

Entrepreneurship, Frictions, and Wealth

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Previous work:

- Potential and existing entrepreneurs face borrowing constraints.
- Entrepreneurship is key to understand wealth inequality.

Entrepreneurs and borrowing constraints

- Entrepreneurial choice depends on own assets and received bequests
- Entrepreneur's portfolio undiversified
- Collateral

Entrepreneurs and wealth inequality

- Wealth more concentrated than labor earnings and income
- Small fraction of entrepreneurs hold large share of total wealth (they also have higher saving rates)

Related Literature

- Entrepreneurial choice
Gentry and Hubbard, Evans and Jovanovic, Quadrini
- Wealth accumulation
Diaz-Gimenez et al., Quadrini and Rios-Rull, Castañeda et al., De Nardi
- Optimal contracts
Albuquerque and Hopenhayn, Monge

What we do:

- Construct a quantitative model consistent with observed data.
- Evaluate model along dimensions not matched by construction.
- Study effects of borrowing constraints on aggregates and wealth inequality.

Preview of results

- Model accounts very well for wealth distributions of entrepreneurs and workers
- Generates entry into entrepreneurship consistent with Hurst and Lusardi's estimates
- Model generates entrepreneurial returns consistent with those in SCF data
- More stringent borrowing constraints \Rightarrow less inequality but also less investment
- Voluntary bequests important for wealth concentration

The model

Demographics

households: overlapping generations (possibly) with altruism.

Two stages of life: young and old, stochastic aging

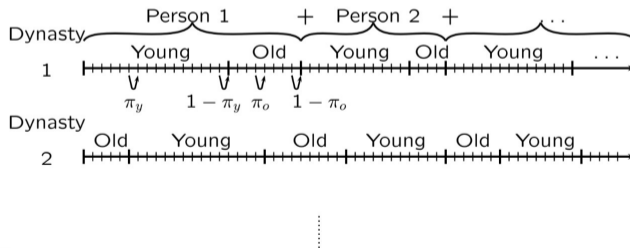
$1 - \pi_y$ = pr of aging

$1 - \pi_o$ = pr of dying

Demographics: OLG with stochastic aging

1 model period = 1 year

Trick to keep computations manageable with short time periods



Household's preferences

Period utility: CRRA in consumption

$$\frac{c^{1-\sigma}}{1-\sigma}$$

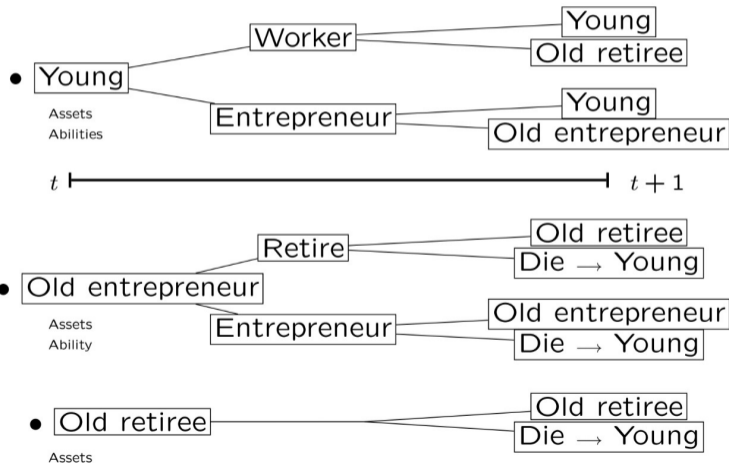
Discount the future at rate β .

Potentially altruistic toward own descendants (η).

Technology

- Entrepreneurial sector:
 $(1 - \delta)k + \theta k^\nu \quad 0 < \nu < 1$
- Non-entrepreneurial sector:
Cobb-Douglas tech employs all workers and the rest of the capital

Time line of decisions



Households

- Observe (y, θ)
- Choose (w, e) for the period
- Workers earn y
- Entrepreneurs invest k

Credit market constraints

- Imperfectly enforceable contracts:
can borrow $(k - a)$, be worker, keep fk , creditors seize $(1 - f)k$
value (investing and repaying) \geq value (keeping fk) and being worker
- e can borrow at \bar{r} , invest k , worker can save at \bar{r}

