

# Wealth Distribution

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## Key facts

Wealth is more concentrated than earnings and income.

Wealth Gini: **0.8**.

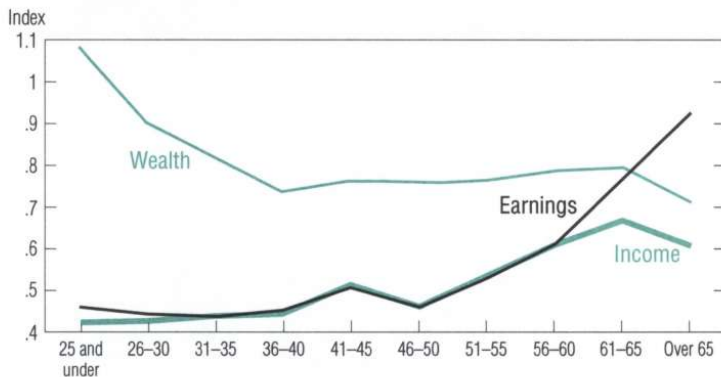
Top 1% hold **35%** of wealth

Bottom 10% hold negative wealth

Bottom **40%** hold negligible wealth.

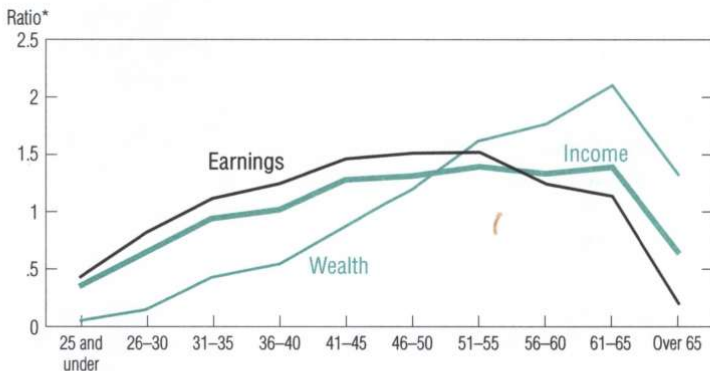
# The role of age

Age does not account for wealth inequality.



Source: Rodríguez et al. (2002)

# Age profiles



Source: Rodríguez et al. (2002)

The figure shows mean wealth / income / earnings by age.

Wealth peaks much later than earnings.

# A benchmark model

Can the standard life-cycle model account for wealth concentration?

Starting point: Huggett (1996)

Purpose:

- ▶ Explore implications of the simplest, reasonable models
- ▶ What is hard to get?

# Model Features

Demographics:

- ▶ In each period,  $1/a_D$  identical households are born.
- ▶ Each lives for  $a_D$  periods (years).
- ▶ Age of retirement is fixed ( $a_R$ ).

Preferences:

$$\mathbb{E} \sum_{a=1}^{a_D} \beta^a u(c_a) \quad (1)$$

# Model Features

Technology:

$$F(K, L) = (1 - \delta)K + C + G + K' \quad (2)$$

Endowments:

- ▶ Working agents are endowed with labor efficiency  $\eta_a e_a$
- ▶  $\eta_a$ : age-efficiency profile (deterministic; exogenous)
- ▶  $e_a$ : labor efficiency (wage) shock; Markov chain

# Model Features

## Government:

- ▶ Taxes labor income:  $T = \tau_w w L$
- ▶ Eats  $G$
- ▶ Pays transfers  $X$  to retired households (annuitized income in the data)
- ▶ Balanced budget:  $G + X = T$

## Markets:

- ▶ Labor: wage  $w$
- ▶ Capital rental:  $r$
- ▶ Goods: numeraire.



# Household problem

Exogenous state variables  $s = (a, e)$  are

- ▶ age  $a$
- ▶ labor endowment  $e$ : .

Endogenous state variable: wealth  $k$ .

Borrowing constraint:  $k \geq 0$ .

# Household Dynamic Program

$$V(k, s) = \max u(y(k, s) - k') + \beta \mathbb{E} V(k', s') \quad (3)$$

with

$$y(k, s) = Rk + w(1 - \tau_w) \eta_a e + \varpi(s) \quad (4)$$

subject to  $k' \geq 0$  (or a fixed borrowing limit).

Euler equation:

$$u'(c) \geq \beta R \mathbb{E} u'(c') \quad (5)$$

with equality if  $k' > 0$ .

*Solution* is a consumption function  $c(k, a, e)$

## Stationary equilibrium: objects

- ▶  $\Gamma(k,s)$ : distribution of households over states
- ▶ Household policy function  $c(k,s)$  and value function  $V(k,s)$ .
- ▶ Aggregate quantities:  $K,L,X$ .
- ▶ Price functions:  $r(K,L), w(K,L)$ .

# Equilibrium conditions

Household policy and value functions are optimal.

