# Beyond Migration:
# Hukou, Marriage Matching, and Fertility in China

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# Motivation

- Rural-hukou workers can take city jobs, but their children's schooling, health care, and housing remain tied to hukou.
- This is semi-urbanization: urban jobs without equal family services.
- China's fertility is very low for its income level.

Question: How does semi-urbanization affect marriage, fertility, and welfare?

This paper:

- An equilibrium model of migration, marriage matching, and fertility.
- Estimated on the 2010 Census; used to evaluate service and mobility reforms.

# Data and Facts

## Data

- 2010 Census: marriages, spouse characteristics, recent births.
- 2012 migrant survey (couples living apart); 2005 mini-census (wages).
- Settlement-barrier index for 215 cities (Zhang and Chen, 2024).

## Facts

1. Migrant fertility has fallen especially fast.
2. Where city barriers are higher, migrant women are less likely to marry or give birth.
3. Hukou is a stronger boundary in marriage matching than education.
4. Wives with urban-hukou husbands are more likely to give birth.

# Model Overview

- Urban and rural locations; types fixed by gender, hukou, and education.
- Rural-hukou workers choose city or rural work (migration cost $\nu$).
- Everyone chooses a spouse type or stays single, with logit tastes.
- Each marriage has a contract $(\alpha_{ij}, n_{ij})$: transfer and fertility.
- Migrant parents decide where to raise children.

Preferences (both spouses)

$$u(c, n) = (1 - \beta) \log c + \beta \log n$$

Wife's budget

$$c_{ij}^F = w_i^F (1 - \chi n_{ij}) + \alpha_{ij} w_j^M - \lambda I_{ij}^{\lambda} n_{ij}$$

Fertility

$$n_{ij} = \beta \, \frac{w_i^F + \alpha_{ij} w_j^M}{\chi w_i^F + \lambda I_{ij}^{\lambda}}$$

# Institutions: A Rural-Hukou Woman's Choices

Marriage options

| | Local urban husband | Migrant husband | Rural husband | Remain single |
|---|---|---|---|---|
| City work<br>Migration cost $\nu$ | Cross-hukou<br>Match cost $\varphi$ | Two migrants<br>Extra child cost $\lambda$ | Live apart<br>Separation cost $\sigma$ | Single |
| Rural work | Not feasible | Live apart<br>Separation cost $\sigma$ | Rural couple | Single |

Migration choice

# Market Clearing and Intuition

For each couple type $(i, j)$:

$$\underbrace{N_i^F P_i^F(j)}_{\text{women's choices}} = \mu_{ij} = \underbrace{N_j^M P_j^M(i)}_{\text{men's choices}}$$

Transfers $\alpha_{ij}$ adjust until every market clears.

## How $\lambda$ works

1. Fertility: raises the cost per child for two-migrant couples.
2. Marriage: lowers the value of two-migrant matches, so more migrants stay single.
3. Migration: moving to cities raises or lowers fertility depending on the family services available there.

# Estimation and Fit

## 19 parameters, 60 moments

| Moments | Cells |
|---|---|
| Marital fertility by couple type | 28 |
| Spouse-choice probabilities | 28 |
| City work, rural hukou | 4 |

Identifying $\lambda$: fertility of migrant wives with migrant vs. local-hukou husbands.

## Key estimates

| | |
|---|---|
| Extra child cost $\lambda$ | 0.036 |
| as % of mother's time cost | 28–57% |
| Cross-hukou cost $\varphi^F$ / $\varphi^M$ | 0.526 / 0.080 |
| Separation cost $\sigma$ | 0.379 |
| Migration cost $\nu$ | 0.44–0.62 |

Fit (corr.): fertility 0.76; matching 0.98.