Young's problem

$$V(a, y, \theta) = \max\{V_e(a, y, \theta), V_w(a, y, \theta)\}$$

Young entrepreneur's problem

$$V_e(a, y, \theta) = \max_{c, k, a'} \left\{ u(c) + \beta \pi_y EV(a', y', \theta') + \beta(1 - \pi_y)EW(a', \theta') \right\}$$

$$a' = (1 - \delta)k + \theta k^\nu - (1 + \bar{r})(k - a) - c, \quad a \geq 0, \quad k \geq 0$$

$$V_e(a, y, \theta) \geq V_w(f \cdot k, y, \theta)$$

Young worker's problem

$$V_w(a, y, \theta) = \max_{c, a'} \left\{ u(c) + \beta \pi_y EV(a', y', \theta') + \beta(1 - \pi_y)W_r(a') \right\}$$
$$a' = (1 + \bar{r})a + w_g y - c, \quad a' \geq 0$$

Old entrepreneur's problem

$$W(a, \theta) = \max \left\{ W_e(a, \theta), W_r(a) \right\}$$

$$W_e(a, \theta) = \max_{c, k, a'} \left\{ u(c) + \beta \pi_o EW(a', \theta') + \eta \beta (1 - \pi_o) EV(a', y', \theta') \right\}$$

$$a' = (1 - \delta)k + \theta k^\nu - (1 + \bar{r})(k - a) - c, \quad a \geq 0, \quad k \geq 0$$

$$W_e(a, \theta) \geq W_r(f \cdot k)$$

Old retiree's problem

$$W_r(a) = \max_{c, a'} \left\{ u(c) + \beta \pi_o E W_r(a') + \eta \beta (1 - \pi_o) E V(a', y', \theta') \right\}$$

$$a' = (1 + \bar{r})a + p - c, \quad a' \geq 0$$

Equilibrium

Prices, decision rules and distribution m over x such that

- Decision rules solve hh's problem
- Capital and labor mkts clear
- Prices equal marginal products
- m is invariant distribution

Calibration

| Fixed Parameter | Value |
|--------------------|---------------------------|
| σ | 1.5 |
| δ | .06 |
| α | .33 |
| A | 1 |
| π_y | .98 |
| π_o | .91 |
| P_y | + |
| ρ | 40% average yearly income |
| η | 1.0 |

| Calibrated Parameter | Value |
|-------------------------|-----------|
| β | .865 |
| θ | [0, 0.51] |
| P_θ | see text |
| ν | .88 |
| f | 75% |

Chosen to match match

- Capital to GDP ratio
- Fraction of entrepreneurs in population
- Fraction of entrepreneurs becoming workers each period
- Fraction of workers becoming entrepreneurs each period
- Median net worth of entr./median net worth. workers
- Fraction of people with zero wealth

SCF questions:

1. “Do you work for someone else, are you self-employed, or what?”
2. “Do you (and your family living here) own or share ownership in any privately-held businesses, farms, professional practices or partnerships?”
3. “Do you (or anyone in your family living here) have an active management role in any of these businesses?”

| | % in pop. | Share tot. wealth |
|-------------------|-----------|-------------------|
| Bz. owners or SE | 16.7 | 52.9 |
| All bz. owners | 13.3 | 48.8 |
| Active bz. owners | 11.5 | 41.6 |
| All SE | 11.1 | 39.0 |
| SE bz. owners | 7.6 | 33.0 |

| | median | mean |
|--------------------------------|--------|------|
| Whole population | 47 | 189 |
| Business owners or SE | 172 | 599 |
| All business owners | 205 | 695 |
| Bus owners but not active mgmt | 293 | 768 |
| Business owners not SE | 179 | 470 |
| All self-employed | 169 | 665 |
| SE (active) business owners | 265 | 829 |
| SE and not business owners | 36 | 224 |

| | | | | |
|------------------------|----|----|----|----|
| Top % | 1 | 5 | 10 | 20 |
| Whole population | | | | |
| % total net worth held | 30 | 54 | 67 | 81 |
| Bz. owners or SE | | | | |
| % hhs in given perc. | 81 | 68 | 54 | 39 |
| All Bz. owners | | | | |
| % hhs in given perc. | 76 | 62 | 49 | 36 |
| Active Bz. owners | | | | |
| % hhs in given perc. | 65 | 51 | 42 | 30 |
| SE | | | | |
| % hhs in given perc. | 62 | 47 | 38 | 26 |
| SE and Bz. owners | | | | |
| % hhs in given perc. | 54 | 39 | 32 | 22 |

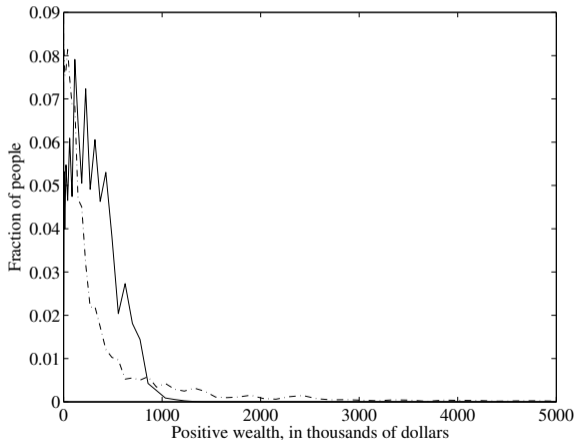
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Evaluate model along:

