

Inheritance, Wealth Distribution, and Estate Taxation

Yanran Guo
UNC - Chapel Hill

2022. 1. 5

Research Question

- Quantitatively, how important is inheritance in determining wealth inequality?
- Can estate tax reduce wealth inequality?

What I Do

1. Measure what fraction of wealth is inherited with a focus on the rich.

Result: 13% ~ 20% of their wealth is inherited; half don't inherit

- Literature: aggregated empirical evidence
 - Intergenerational transfers account for 51% of net worth accumulation (Gale and Scholz, 1994)
 - 56% of wealth transfers go to the richest 10 percent (Feiveson and Sabelhaus, 2018)

2. Extend standard theory to account for the new facts on inheritance.
- Literature: use bequest motive as a modeling device
 - Castaneda, Diaz-Gimenez, and Rios-Rull (2003), Cagetti and De Nardi (2009)
 - De Nardi (2004), De Nardi and Yang (2016)

3. Quantify the effect of estate tax reform in my model framework.

Results:

- Almost no effect on wealth distribution
- But welfare gains
- Welfare maximizing estate tax rate is 0.94.

Data and Empirical Findings

Survey of Consumer Finances (SCF) data from 1989 to 2019

- Net worth definition
- Information on up to three wealth transfers the household has received
 - The year in which the transfer was received
 - The value of the transfer when received

Sample selection:

Households who are ≥ 60 years old and don't expect to receive a substantial inheritance or transfer of assets in the future.

Direct estimation of inheritance:

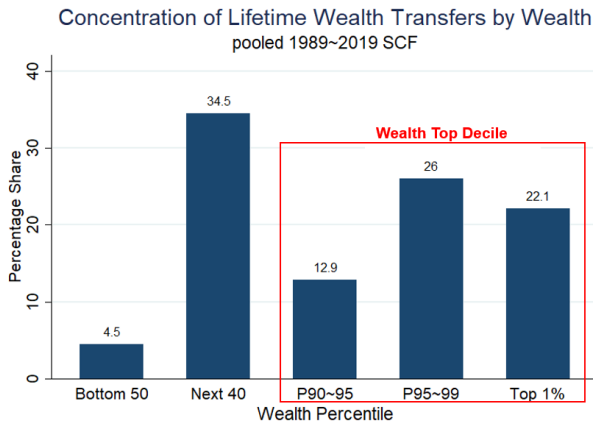
- Present value of inheritance is computed using a real interest rate of 3%
- Sum up all past transfers

Sample Summary (pooled 1989-2019, SCF)

Age at which the first transfer was received (mean)	53
Share of inheritors over the lifetime	30%
Share of inheritance in recipients' wealth	50%
Cutoff value for the wealth top percentile (2019 USD)	9,000,000

1. The dist. of wealth transfers received over lifetime is highly skewed.
 - 70% of households don't inherit.
 - The top decile accounts for 90% of the total wealth transfers.
 - The top percentile accounts for 54% of the total wealth transfers.

2. The bulk of intergenerational transfers flow to wealthy HHs.



Empirical Findings

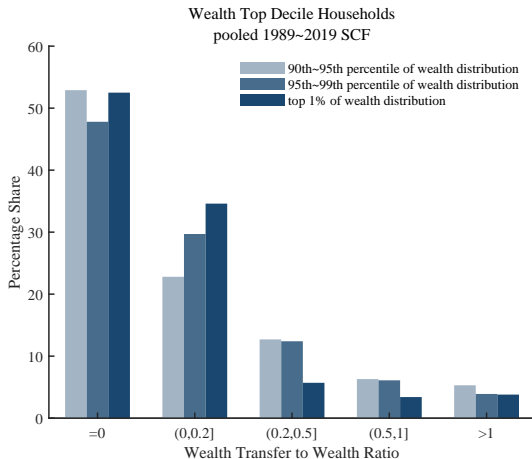
3. **New Fact:** Direct intergenerational wealth transfers account for a small fraction of rich households' wealth.

Table: Ratio of Wealth Transfers to Current Net Worth

Wealth Top decile	Sub-groups in top decile		
	P90 ~ 95	P95 ~ 99	Top 1%
0.18	0.24	0.22	0.13

Empirical Findings

4. **New Fact:** Half of the wealth top percenters don't inherit.



