Wealth Accumulation in the US: Do Inheritances and Bequests Play a Significant Role*

John Laitner†

January 26, 2015

* The author gratefully acknowledges support from the U.S. Social Security Administration (SSA) through the Michigan Retirement Research Center (MRRC), award 10P 983585. The opinions and conclusions of this research are solely those of the author and should not be construed as representing the opinions or policy of the SSA or any agency of the Federal Government or of the MRRC.

† University of Michigan, Dept. of Economics

Models of Saving Behavior

- Life-cycle Model [Modigliani 1986]
  - Individual households
  - Each household smooths consumption over the "cycle" of its lifetime earnings
- Representative Agent or Dynastic Model [Becker 1974, Barro 1974, Cooley & Prescott 1995]
  - Altruistic, intergenerational connections lead to bequests/inheritances
  - Smooth over consumption of different generations within a family line

Goal: Study Nested Model

- Attempt to understand the most important motives for private saving

- Attempt to understand why the distribution of wealth seems much more concentrated than the distribution of earnings

- Attempt to assess possible implications for public policy

  - A dynastic model of saving can lead to Ricardian neutrality, for example. Is that important in practice?

  - Role of estate taxes?

Evidence Seems Mixed

- Does the life-cycle model explain as much wealth accumulation as we see?
  - Kotlikoff and Summers 1981
  - Modigliani 1988; Kotlikoff 1988
- Can the life-cycle model explain as much wealth inequality as we see?
  - Laitner 2001, 2002
  - Huggett 1996
- What do model estimates from panel data set show?
  - Alonji et al 1992, 1997
  - Laitner and Juster 1996; Laitner and Ohlsson 2001; Laitner and Sonnega 2010, 2012

Non-stochastic Formulation [Laitner 2001]

- N households each birth cohort

- Each has 2-period-lifespan life span; inelastic labor supply 1 in youth, 0 in old age; logarithmic preferences

- Closed economy; no population growth or technological progress

Demand for Capital

- Aggregate production function:

$$Y = [K]^{\alpha} \cdot [N]^{1-\alpha}$$

- So,

$$\frac{(r+\delta)\cdot K}{W \cdot N} = \frac{\alpha}{1-\alpha}$$

$$\Longleftrightarrow \frac{K}{W \cdot N} \cdot \frac{1-\alpha}{\alpha} = \frac{1}{r+\delta} \qquad (D)$$

Supply of Financing: Pure Life-Cycle Model Case

- Each life-cycle household solves:

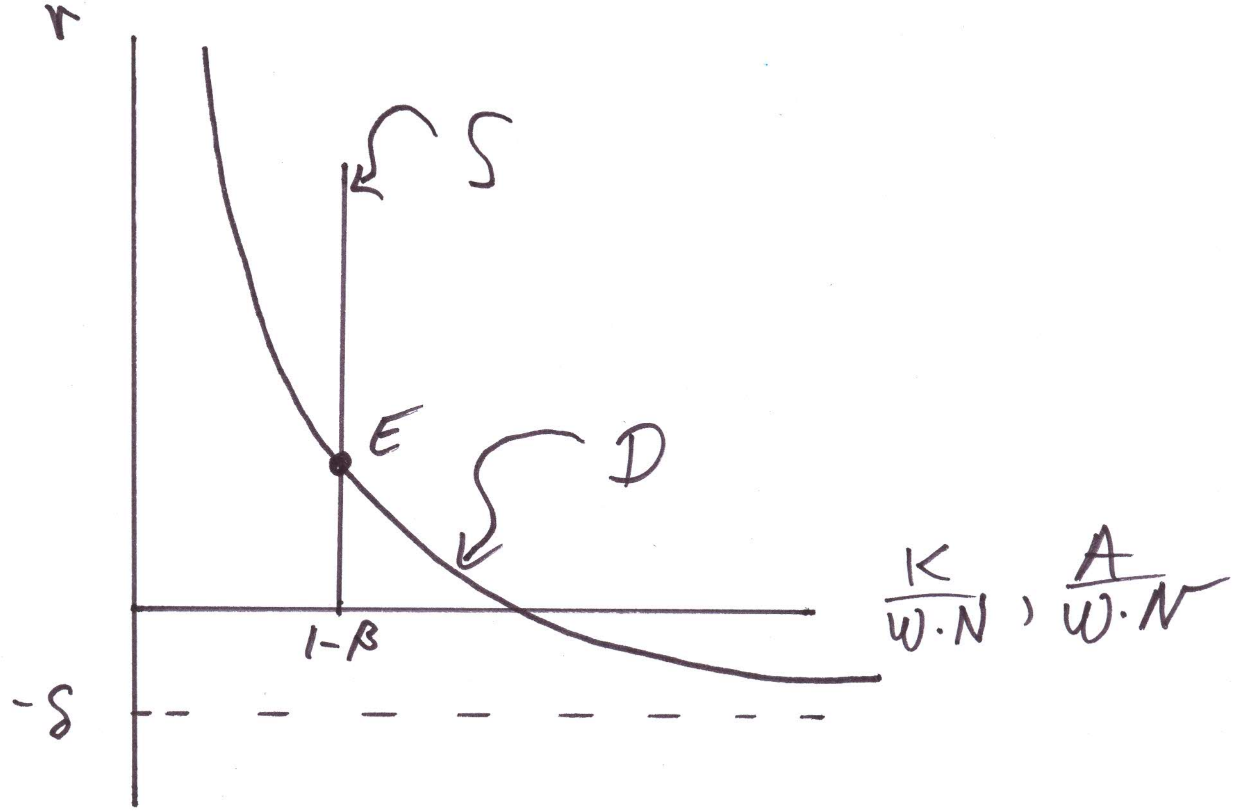
$$\max_{c^1, c^2} \{\beta \cdot \ln(c^1) + (1-\beta) \cdot \ln(c^2)\}$$

