Bequests, Fertility, and Barriers to Entrepreneurship

The Intergenerational Transmission of Economic Inequality

Rouzhi Liang

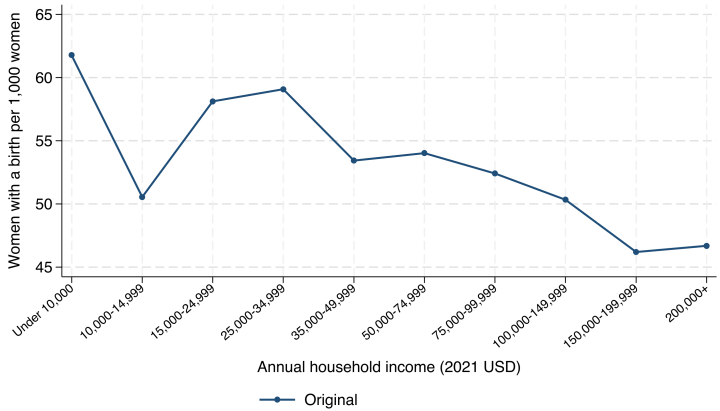
Southern Methodist University

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Motivation

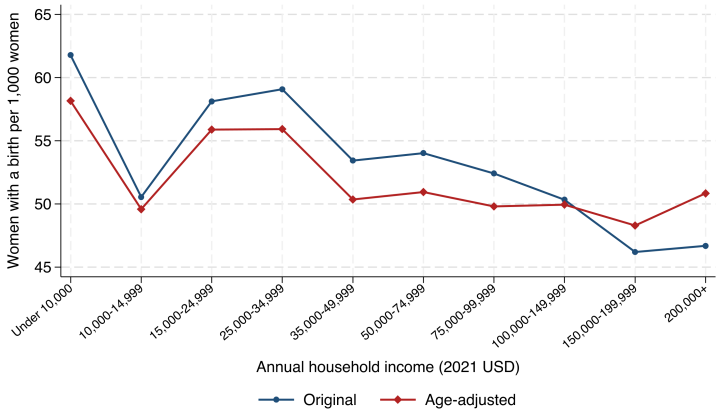
- Entrepreneurship is important for economic development, but borrowing constraints can limit entrepreneurial activities. (Evans & Jovanovic, 1989)
- Intergenerational transfers can help relax these constraints, but parental resources are shared among siblings.
- Parental income affects both family resources and fertility decisions, which together shape the resources available to each child and their entrepreneurial opportunities, with implications for:
  - Aggregate efficiency
  - Intergenerational inequality

Income and Fertility



Source: U.S. Census Bureau, 2021 ACS 1-Year PUMS.

Income and Fertility



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Paper Overview and Methodology

Question	How do parental **fertility** and **bequest** choices influence children's entrepreneurship, and how will that mechanism influence economic growth and intergenerational inequality?
Model	A two-stage **OLG** Model with endogenous fertility, bequest and entrepreneurship choices.
Calibration	Calibrate the parameters targeting US PSID data to match **entrepreneurship** and the distributions of **income, fertility and consumption**.
Counterfactuals	(1) Reducing financial barriers; (2) Shutting down the endogenous fertility channel.

Main Conclusions

- Parental choices can interact with financial barriers, generating economic efficiency loss.
- Reducing financial barriers in the U.S. increases income per capita, but it decreases the entrepreneurship rate and increases overall inequality.
- Ignoring the endogenous fertility channel leads to inaccurate estimation of intergenerational inequality.

Related Literature

- **Fertility, human capital investment & labor income**
  - Ehrlich and Kim (2007); Moav (2005)
  - → **Gap:** Focus exclusively on labor income.
- **Parental monetary transfers & income/wealth inequality**
  - *Exogenous fertility:* De Nardi (2004); De Nardi and Yang (2016)
  - *Endogenous fertility:* Pestieau (1984); Daruich and Kozlowski (2016); Cooke et al. (2017); Aso (2024)
  - → **Gap:** Abstract from the entrepreneurship channel.
- **Bequest, entrepreneurship and inequality**
  - Cagetti and De Nardi (2006); Ivanova (2023)
  - → **Gap:** Omit the dilution effect of fertility on family resources.