Robustness and Discussion

Other evidence

Korom et al. (2017): 1982-2013 Forbes 400, 60 – 70% either came from families where the parents were blue-collar workers or came from a background that was not rich.

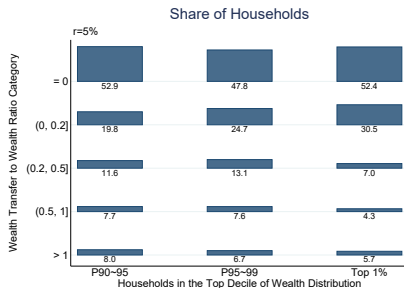
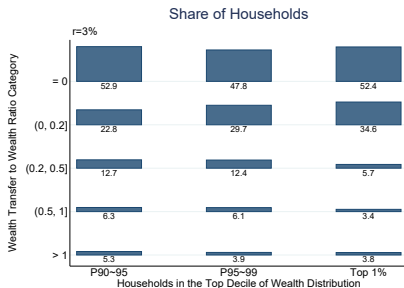
Halvorsen et al. (2021): Norwegian administrative data

Klevmarken (2004): Swedish panel survey

Robustness and Discussion

About the interest rate:

A 3% real interest rate may be low for the rich.



About the inheritance value:

There could be underreporting of received wealth transfers.

- Recall error
- Tax evasion: Schmalbeck (2001), Kopczuk (2007) “deathbed” estate planning
- Indirect transfer
- Incorrect calculation?

Model

Have a model that can be calibrated to match

- Earning and wealth distribution (standard)
- Wealth transfers (new)

Start from CDR (2003)

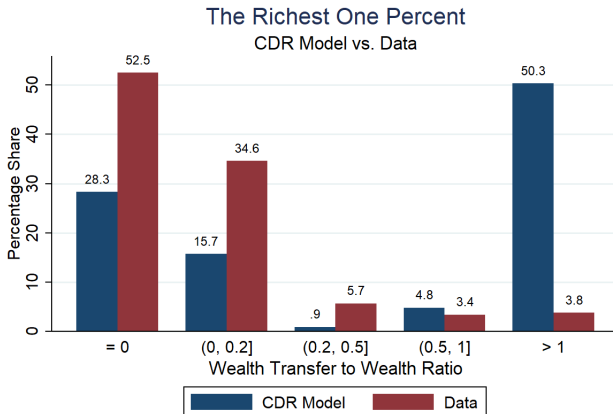
Castaneda, Diaz-Gimenez, and Rios-Rull (2003)

- The simplest possible setup, but generates earnings and wealth distribution.
- Two mechanisms: superstar labor state + perfect altruism

Can't be used directly. Need some modification. Why?

Start from CDR (2003)

Inheritance is important for wealth accumulation in CDR economy.



Source: 1989~2019 pooled SCF data

Start from CDR (2003)

- Perfect altruism ($b=1$)

$$V^{parent} + b \cdot V^{children}$$

- Calibrate b by matching the model to earnings dist., wealth dist., and inheritance to wealth ratio.

	P90 ~ 95	P95 ~ 99	P99 ~ 100
Earnings Dist.			
Data	12.2	15.7	16.5
Original CDR	11.9	17.0	15.5
Modified CDR	9.5	21.7	26.7
Wealth Dis.			
Data	12.0	24.1	33.2
Original CDR	14.2	18.8	33.5
Modified CDR	19.1	43.2	20.6

Model Overview

Two modifications to CDR (2003)

- ① Parameters that governs bequest motive: b
- ② Rate of return heterogeneity: return on capital is increasing in wealth.
 - Technical reason: Benhabib et al. (2011), De Nardi and Fella (2017)
 - Empirical evidence: Bach et al. (2020), Fagereng et al. (2020)

Model Overview: Households

Demographics and Endowments

- Stochastic aging: working young and retired old
- Efficiency labor units $s \in \mathcal{S}$ and $\Gamma(s'|s) = \Pr(s_{t+1} = s' | s_t = s)$

Preference

- Utility comes from consumption and leisure.

$$u(c_t, l_t) = \frac{c_t^{1-\sigma_1}}{1-\sigma_1} + \chi \frac{(1-l_t)^{1-\sigma_2}}{1-\sigma_2}$$