$$\text{subject to:} \quad c^1 + \frac{c^2}{1+r} \leq W$$

- Assets, A, carried t to $t+1$:

$$\frac{A}{W \cdot N} = 1 - \beta \qquad (S)$$

Steady-State Equilibrium: Pure Life-Cycle Model Case



Supply of Financing: Dynastic Model Case

- Inheritance received time-t family is I_t; bequest is I_{t+1}. During its lifetime, a dynastic household solves

$$V(I_t\,,\,I_{t+1}) \equiv \max_{c^1\,,\,c^2} \{\beta \cdot \ln(c^1) + (1-\beta)\cdot \ln(c^2)\}$$

$$\text{subject to:}\quad c^1 + \frac{c^2}{1+r} \leq I_t + W - \frac{I_{t+1}}{1+r}$$

- Given intertemporal discount factor ξ, a family-line solves

$$\max_{I_t\,,\,t=0,1,\ldots} \{\sum_{t\geq 0} [\xi]^t \cdot V(I_t\,,\,I_{t+1})\}$$

$$\text{subject to:}\quad I_t \geq 0 \quad \text{all} \quad t$$

Supply of Financing: Dynastic Model Case (cont.)

- For a constant interest rate equilibrium with

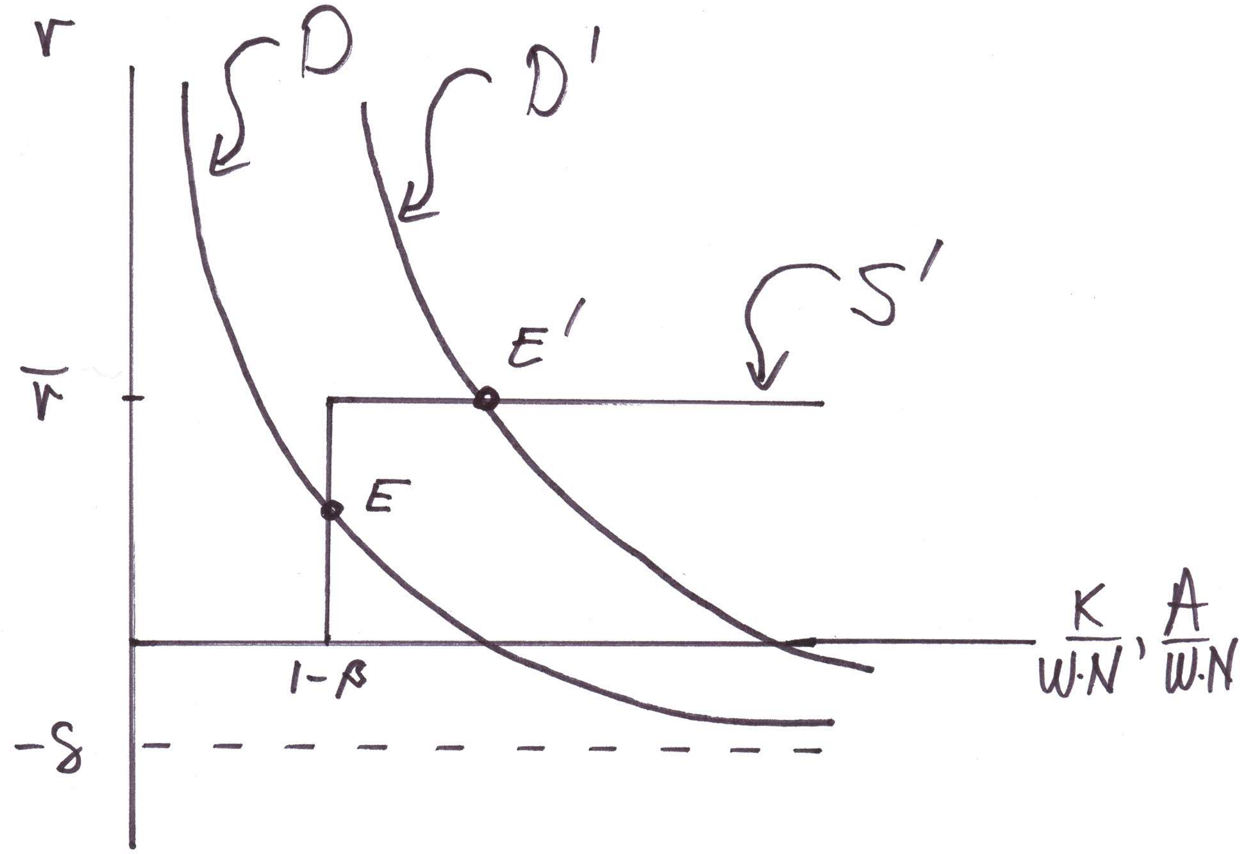
$$I_t > 0\,,$$

we need

$$r = \bar{r} \quad \text{with} \quad \xi \cdot (1 + \bar{r}) = 1$$

- If $r < \bar{r}$, the constraint $I_t \geq 0$ binds and wealth accumulation is as in the pure life-cycle case

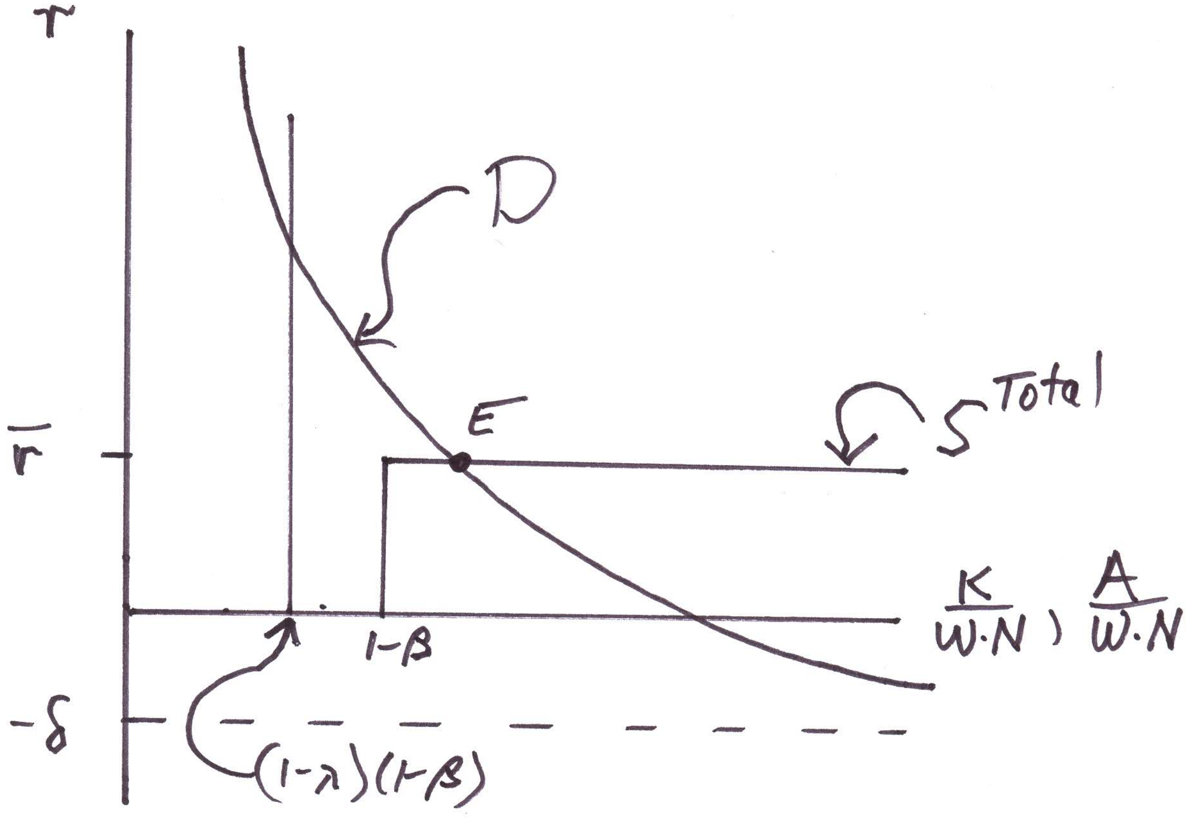
Steady-State Equilibrium: Dynastic Model Case