Contribution

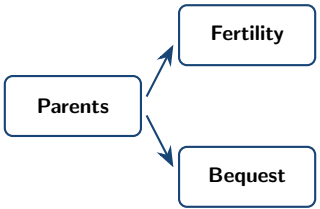
This Paper: Provides a unified model

- with endogenous fertility and bequest choices,
- to evaluate how parental decisions shape children's entrepreneurship under financial barriers,
- and to analyze how this mechanism drives economic inequality.

Model

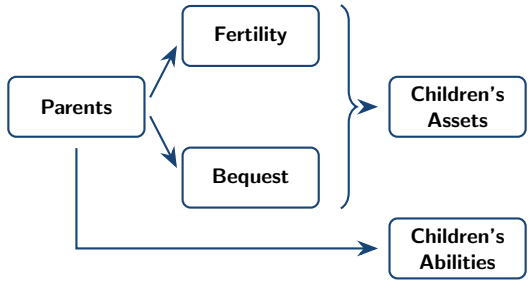
Model Overview

- A discrete-time OLG model with two periods: children and adults



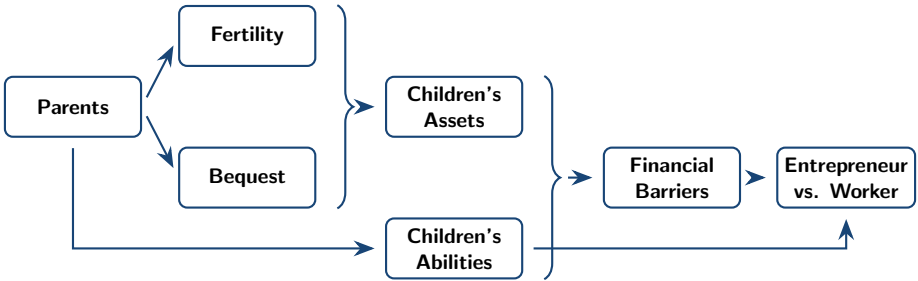
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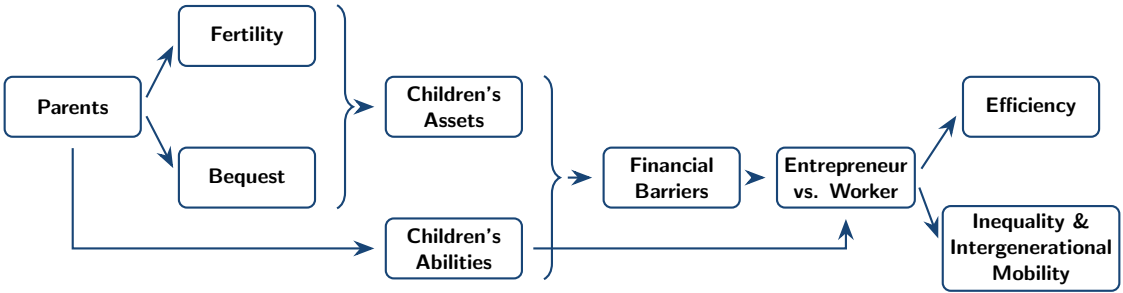
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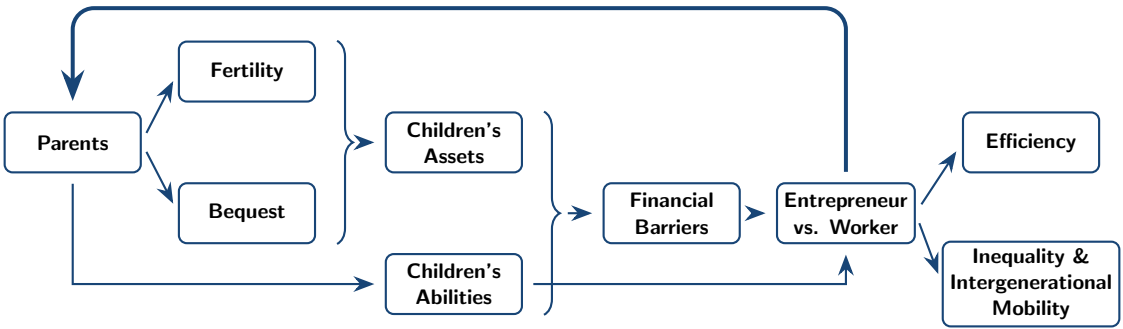
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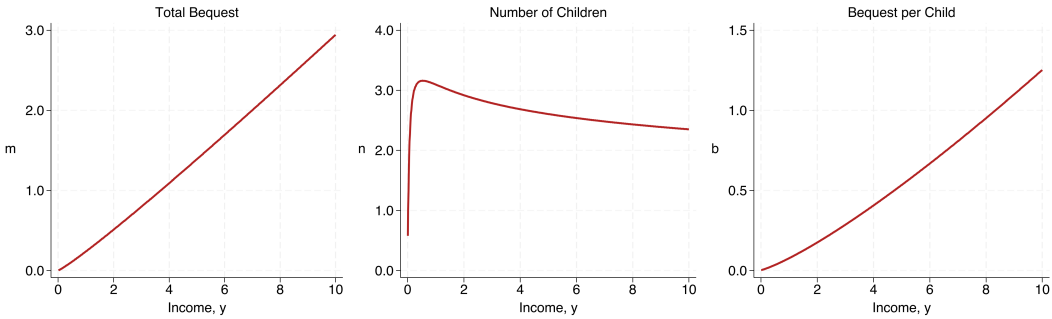
Utility Maximization