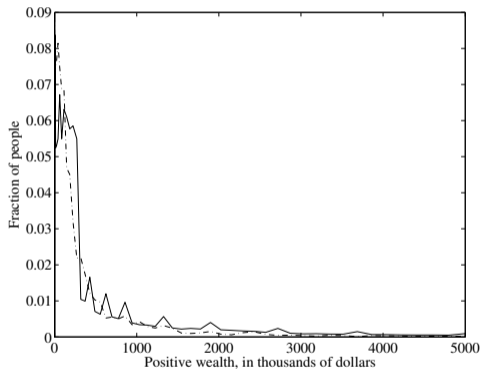
- Overall wealth distribution
- Entrepreneurs' wealth distribution
- Hurst and Lusardi's key regression results
- Private equity returns

| K/Y | Wealth Gini | Perc. entr. | Perc. wealth in the top | | | |
|-----------------------------|----------------|----------------|-------------------------|----|-----|-----|
| | | | 1% | 5% | 20% | 40% |
| <hr/> | | | | | | |
| U.S. data | | | | | | |
| 3.0 | .78 | 7.6% | 30 | 54 | 81 | 94 |
| <hr/> | | | | | | |
| Baseline with entrepreneurs | | | | | | |
| 3.0 | .8 | 7.5% | 31 | 60 | 83 | 94 |
| <hr/> | | | | | | |

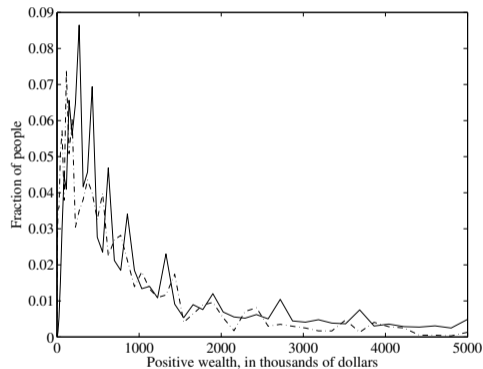
Distribution of wealth, model without entrepreneurs. Dash-dot: data; Solid: model.



Distribution of wealth, model with entrepreneurs



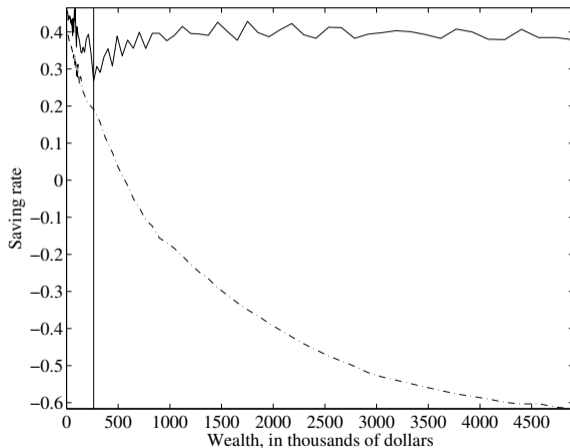
Population



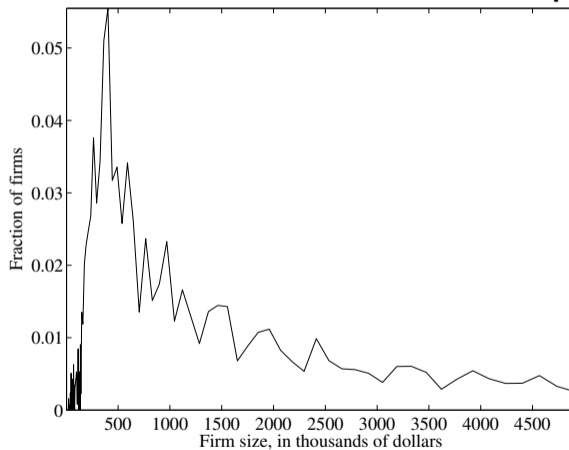
Entrepreneurs

Dash-dot line: data; Solid line: baseline model.