Combination Model

- Suppose fraction λ of households each birth cohort are dynastic, and fraction $1-\lambda$ are purely life cycle

- Steady-State Equilibrium:



Outcomes

- At a steady-state equilibrium with $I_t > 0$, we have Ricardian neutrality in the sense that a permanent increase in the national debt, for example, will not affect the long-run interest and wage rates

- Dynastic households can be much wealthier than the purely life-cycle households — especially if they are relatively few in number (i.e., if λ is small)

- Changes in the national debt, for example, could change the long-run degree of wealth inequality in the economy

Stochastic Formulation [Laitner 1992]

- Let all N households in each cohort be potentially dynastic

- Let a household be born with earning ability z_t, a random sampling of random variable $\tilde{z}$. The distribution of $\tilde{z}$ is exogenously given. Different households in the same cohort have independent samplings from $\tilde{z}$

- A household's life-cycle problem is

$$V(I_t\,,\,I_{t+1}\,,\,z_t) \equiv \max_{c^1\,,\,c^2} \{\beta \cdot \ln(c^1) + (1-\beta)\cdot \ln(c^2)\}$$

$$\text{subject to:} \quad c^1 + \frac{c^2}{1+r} \leq I_t + z_t \cdot W - \frac{I_{t+1}}{1+r}$$

Stochastic Formulation (cont.)

- A dynasty solves

$$\max_{I_t\,,\,t=0\,,\,1\,,\,\ldots} \{E\big[\sum_{t\geq 0} [\xi]^t \cdot V(I_t\,,\,I_{t+1}\,,\,z_t)\big]\}$$

$$\text{subject to:} \quad I_t \geq 0 \quad \text{all} \quad t\,,$$

$$z_t \quad \text{an independent sampling from} \quad \tilde{z}$$

- Dynamic programming can yield a "policy function"

$$G(I_t\,,\,z_t) = I_{t+1}$$

- The latter, solution of the life-cycle problem, and the distribution of $\tilde{z}$ together yield a Markov transition function, from which we can determine a stationary distribution of net worth