- Parents face the following utility maximization problem:

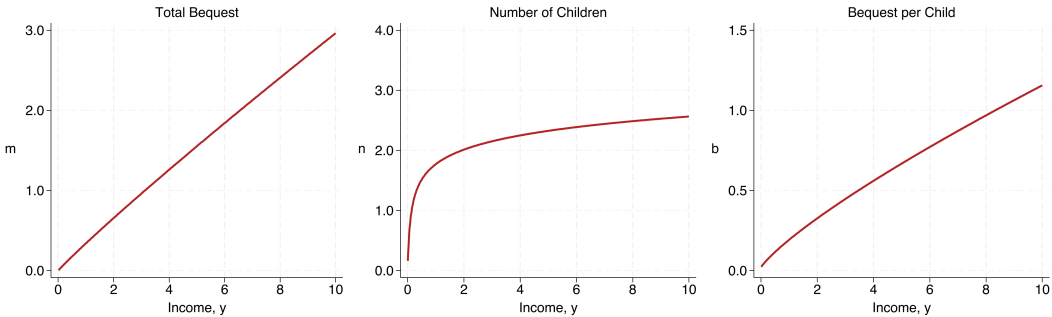
$$\max_{\{c_{it},\, n_{it},\, m_{it}\}} \Big(\theta_1 \underbrace{c_{it}}_{\text{Consumption}}^{1-\frac{1}{\varepsilon}} + \theta_2 \underbrace{m_{it}}_{\text{Total Bequest}}^{1-\frac{1}{\varepsilon}} + (1-\theta_1-\theta_2) \underbrace{n_{it}}_{\text{Number of Children}}^{1-\frac{1}{\varepsilon}} \Big)^{\frac{\varepsilon}{\varepsilon-1}}$$

$$c_{it} + m_{it} + \underbrace{(\tau\, y_{it} + \xi) n_{it}}_{\text{Child Cost}} = y_{it}$$

Income, Fertility and Bequest Dilution: $\epsilon > 1$



Income, Fertility and Bequest Dilution: $\epsilon < 1$



Asset and Talent Inheritance: Individual-Level Transmission

When children grow up, they inherit assets and abilities from their parents:

- **Financial Assets:** Each child receives an equal share of the total parental bequest:

$$a_t^{\text{child}} = \frac{m_{t-1}^{\text{parent}}}{n_{t-1}^{\text{parent}}}$$

- **Ability Transmission:** Follows intergenerational AR(1) processes in logs:

$$\text{Entrepreneurial:} \quad \log(z_t^{\text{child}}) = (1-\rho_z)\mu_z + \rho_z \log(z_{t-1}^{\text{parent}}) + \epsilon_t^{z,\text{child}},$$

$$\text{Labor:} \quad \log(h_t^{\text{child}}) = (1-\rho_h)\mu_h + \rho_h \log(h_{t-1}^{\text{parent}}) + \epsilon_t^{h,\text{child}}.$$

$$\epsilon_t^{z,\text{child}} \sim \mathcal{N}\left(0, \sigma_{\epsilon,z}^2\right) \quad \text{and} \quad \epsilon_t^{h,\text{child}} \sim \mathcal{N}\left(0, \sigma_{\epsilon,h}^2\right).$$

Fertility and the Distribution of Assets and Abilities

Heterogeneous fertility choices reshape the next generation through two channels:

- **Resource Dilution:** larger family size reduces inherited assets per child, given total parental bequests.

- **Population Composition:** parents with more children contribute a larger share of the next generation, reshaping the joint distribution of inherited assets and abilities.

Limited Commitment & Endogenous Borrowing Limits

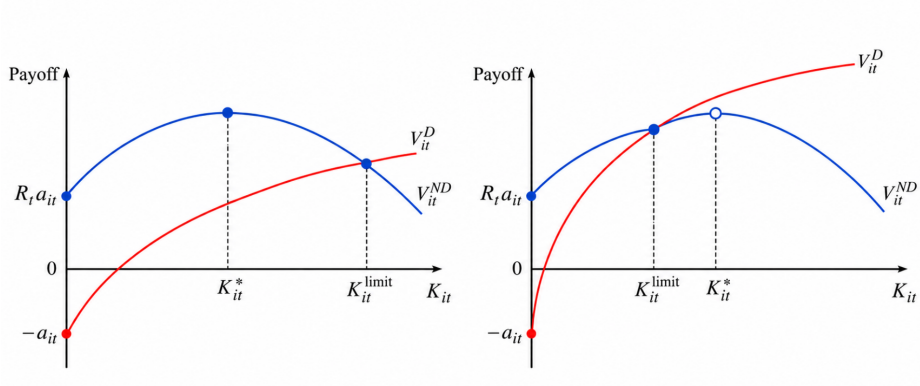
- Default Option: Entrepreneurs can borrow from a bank and
  - produce & repay the interest, or
  - default, keep $1-s$ of profit net labor cost, but lose the asset
- Banks lend up to the maximum amount consistent with entrepreneurs' repayment incentives:

$$\underbrace{\max_{\{K_{it}\in[0,K_{it}^{\text{limit}}],L_{it}\}}(1-s)\{A(z_{it})^{1-\alpha-\beta}(K_{it})^{\alpha}L_{it}^{\beta}-W_tL_{it}\}}_{\text{Default Profit}}-\underbrace{a_{it}}_{\text{Punishment}}$$

$$\leq\underbrace{\max_{\{K_{it}\in[0,K_{it}^{\text{limit}}],L_{it}\}}\{A(z_{it})^{1-\alpha-\beta}(K_{it})^{\alpha}L_{it}^{\beta}-R_tK_{it}-W_tL_{it}\}}_{\text{Non-default Profit}}+\underbrace{R_ta_{it}}_{\text{Asset Return}}$$

- Capital limit is an increasing function of s,a_{it} and z_{it}.