Prices equal marginal products:

►  $r = F_K(K, L), w = F_L(K, L).$

Goods market clears:  $Y = C + I + G.$

Labor market clears:  $L = \sum_s e(s) \eta(s) \Lambda(s).$

Capital market clears:  $K = \sum_s \int_k \Gamma(k, s) k dk.$

Distribution of households is stationary.

# Calibration

Standard functional forms (e.g., Cobb Douglas technology).

This is an “old fashioned” calibration

- ▶ the number of data moments exactly matches the number of calibrated parameters.

Calibrated parameters:  $\beta, \delta, A$ .

Calibration targets:  $K/Y, w = 1, R$ .

Labor efficiencies: approximate an AR(1) that is estimated from panel data (PSID).

## Results

Fraction held by top	1%	5%	20%	Gini	Fraction neg. wealth
Huggett (1996)	10.8	32.4	68.9	0.70	19%
U.S. data	<b>34.7</b>	57.8	81.7	0.80	11%

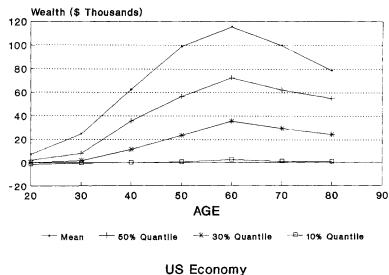
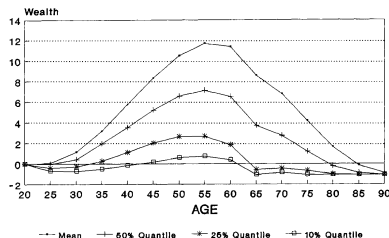
The model has too many households without wealth.

Still, the wealth Gini is lower than in the data.

The key failure: the top 1% are not rich enough.

The literature has been preoccupied with matching the top 1% ever since.

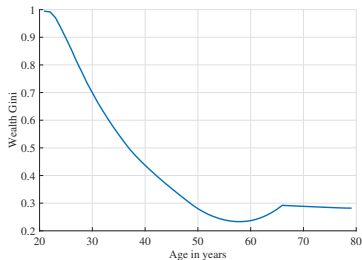
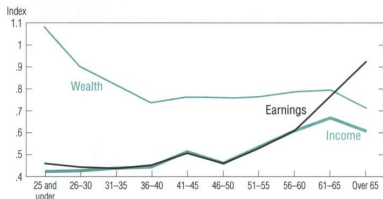
# Age profiles



The old dissave much too fast.

This is from a model with borrowing.

# Age matters too much



Source: Rodríguez et al. (2002) and my calculations.



## An accounting problem

*Given the estimated earnings process, it is not feasible for Huggett's households to accumulate the highest SCF wealth observations.*

- ▶ The earnings process is estimated from the PSID.
- ▶ Wealth is estimated from the SCF.
- ▶ The SCF over-samples the rich; the PSID does not.

The model cannot account for the highest wealth observations *by construction*.

- ▶ The highest PSID incomes are simply not large enough.

Problem: There is no publicly available U.S. dataset from which an untruncated earnings process could be estimated.

# Possible solutions

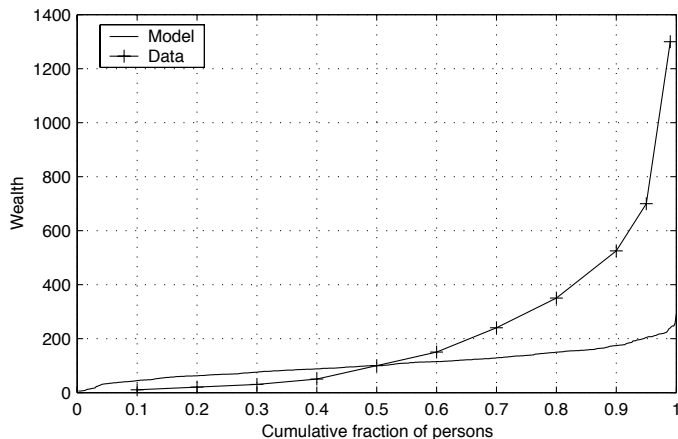
One solution: Castaneda et al. (2003)

- ▶ Invent an earnings process that is consistent with the cross-sectional distribution of earnings from the SCF

Use administrative data: (De Nardi et al., 2018)

# Wealth and earnings

Wealth and lifetime earnings are too strongly correlated.



Life-cycle model versus Venti and Wise (2000) data (5th lifetime income decile)

# Conclusion

Huggett's model goes a long way towards accounting for wealth inequality.

Main discrepancies:

- ▶ Model misses the very top of the distribution.  
This may be due to the truncated earnings process.
- ▶ Wealth is decumulated too slowly at old age.
- ▶ The model only accounts for the cross-sectional distribution  
How does it do with respect to other moments?

# Surveys

- ▶ De Nardi and Fella (2017)
- ▶ Benhabib and Bisin (2018)

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Venti, S.F., Wise, D.A., 2000. Choice, Chance, and Wealth Dispersion at Retirement. Working Paper 7521. National Bureau of Economic Research. URL:  
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