Analysis

- Propositions in Laitner 1992 show that if

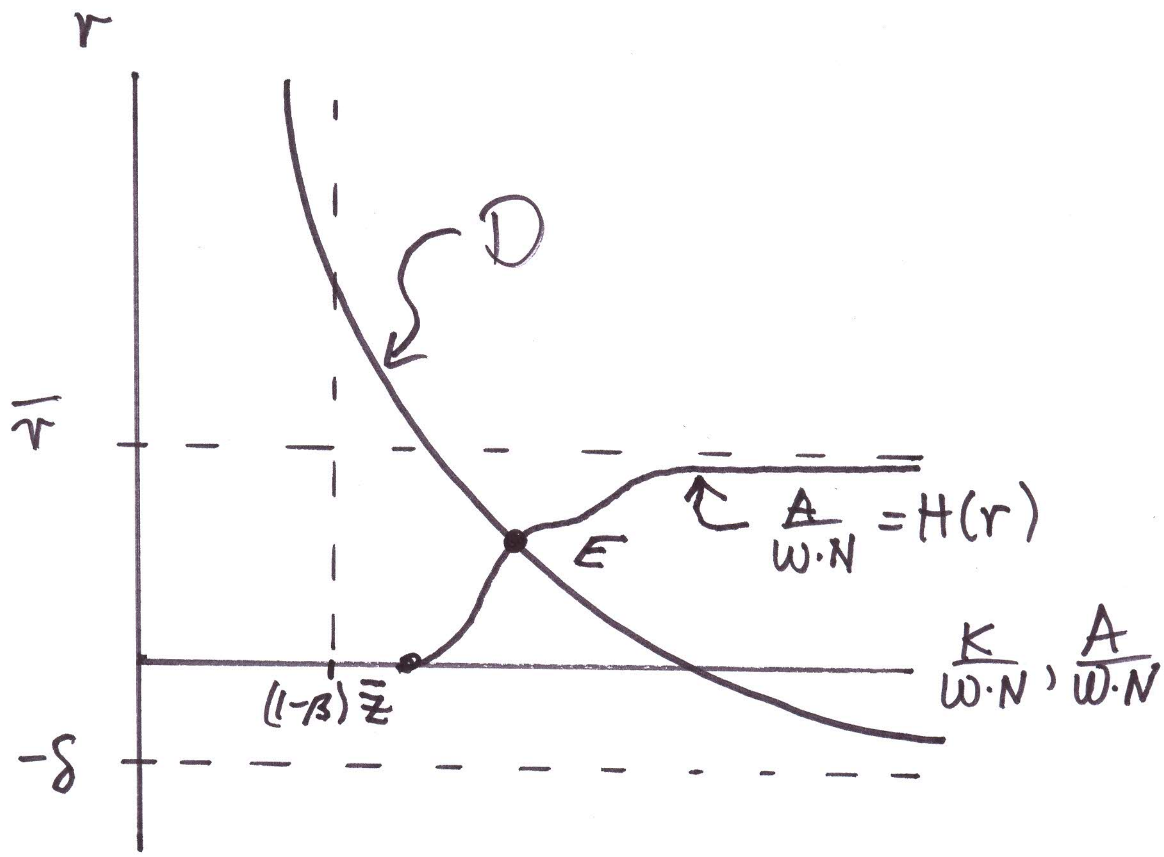
$$\frac{A}{W \cdot N}$$

is steady-state household wealth per wage-bill-unit carried from t to $t+1$, we can derive a continuous function $H(.)$ with

$$H(r) = \frac{A}{W \cdot N}$$

- The picture is as on the next slide. $\bar{r}$ from the non-stochastic model provides an asymptotic upper bound, as shown

Steady-State Equilibrium for Stochastic Model



Description of Outcome

- In each generation t, some households are born with a very high z_t realizations; others are not

- Households with very high z_t lifetime realizations may leave bequests to share their luck with their descendants. I.e., such households will tend to choose, $I_{t+1} > 0$

- Other households will choose $I_{t+1} = 0$

- In other words, the division into life-cycle and dynastic behaviors will be endogenous

Description of Outcome (cont.)

- Large, dynastic fortunes will tend to arise from high-z households. High earners will share their good luck with their descendants by leaving sizable bequests. Nevertheless, within a finite number of generations, there will be regression to the mean within each dynasty

- Note that a household with exceptional earnings will tend to save a much larger fraction of its lifetime earnings than a purely life-cycle household

Wealth Accumulation in the US [Laitner 2014]

- Laitner 2014 presents a more detailed version of stochastic hybrid model
  - Households have realistic life spans
  - Intergenerational earning-ability correlations in family lines — Solon 1992
  - Income taxes, government spending, government debt
  - Estate taxes
  - Social Security
  - Underlying technological progress
- More general preferences: $u(c) = [c]^{\gamma}/\gamma\,,\ \gamma < 1$

Calibrations in Laitner 2014

- Use 1995 SCF [Survey of Consumer Finances]