Unconstrained and Constrained Individuals

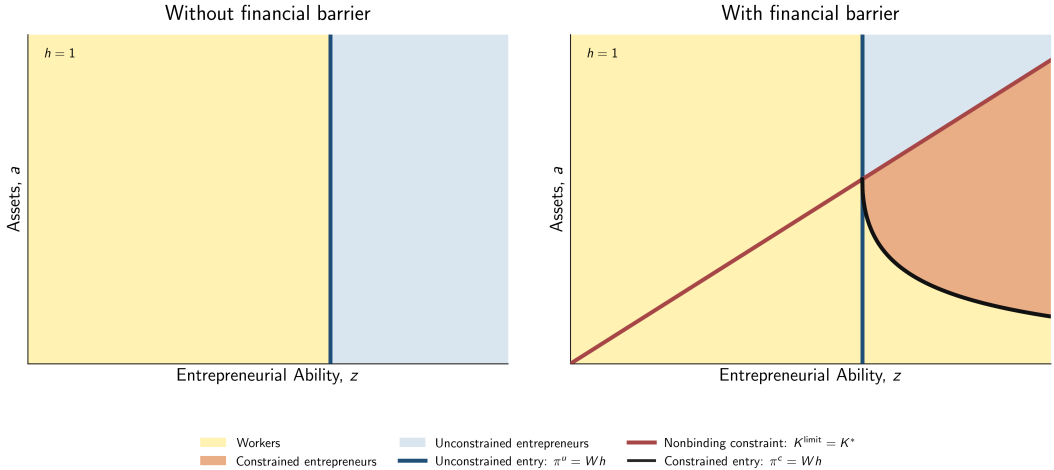


Occupation Choice: Workers vs. Entrepreneurs

- Workers supply h_{it} efficiency units of labor; W_t is the wage per efficiency unit.
  - Workers' income:
$$y_{it}^{W} = W_t h_{it} + R_t a_{it}.$$
- Entrepreneurs choose capital K_{it} and labor in efficiency units L_{it}:
$$\pi_{it}^{*} = \max_{\{K_{it} \leq K_{it}^{\text{limit}}, L_{it}\}} \left\{ A z_{it}^{1-\alpha-\beta} K_{it}^{\alpha} L_{it}^{\beta} - R_t K_{it} - W_t L_{it} \right\}.$$
  - Entrepreneurs' income:
$$y_{it}^{E} = \pi_{it}^{*} + R_t a_{it}$$

  .
- Occupational choice:
$$o_{it} = \begin{cases} 1 & \text{if} \quad y_{it}^{\text{E}} \geq y_{it}^{\text{W}} \\ 0 & \text{if} \quad y_{it}^{\text{E}} < y_{it}^{\text{W}} \end{cases}$$

Occupational Choice and Efficiency Loss



Equilibrium

State variable: $\mathbf{x} = (a, z, h)$. In equilibrium:

- Adults maximize utility subject to the budget constraint.
- The bank sets up capital limits for each individual.
- Entrepreneurs maximize profits given K_{it}^{limit}.
- Adults make optimal occupational choices.
- Labor and capital markets clear:

$$\int_{i_t \in W} h_{it}\, di_t = \int_{i_t \in E\&Unconstrained} L_{it}^{*}\, di_t + \int_{i_t \in E\&Constrained} L_{it}^{\text{limit}}\, di_t$$

$$\int_{i_t} a_{it}\, di_t = \int_{i_t \in E\&Unconstrained} K_{it}^{*}\, di_t + \int_{i_t \in E\&Constrained} K_{it}^{\text{limit}}\, di_t$$

- The joint distribution of (a, z, h) is stationary, accounting for endogenous fertility and intergenerational transmission.

Calibration

Calibration Summary

- **Jointly calibrated: 12 parameters**

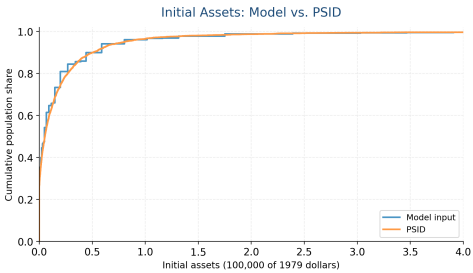
$$\underbrace{\tilde{s}, g, A}_{\text{production/finance}} \qquad \underbrace{\sigma_e, \sigma_h, \rho_e, z_e^\star}_{\text{ability}} \qquad \underbrace{\theta_1, \theta_2, \varepsilon, \tau, \xi}_{\text{preferences/child costs}} \quad .$$

- **Production:** $\alpha = (1-g)/3$ and $\beta = 2(1-g)/3$.
- **Normalize abilities**
- Working ability persistence ρ_h matches PSID labor income persistence.
- $\sigma_{\epsilon,z}, \sigma_{\epsilon,h}$ implied by dispersion and persistence.

