δ_f to absorb differences

What Drove the Reversal: Possible explanations for Women's Changes

Economic factors:

- Women's wages rose relative to men's
- Marriage less necessary for economic security
- College women out-earn less-educated husbands

Social norms:

- Single motherhood more acceptable
- Career prioritization normalized
- Less stigma from remaining unmarried

Men Have not Adjusted

"Suitable spouse" hypothesis:

- Women's standards rose for what constitutes an acceptable partner
- Not just "fewer available men" (demographics)
- But "fewer men who meet the bar" (preferences)
- Cf. Wilson (1987): "shortage of marriageable men"

Domestic burden:

- Unequal division of housework/childcare
- Marriage brings costs as well as benefits

From Marriage Preferences to Fertility

Recall (Beaujouan & Berghammer, 2019): Young women's desired fertility has not declined—the gap between intentions and realizations is explained by partnership.

The transmission mechanism:

1. Women's relative preference for unions declined (δ_f: $+0.56 \to -0.43$)
2. $\Rightarrow$ Women became more selective / less eager to partner
3. $\Rightarrow$ Marriage rates fell (married women: 60% $\to$ 50%)
4. $\Rightarrow$ Fertility fell mechanically (given stable within-group rates)

Counterfactual: If 1985 cohort had 1965 preferences ($\delta_f = +0.56$):

- Model predicts **substantially higher marriage rates**
- $\Rightarrow$ Higher fertility through composition alone

Partnership preferences—not just demographics—are a first-order driver of fertility decline

Summary

What we find:

1. Demogr changed: college sex ratio 0.98 $\rightarrow$ 0.78
2. But demogr alone can't explain marriage decline
3. The sex gap in union preferences reversed:
    - 1965: Women valued unions **more** ($\delta_f = +0.56$)
    - 1985: Women valued unions **less** ($\delta_f = -0.43$)
4. This preference shift accounts for large share of marriage decline
5. We will look at others (persistence of love?, smaller costs of break up?)

Why it matters for fertility:

- Fertility within marriage: stable
- Marriage rates: falling
- Fertility *intentions:* **stable**
- $\Rightarrow$ Fertility falls through marriage channel

Policy implication:

For more children targeting childbearing directly may be less effective than making marriage more attractive

Bottom Line

The fertility decline is partly a marriage decline, and the marriage decline reflects changing preferences against marriage, especially for women, not just demographics.

Backup Slides

Backup: Female Employment Has Stabilized

The traditional story: Rising female employment ⇒ lower fertility

But this channel is exhausted (Lifshitz, 2025):

- Female labor force participation rose dramatically for the Baby Boom generation
- But it stabilized from the ∼1965 cohort onward
- Married mothers' employment: flat since 1990s
- Yet fertility continued to decline after 2007

Cohort patterns:

Cohort	Mothers' LFP
1945	Rising
1965	Stabilized
1985	Stable

Implication: Continued increases in women's work cannot explain the post-2007 fertility decline.

⇒ We need to look elsewhere: partnership formation

Backup: Marriage and Fertility Move Together Across Cohorts

Fertility by cohort and age

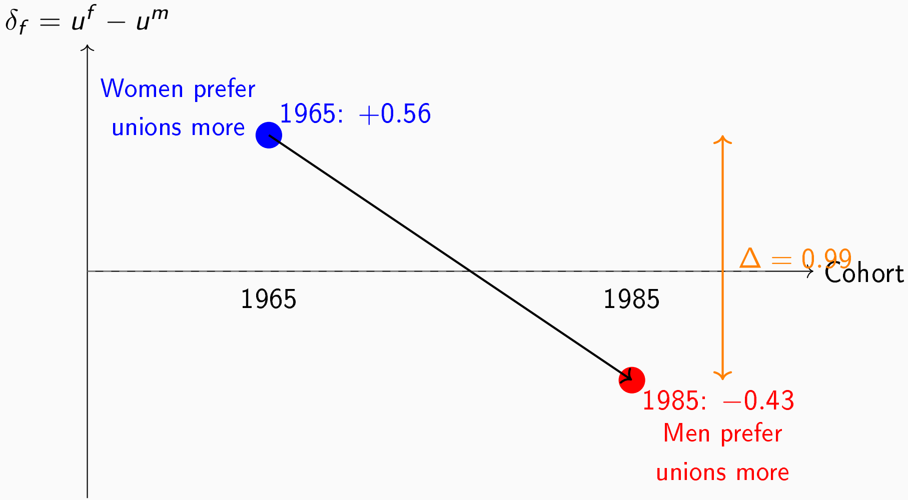
- Earlier cohorts reach higher cumulative fertility at each age
- Later cohorts exhibit lower fertility at the same ages
- Gaps persist into the late 30s

Ever-married rates by cohort and age

- Marriage rates decline sharply across successive cohorts
- Declines occur at the same ages where fertility gaps emerge

Key takeaway: Across cohorts, lower marriage rates at a given age are mirrored by lower cumulative fertility at that age, suggesting partnership formation is a key mediating channel for fertility decline.

Backup: Visualizing the Sex Difference Reversal



Complete reversal: from women valuing unions more to men valuing unions more