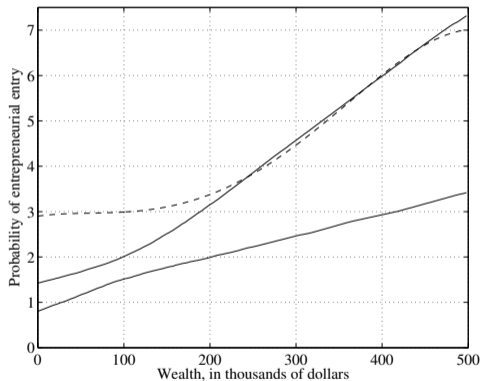
Saving rate for highest-ability workers. Solid: high entr. ability; dash-dot: no entr. ability



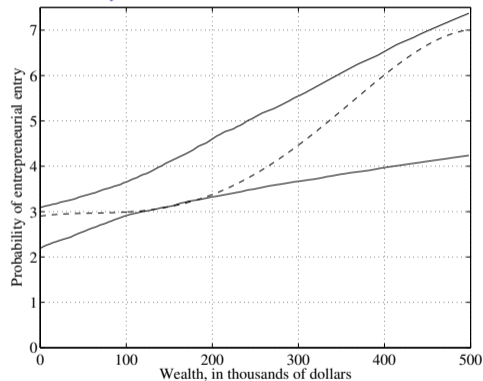
Firm size distribution, baseline model with entrepreneurs.



Probability of entering entrepreneurship as function of own wealth (as Hurst and Lusardi).



Benchmark



Small fraction of “non-entrepreneurial self-employed”

Median rate of return (income divided by business net worth).

SCF data, capital income only: 3%

SCF data, total income: 40%

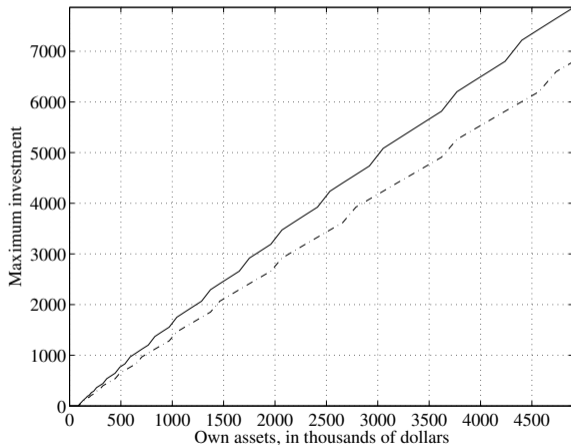
Model, total income: 47%

Model, total income, 10% underreporting: 40%

Model, total income, 20% underreporting: 35%.

| Capital- output ratio | Wealth Gini | Perc. entr. | Percentage wealth in the top | | | |
|---|----------------|----------------|------------------------------|----|-----|-----|
| | | | 1% | 5% | 20% | 40% |
| U.S. data | | | | | | |
| 3.0 | .78 | 7.6% | 30 | 54 | 81 | 94 |
| Baseline with entrepreneurs | | | | | | |
| 3.0 | .80 | 7.5% | 31 | 60 | 83 | 94 |
| More stringent borrowing constraints: $f = 0.85$ | | | | | | |
| 2.7 | .72 | 6.9% | 24 | 49 | 75 | 91 |
| No altruism: $\eta = 0$, only involuntary bequests | | | | | | |
| 2.5 | .72 | 7.6% | 21 | 45 | 73 | 90 |
| $\eta = 0$, recalibrated β | | | | | | |
| 3.0 | .80 | 7.9% | 28 | 57 | 81 | 94 |

Maximum investment. Solid line: baseline; dash-dot line: more restrictive BC.



Summary of results

- Model accounts very well for wealth distributions of entrepreneurs and workers
- Model generates entry into entrepreneurship consistent with Hurst and Lusardi's estimates
- Model generates entrepreneurial returns consistent with those in SCF data
- More stringent borrowing constraints \Rightarrow less inequality but also less investment
- Voluntary bequests important for wealth concentration

Algorithm

1. Construct grid for state variables
2. Fix tax rate, wage, and interest rate
3. Fix $\hat{k}(\dots) = k_{max}$
4. Solve value functions by value function iteration
5. Check endogenous b.c.
6. If not satisfied, update $\hat{k}(\dots)$
7. Iterate until $\hat{k}(\dots)$ satisfies end. b.c.
8. Compute transition matrix
9. Compute invariant distribution by iterating on it
10. Compute total savings and total capital invested by the entrepreneurial sector implied by invariant distribution and hence capital in the non-corporate sector. Same for labor.
11. Compute implied wages and interest rate
12. iterate until capital markets clear

U.S. wealth and earnings distributions

| Percentage held by the top | 1% | 5% | 20% | 40% | 80% |
|----------------------------|----|----|-----|-----|-----|
| Wealth | 30 | 54 | 81 | 94 | 100 |
| Gross earnings | 6 | 19 | 48 | 72 | 98 |