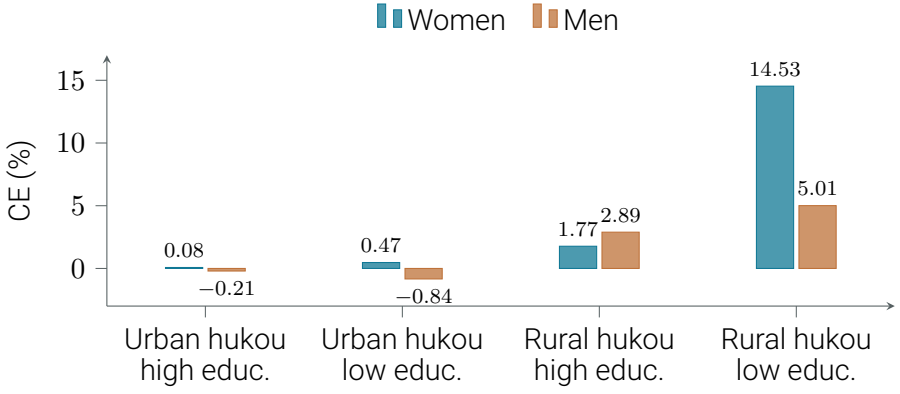
# Counterfactual 1: Equal Child Services ($\lambda = 0$)

| | Baseline | $\lambda = 0$ | Change |
|---|---|---|---|
| Married share $M$ | 0.674 | 0.789 | $+0.115$ |
| Mean marital fertility $\bar{n}$ | 1.962 | 2.340 | $+0.378$ |
| Aggregate fertility $T = M\bar{n}$ | 1.323 | 1.845 | $+0.522$ |

- 47% of the fertility gain comes from more marriages.
- Migration rises even with migration costs unchanged: low-educated rural women's city share goes from 0.40 to 0.69.

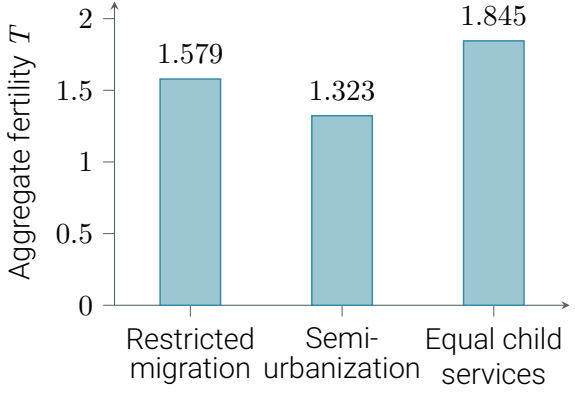
Fiscal cost

# Equal Child Services: Welfare by Gender




- Average gains: women $+9.7\%$, men $+3.7\%$.
- Local urban men lose slightly because they pay larger transfers to migrant wives.
- Fiscal cost: about 0.32% of GDP.

# Counterfactual 2: Restricted Migration




Fertility is lowest under semi-urbanization.

Restriction raises fertility because couples shift back to rural states.

But welfare falls:

Women $-6.6\%$, men $-7.1\%$

# Counterfactuals 3–4: Easier Migration and Joint Reform

Robustness

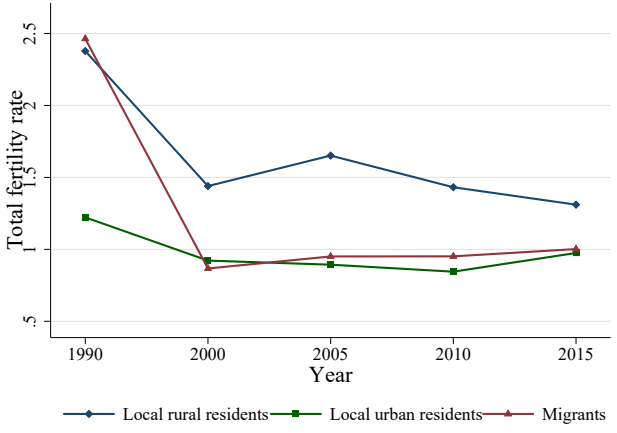
| Aggregate fertility $T$ | Current services | Equal services |
|---|---|---|
| Current migration costs | 1.323 | 1.845 |
| No migration costs ($\nu = 0$) | 1.066 | 1.971 |
| Effect of removing migration costs | $-0.257$ | $+0.126$ |

- Current services: migrants move to cities, where fewer marry and couples still pay $\lambda$.
- Equal services: the same move raises both marriage and marital fertility.
- The two reforms are complements (interaction $= +0.383$).