Calibration procedure. Given initial assets and ability distributions, clear capital and labor markets and match *first-generation choices* to the data:

$$Q(\vartheta) = \sum_{j=1}^{12} \left[\frac{m_j^{\text{model}}(\vartheta) - m_j^{\text{data}}}{\max\{|m_j^{\text{data}}|,\, 0.05\}} \right]^2 .$$

Model Inputs



Model VS PSID Wealth Distribution

Input Distributions

- **Initial Assets:** PSID wealth level between ages 28 and 32.
- **Ability:** Log-normal with Gaussian intergenerational log-AR(1) transmission.
- **Superstar entrepreneurs:** mass 0.3%; inheritance probability 1%.

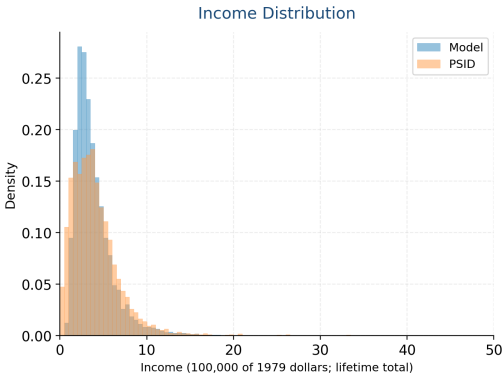
Calibration: Parameters and Target Moments

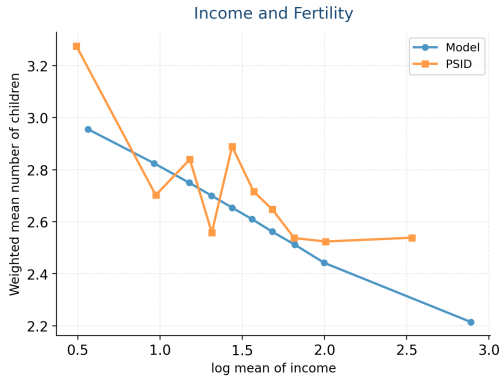
Param.	Description	Value	Target Moment	Data
Production			**Income & Earnings**	
$\tilde{s}$	Financial friction	0.9607	Log mean income, $\log E[y]$	1.414
g	Span of control	0.0672	Log median income	1.270
α	Capital elasticity (derived)	0.3109	Income Gini	0.367
β	Labor elasticity (derived)	0.6218	Bottom-50% income share	0.249
A	Effective productivity	8.0712	Income P_{90}/P_{50}	2.075
			Worker earnings P_{90}/P_{50}	1.992
Ability			**Entrepreneurship**	
σ_e	Entrepreneurial log-ability dispersion	0.4797	Entrepreneurship rate	0.090
σ_w	Worker log-ability dispersion	0.5089	$P(E_c \mid E_f) - P(E_c \mid W_f)$	0.160
ρ_e	Entrepreneurial persistence	0.2654		
ρ_h	Worker persistence	0.5320		
$z_e^\star$	Superstar ability	50.49		
Preferences			**Household Choices**	
θ_1	Consumption utility weight	0.3641	Consumption–income ratio	0.388
θ_2	Bequest utility weight	0.2956	Mean number of children	2.723
ε	CES elasticity	1.2424	Fertility elasticity: low–mid	−0.121
τ	Proportional child cost	0.1370	Fertility elasticity: mid–high	−0.112
ξ	Fixed monetary child cost	0.00918		