- Calibrate a T-distribution for $\widetilde{\ln(z)}$. See Table 1

- Other calibrations see Table 5

- 1995 US distribution of household wealth from SCF — see Table 7

Table 1. The Distribution of Earnings

Statistic	SCF Data: Un–adjusted	SCF Data: Adjusted Singles	SCF Data: Normalized, Ages 22–63, Restricted Amounts	Theoretical Model: DF=100	Theoretical Model: DF=4.86
Gini	.49	.46	.40	.46	.48
Share Top .5%	9.2%	9.0%	6.5%	3.1%	6.6%
Lower Bound	$375,000	$475,000	$6.68	$5.73	$6.38
Share Top 1%	12.5%	12.1%	9.2%	4.8%	8.9%
Lower Bound	$267,000	$300,000	$4.57	$4.79	$5.00
Share Top 2%	17.4%	16.6%	13.1%	9.0%	12.7%
Lower Bound	$200,000	$219,000	$3.34	$3.93	$3.93
Share Top 3%	21.2	20.1%	16.1%	12.1%	15.8%
Lower Bound	$160,000	$186,000	$2.87	$3.47	$3.40
Share Top 4%	24.3%	23.1%	18.8%	14.9%	18.5%
Lower Bound	$134,000	$156,000	$2.57	$3.15	$2.82
Share Top 5%	27.0%	25.7%	21.3%	17.6%	21.0%
Lower Bound	$117,000	$140,000	$2.30	$2.91	$2.82
Share Top 10%	37.3%	35.6%	31.0%	28.4%	31.4%
Lower Bound	$84,000	$99,000	$1.72	$2.24	$2.14
Share Top 20%	52.6%	50.3%	45.8%	44.7%	46.8%
Lower Bound	$62,000	$74,000	$1.31	$1.63	$1.55
Share Top 50%	82.0%	80.0%	76.5%	75.8%	76.5%
Lower Bound	$33,000	$43,000	$.80	$.90	$.86
Share Top 90%	99.3%	99.2%	97.9%	97.4%	97.4%
Lower Bound	$8,000	$10,000	$.26	$.37	$.37
Mean	$47,000	$57,000	$1.000	$1.000	$1.000
Observations (incl. all imputations)	17,125	17,125	14,695	NA	NA
Households	3425	3425	2939	NA	NA

Source: col. 1: 1995 SCF. See text.
col. 2: Previous, double singles' earnings and halve weight.
col. 3: Previous, normalize mean, ages 22–63, and amounts .2–20,000.
col. 4: Model, degrees freedom 100.
col. 5: Model, degrees freedom 4.86.

Table 7. Unadjusted and Adjusted 1995 SCF Distribution of Wealth					
	Variant				
Statistic	1	2	3	4	5
Share Top 1%	34.9%	29.4%	28.2%	28.1%	27.7%
Lower Bound	$2,456,500	$2,545,838	$2,566,387	$2,335,019	$2,335,847
Share Top 2%	43.1%	36.9%	35.4%	35.3%	35.1%
Lower Bound	$1,317,200	$1,509,913	$1,523,435	$1,354,714	$1,378,650
Share Top 3%	48.5%	42.1%	40.4%	40.2%	40.1%
Lower Bound	$997,029	$1,186,598	$1,200,041	$1,049,550	$1,056,242
Share Top 4%	52.6%	46.3%	44.4%	44.1%	44.1%
Lower Bound	$786,585	$958,947	$972,148	$854,263	$854,265
Share Top 5%	56.1%	49.8%	47.8%	47.4%	47.5%
Lower Bound	$679,789	$833,960	$848,717	$745,184	$751,694
Share Top 10%	67.9%	62.9%	60.6%	59.7%	60.0%
Lower Bound	$381,022	$534,293	$547,208	$485,742	$490,099
Share Top 20%	80.6%	78.2%	75.7%	74.7%	75.1%
Lower Bound	$197,109	$284,940	$297,142	$263,500	$260,888
Share Top 50%	96.4%	95.9%	94.0%	93.6%	93.7%
Lower Bound	$57,400	$74,469	$86,702	$81,466	$78,715
Share Top 90%	100.3%	100.2%	99.8%	99.8%	99.8%
Lower Bound	$60	$500	$11,398	$11,153	$11,047
Gini	.79	.76	.73	.73	.73
Mean	$212,820	$255,500	$267,620	$240,158	$238,063
Observations (incl. all imputations)	21,495	21,495	21,495	21,495	19,111
Households	4,299	4,299	4,299	4,299	3,822

Source: col 1: 1995 SCF (see text)
col 2: Previous, including all private pensions
col 3: Previous, including all consumer durables
col 4: Previous, less income taxes on private pensions and IRAs, less capital gains taxes
col 5: Previous, ages 22–73.