# Conclusion

1. Semi-urbanization yields the lowest fertility.
2. Equal child services raise both marriage and marital fertility; more marriages account for 47% of the gain.
3. Low-educated rural women gain the most; local urban men lose slightly.
4. Mobility and service reforms are complements.

# Fact 1: Fertility Has Fallen Fastest among Migrants




Census and mini-census, 1990–2015.

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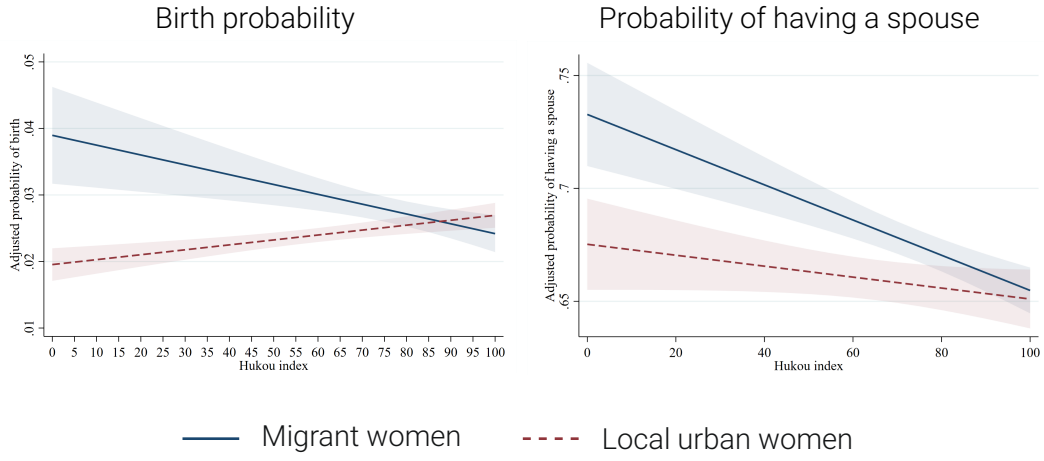
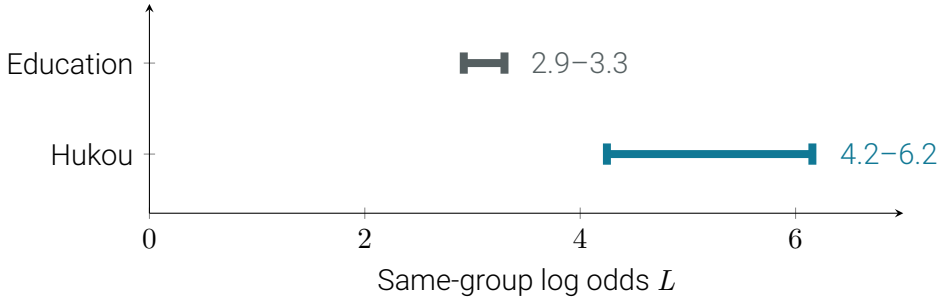
# Fact 2: Hukou Barriers, Marriage, and Births




Adjusted associations from a pooled regression with individual controls and city controls (log GDP per capita, population, house price, services share). 2010 Census, women aged 15–50, 215 cities; barrier index from Zhang and Chen (2024).

# Fact 3: Hukou Is a Strong Boundary in Marriage

2010 Census; couples working in cities.




$$L = \log\left(\frac{\mu_{AA}\mu_{BB}}{\mu_{AB}\mu_{BA}}\right)$$

$\mu_{AB}$: marriages of $A$ women with $B$ men; higher $L$ means more sorting.

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# Fact 4: Income, Hukou, and Fertility

2010 Census; women aged 20–49. Outcome: birth in the previous year.

| | (1) Income | (2) Hukou | (3) Wife's earnings |
|---|---|---|---|
| Higher-income husband | $0.009^{***}$ | | |
| | $(0.001)$ | | |
| Husband has urban hukou | | $0.016^{***}$ | |
| | | $(0.003)$ | |
| Wife's normalized income | | | $-0.057^{***}$ |
| | | | $(0.004)$ |
| Observations | 460,801 | 159,608 | 460,801 |

Separate regressions with spouses' age and education controls. Income uses type-based wage rankings.
$^{***}p < 0.01$.