- Imperfect altruism: b

Model Overview: Households

Returns to Capital

Following Hubmer et al. (2021), the return on saving is specified as

$$\underline{r} + r^X(k_t) + \sigma^X(k_t)\eta_t$$

- \underline{r} : an aggregate return component
- $r^X(\cdot)$: the mean excess returns
- $\sigma^X(\cdot)$: the standard deviation of excess returns
- η_t : an *i.i.d* standard normal idiosyncratic shock

$$G + \text{Retirement Benefit} = \text{Tax Revenue}$$

- Income tax on ordinary gross income y

$$\tau(y) = a_0[y - (y^{-a_1} + a_2)^{(-1/a_1)}]$$

- Capital gains tax on stochastic part of capital income \tilde{y}

$$\tau_k(\tilde{y}) = a_3 \tilde{y}$$

- Estate tax

$$\tau_E(k) = \begin{cases} 0 & \text{for } k \leq \underline{z} \\ \tau_b(k - \underline{z}) & \text{for } k > \underline{z} \end{cases}$$

Model Overview: Firm

$$Y = F(K, L) = K^\theta L^{1-\theta}$$

Firm rents production factors in competitive spot markets at

- a wage rate $w = MPL$
- an average market return on capital $r = MPK - \delta$

$$rK = \int (\underline{r} + r^X(k) + \sigma^X(k)\eta) k(x) d\Lambda(x)$$

Parameters obtained externally

- Calibrate a subset of parameters with estimates independent of the model, or commonly used values in the literature.

Parameters estimated internally – SMM

- Key parameters: earning process, b
- Target earning dist., wealth dist., and facts on wealth transfers

Model Fit: Targeted Moments

labor efficiency

aggregates

	Top Groups (%)			
	Gini	P90 ~ 95	P95 ~ 99	P99 ~ 100
Earnings Dist.				
Data	0.62	12.2	15.7	16.5
Model	0.59	10.1	17.4	16.1
Wealth Dis.				
Data	0.81	12.0	24.1	33.2
Model	0.82	15.0	22.4	33.3

Inheritance to Wealth Ratio				Fraction of the Richest 1%
	Wealth Top Decile	Sub-groups in Top Decile		with Ratio ≤ 0.2
		P95 ~ 99	P99 ~ 100	
Data	0.18	0.22	0.13	87.0
Model	0.19	0.21	0.12	86.8

Model Performance: Untargeted Moments

Wealth Mobility

Transition probabilities of the richest 1% over eight years

	Wealth Percentiles			
	Bottom 90	<i>P</i> 90 – 95	<i>P</i> 95 – 99	Top 1%
Bach et al. (2020)	3.1	3.4	30.1	63.3
Model	0	3.2	30.8	66.0

Policy Experiment

Policy Experiment

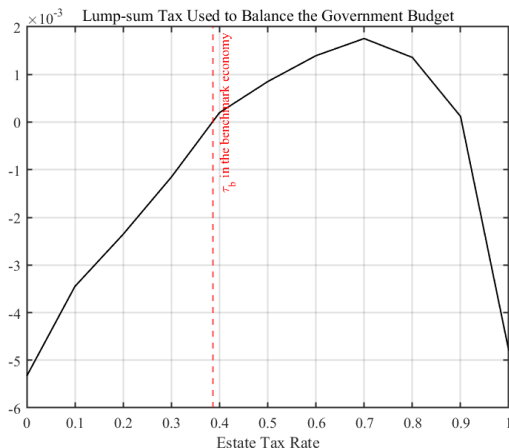
- Estate tax

$$\tau_E(k) = \begin{cases} 0 & \text{for } k \leq \underline{z} \\ \tau_b(k - \underline{z}) & \text{for } k > \underline{z} \end{cases}$$

- I study the effect of changing the marginal estate tax rate τ_b .
 - Baseline $\tau_b = 0.39$
- Use a lump-sum tax to all households (T) to balance the gov. budget.
- All experiments are conducted in GE.
- Steady state comparison.