Calibrations (cont.)

- Procedure for calibrating 3 preference parameters not set directly from data:

  - β: Use observed lifetime household consumption profiles [CEX]

  - ξ: Match the actual amount of wealth in US economy with simulation [FOF]

  - γ: Match US estate-tax collections to model simulation [SOI]

Outcomes

- See Table 6
- Remarks:
  - Logarithmic utility, $\gamma = 0$, seems the best
  - Parental preference for grown child's utility relative to self: $\xi = 0.41$

Table 6. Simulated Distribution of Wealth					
	Dynastic Model with $\gamma =$				Pure Life–Cycle Portion of Model $\gamma = 0.0$
Statistic	-2.0	-1.0	0.0	0.5	
Gini	.71	.71	.71	.70	.69
Share Top 1%	22.4%	22.2%	21.5%	19.9%	13.3%
Lower Bound	$1,534,000	$1,534,000	$1,540,000	$1,579,000	$1,389,000
Share Top 2%	27.6%	27.4%	26.8%	25.4%	19.1%
Lower Bound	$1,237,000	$1,245,000	$1,263,000	$1,312,000	$1,090,000
Share Top 3%	31.7%	31.5%	31.0%	29.8%	23.3%
Lower Bound	$911,000	$911,000	$915,000	$951,000	$840,000
Share Top 4%	35.0%	34.9%	34.4%	33.2%	27.1%
Lower Bound	$857,000	$849,000	$854,000	$859,000	$807,000
Share Top 5%	38.2%	38.0%	37.5%	36.4%	30.8%
Lower Bound	$815,000	$814,000	$818,000	$820,000	$773,000
Share Top 10%	51.8%	51.7%	51.3%	50.4%	46.3%
Lower Bound	$600,000	$603,000	$614,000	$629,000	$518,000
Share Top 20%	69.9%	69.8%	69.5%	68.8%	67.2%
Lower Bound	$417,000	$418,000	$421,000	$423,000	$396,000
Share Top 50%	97.6%	97.6%	97.5%	97.4%	97.6%
Lower Bound	$90,000	$91,000	$94,000	$95,000	$71,000
Share Top 90%	100.0%	100.0%	100.0%	100.0%	100.0%
Lower Bound	$0	$0	$0	$0	$0
Mean	$263,000	$263,000	$263,000	$262,000	$215,000
Estate Tax Revenue	$21.6 bil.	$21.0 bil.	$19.0 bil.	$14.5 bil.	NA
Parameters					
β	1.02	1.00	.98	.97	NA
ξ	.06	.15	.41	.67	NA
τ	.23	.23	.23	.23	NA
Supply and Demand Elasticities for Figure 3 (absolute values)					
Supply	.30	.57	1.41	3.66	1.13
Demand	.40	.40	.40	.40	.40
Share of Private Net Worth from Life–Cycle Saving					
Fraction	.84	.84	.84	.84	NA

Source: See text.

Key Economic Outcomes

- Contribution of life-cycle wealth accumulation to total: life-cycle fraction=0.84

- Elasticity of "wealth supply" with respect to r: 1.41. "Demand elasticity: 0.40

- Model share of wealth held by top 1, 2, 3, or 5%: 21.5%, 26.8, 31.0, 37.5

  - Same percentages with purely life-cycle saving: 13.3%, 19.1, 23.3, 30.8

  - Same percentages in US 1995 data: 27.7%, 35.1, 40.1, 47.5

Verdict At This Point:

- Modigliani's original assessment that life-cycle saving explained roughly 80% of US wealth holdings seems supported — so far

- Elasticity of wealth supply seems to support analysis based on life-cycle model as opposed to representative agent framework

- More calibrations (sensitivity analysis) needed

Interpretation of Evidence

- Model can explain at least part of the high concentration that we see in the US distribution of wealth across households

- Lack of support in panel data for intergenerational connections within family lines might be due to middle-class nature of samples for most data sets; our nested model generates substantial bequests for only a minority of households in any cohort

- In our model, Ricardian neutrality might emerge in the aggregate — even if dynastic behavior explains only a modest fraction of total wealth accumulation. The simulations so far do not, however, point to that outcome