# Migration Depends on Family Opportunities

For rural-hukou type $b$, the value of each location includes all its marriage options and singlehood:

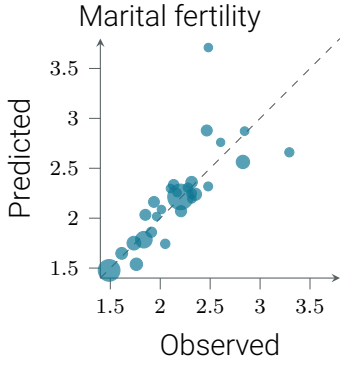
$$W^g_{\ell b} = \theta \log\Big[ \sum_{a \in \mathcal{A}_{\ell b}} \exp(\, V^g_a/\theta)\Big], \qquad \ell \in \{\, U, R\}.$$

Probability of city work:

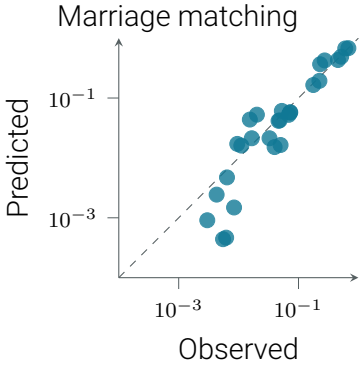
$$r^g_b = \frac{\exp[(\, W^g_{Ub} - \nu_{g,e})/\theta]}{\exp[(\, W^g_{Ub} - \nu_{g,e})/\theta] + \exp[\, W^g_{Rb}/\theta]}.$$

- Better family options in cities attract migrants even when $\nu$ is unchanged.
- Migration, matching, transfers, and fertility are solved jointly; wages are fixed.

# Model Fit: Fertility and Matching




Corr. $= 0.761$ RMSE $= 0.304$




Corr. $= 0.979$ RMSE $= 0.0437$

Singlehood fit is uneven: the model under-predicts singlehood for low-educated local urban women and high-educated rural stayers.

# What Identifies $\lambda$, and What It May Also Capture

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- $\lambda$ is disciplined by the fertility gap between migrant wives with migrant husbands and those with local-hukou husbands.
- The same gap could also reflect:
  - $\rightarrow$ selection into cross-hukou marriage;
  - $\rightarrow$ children inheriting urban hukou from local fathers;
  - $\rightarrow$ births and early child-rearing in home villages.
- Cobb–Douglas preferences imply a unit price elasticity of fertility; results are robust under CES.
- The model has no left-behind-children option.

# Fiscal Cost of Equal Child Services

$$\Delta G = \underbrace{(c_u - b_0)K_0}_{\text{existing children}} + \underbrace{(c_u - c_r)M}_{\text{additional migration}} + \underbrace{c_u B}_{\text{additional births}}$$

| Component | Share of added cost |
|---|---|
| Services for existing migrant children | 23.0% |
| Additional migration, net of rural savings | 3.1% |
| Additional births | 73.9% |
| Total additional net spending | 0.32% of GDP |

Excluding additional births: 0.08% of GDP, close to 0.07% in Gu and Wei (2016).

$c_u$, $c_r$: annual public spending per child in urban and rural areas; $b_0$: existing support per migrant child; $K_0$: existing migrant children; $M$: net decline in rural children; $B$: net increase in children.

# Robustness: CES Preferences

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| $\rho$ | Mobility: unequal services | Mobility: equal services | Interaction |
|---|---|---|---|
| 0.90 | $-0.244$ | $+0.185$ | $+0.429$ |
| 1.00 | $-0.257$ | $+0.126$ | $+0.383$ |
| 1.10 | $-0.269$ | $+0.062$ | $+0.332$ |
| 1.20 | $-0.280$ | $-0.002$ | $+0.278$ |

- All 19 parameters are re-estimated at each $\rho$.
- The interaction is positive at all 11 grid points; the sign reversal holds at 10 of 11.
- The fertility ranking across the three regimes is unchanged.