Effects on Aggregate Variables

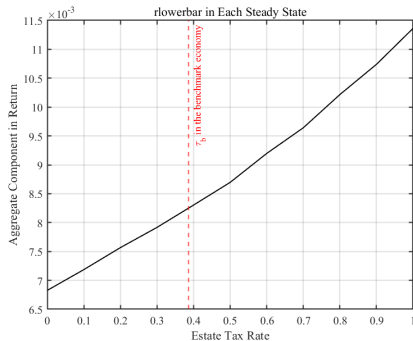
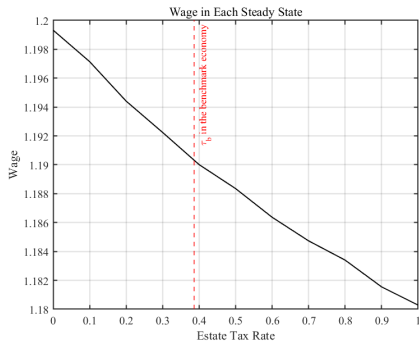
Lump-sum tax to balance government budget



0.002 is 0.1% of the labor income of a young HH with zero wealth and the lowest productivity in the benchmark model economy.

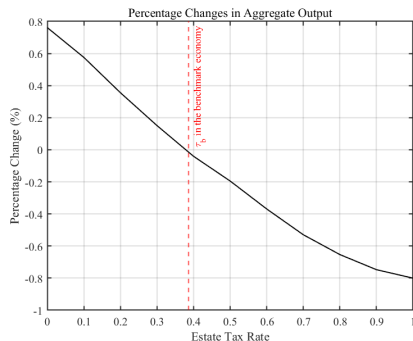
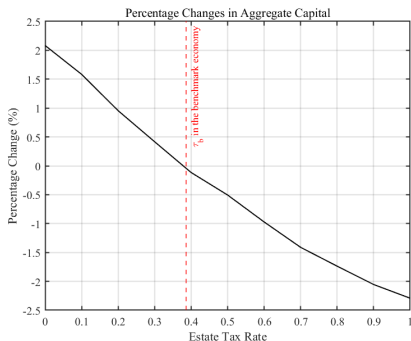
Effects on Aggregate Variables

Prices



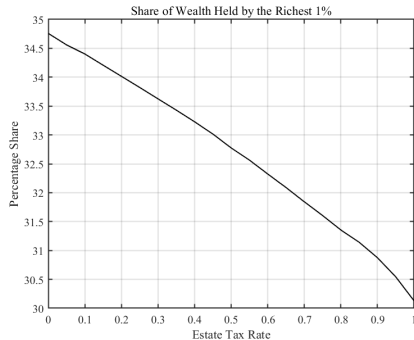
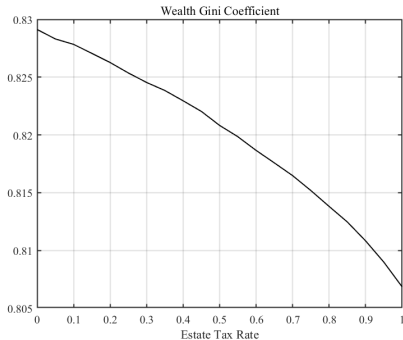
Effects on Aggregate Variables

% Changes in Aggregate Capital and Output



Distributional Effects

Inequality Measures

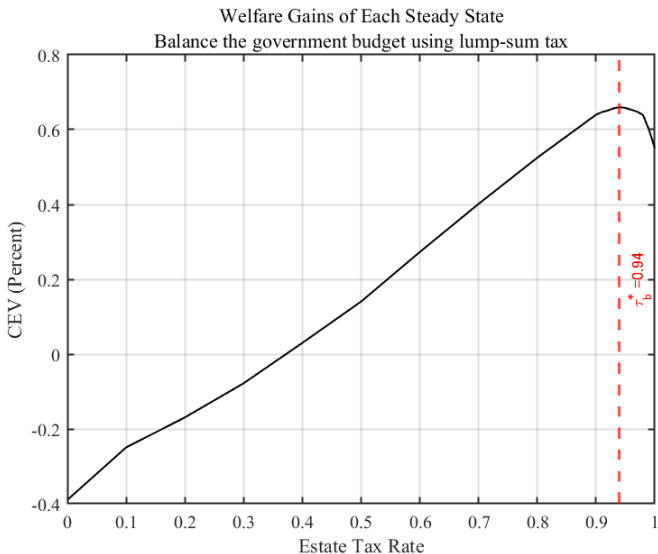


- Calculate the welfare using consumption equivalent variation (CEV):

The percentage Δ^{CEV} by which every HH's initial SS consumption would have to be increased in order to be indifferent btw the initial and the new SS, keeping everything else constant.