Model Fit

Target Moment	Data	Model
Income & Earnings		
Log mean income, $\log E[y]$	1.414	1.466
Log median income	1.270	1.209
Income Gini	0.367	0.366
Bottom-50% income share	0.249	0.266
Income P_{90}/P_{50}	2.075	2.009
Worker earnings P_{90}/P_{50}	1.992	2.042
Entrepreneurship		
Entrepreneurship rate	0.090	0.090
$P(E_c \mid E_f) - P(E_c \mid W_f)$	0.160	0.161
Household Choices		
Consumption–income ratio	0.388	0.387
Mean number of children	2.723	2.720
Fertility elasticity: low–mid	−0.121	−0.121
Fertility elasticity: mid–high	−0.112	−0.112

Income and Fertility





Counterfactuals

Counterfactual: Financial Barriers and Economic Development

	2nd generation	Steady state
Entrepreneurship rate		
$\tilde{s} = \tilde{s}^{\text{baseline}}$	8.72%	8.68%
$\tilde{s} = 1$	-9.25%	-8.93%
$\tilde{s} = 10^{-5}$	+277.42%	+322.09%
Income per capita		
$\tilde{s} = \tilde{s}^{\text{baseline}}$	5.224	5.692
$\tilde{s} = 1$	+0.04%	+0.04%
$\tilde{s} = 10^{-5}$	-16.58%	-21.88%
Mean CES utility		
$\tilde{s} = \tilde{s}^{\text{baseline}}$	1.995	2.170
$\tilde{s} = 1$	+0.01%	+0.03%
$\tilde{s} = 10^{-5}$	-9.51%	-14.41%

Counterfactual: Financial Barriers, Inequality, and Mobility

	2nd generation	Steady state
Income Gini coefficient		
$\tilde{s} = \tilde{s}^{\text{baseline}}$	0.313	0.297
$\tilde{s} = 1$	+0.29%	+0.15%
$\tilde{s} = 10^{-5}$	-6.63%	-10.61%
Income P90/P50		
$\tilde{s} = \tilde{s}^{\text{baseline}}$	1.903	1.887
$\tilde{s} = 1$	+0.05%	+0.14%
$\tilde{s} = 10^{-5}$	-1.14%	-0.75%
Bottom-to-top mobility		
$\tilde{s} = \tilde{s}^{\text{baseline}}$	10.70%	10.16%
$\tilde{s} = 1$	+0.28%	-2.80%
$\tilde{s} = 10^{-5}$	+30.67%	+46.43%

$\tilde{s} = 1$: Trade-off Between Efficiency and Equity

Equilibrium outcome	$\tilde{s} = \tilde{s}^{\text{baseline}}$	$\tilde{s} = 1$
	Level	*Change (%)*
Interest rate, R	2.7255	$+1.69\%$
Wage per efficiency unit, W	4.2931	-0.40%
Entrepreneurship rate	8.68%	-8.93%
Average firm size	10.52	$+10.73\%$

Counterfactual: Endogenous vs. Fixed Fertility

	2nd generation		Steady state	
	Endogenous	$n = \bar{n}$	Endogenous	$n = \bar{n}$
Income Gini	0.313	0.00%	0.297	-4.11%
Income P90/P50	1.903	0.00%	1.887	-1.27%
Mobility	10.70%	-1.50%	10.16%	+4.92%

Conclusion

- **An OLG Framework:**
  Integrates endogenous fertility, bequests, and occupational choices under borrowing constraints, calibrated by US PSID data.

- **Macroeconomic Trade-offs:**
  Alleviating financial barriers boosts income per capita and welfare, but *exacerbates* income inequality and *lowers* mobility.

- **The Fertility Channel:**
  Standard models that exclude fertility choices inaccurately estimate income inequality and intergenerational mobility.

Ongoing & Future Work

- **Self-Financing Dynamics:**
  Exploring how entrepreneurs accumulate wealth to overcome credit limits over the life cycle.

- **Endogenous Human Capital:**
  Incorporating parental human capital investments.

Thank you

Assets, Entrepreneurial and Working Abilities