Welfare Effects

reason



Conclusion

- For the richest 1% in the U.S. economy, intergenerational wealth transfers only account for 13% of their net worth. Half of them have zero inheritance.
- I modify a standard macro model so that it can be calibrated to match these new facts on inheritance.
- Estate tax as a distributional tool is ineffective, but there will be a welfare gain when raising the estate tax rate.

Appendix

Net worth =

The current value of all marketable assets - The current value of debts.

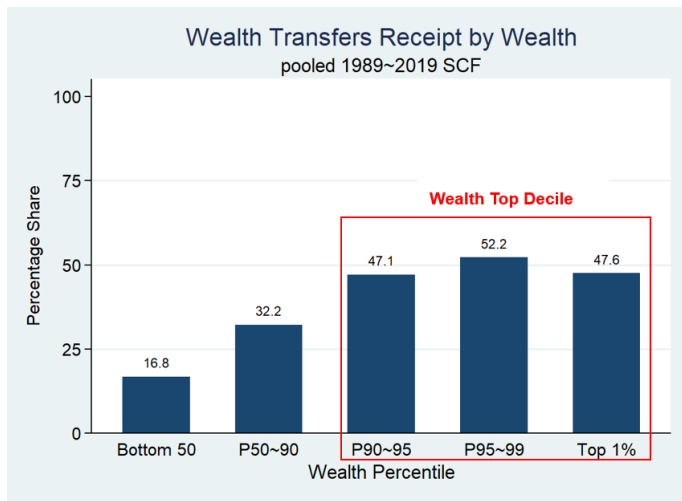
Assets include both financial assets and nonfinancial assets:

- Financial assets: liquid assets; certificates of deposit; directly held pooled investment funds; bonds; stocks; quasi-liquid retirement assets; whole life insurance; other managed assets; and other financial assets.
- Nonfinancial assets: vehicles; houses; businesses; and other nonfinancial assets.

Total liabilities = mortgage debt + consumer debt + other debt.

Table: Distributional Summary Statistics

Quantile Group	Threshold Value (2019 \$)	Share %
8	66,340	1.5
9	275,475	7.9
10		90.6
Percentile Group		
99	2,624,000	10.3
100		54.3



Dynamic Programming of the Last Phase Old HH

$$V^O(n, k, s, \eta) = \max u(c, l - 0)$$

back

$$+ \beta \cdot (1 - \Omega^O) \cdot \mathbb{E} \left[V^O(n, k', s, \eta') \right]$$

$$+ \beta \cdot \Omega^O \cdot b \cdot \mathbb{E} \left[V^Y(1, a', s', \eta') | k, s \right]$$

$$s.t. \quad k' + c = k + y - \tau(y) + \tilde{y} - \tau_k(\tilde{y})$$

$$y = (\underline{r} + r^X)k + \bar{\tau}$$

$$\tilde{y} = \sigma^X \eta k$$

$$k' \geq 0$$

$$a' = \begin{cases} k' & \text{if } k' \leq \underline{z} \\ k' - \tau_b \cdot (k' - \underline{z}) & \text{if } k' > \underline{z} \end{cases}$$

Estimation Results for Labor Efficiency Units

Table: Labor Efficiency Endowments and its Stationary Distribution

	s_1	s_2	s_3	s_4
Value	1.00	2.57	7.91	763.56
Stationary Distribution (%)	51.92	37.58	10.40	0.09

[back](#)

Table: Values of the Targeted Ratios and Aggregates in the U.S. and in the Model Economies

Target	Data	Model
Average hours worked	0.3	0.4
Ratio of capital to annual output	3	3
Aggregate transfers to output ratio	5.1%	4.0%
Ratio of estate tax revenues to GDP	0.33%	0.28%
Proportion of estates that pay estate taxes	2.0%	1.9%
Average effective federal income tax rate	10.39%	14.29%

Policy Experiment [back](#)

