On the Long-run Evolution of Inheritance
France 1900-2050

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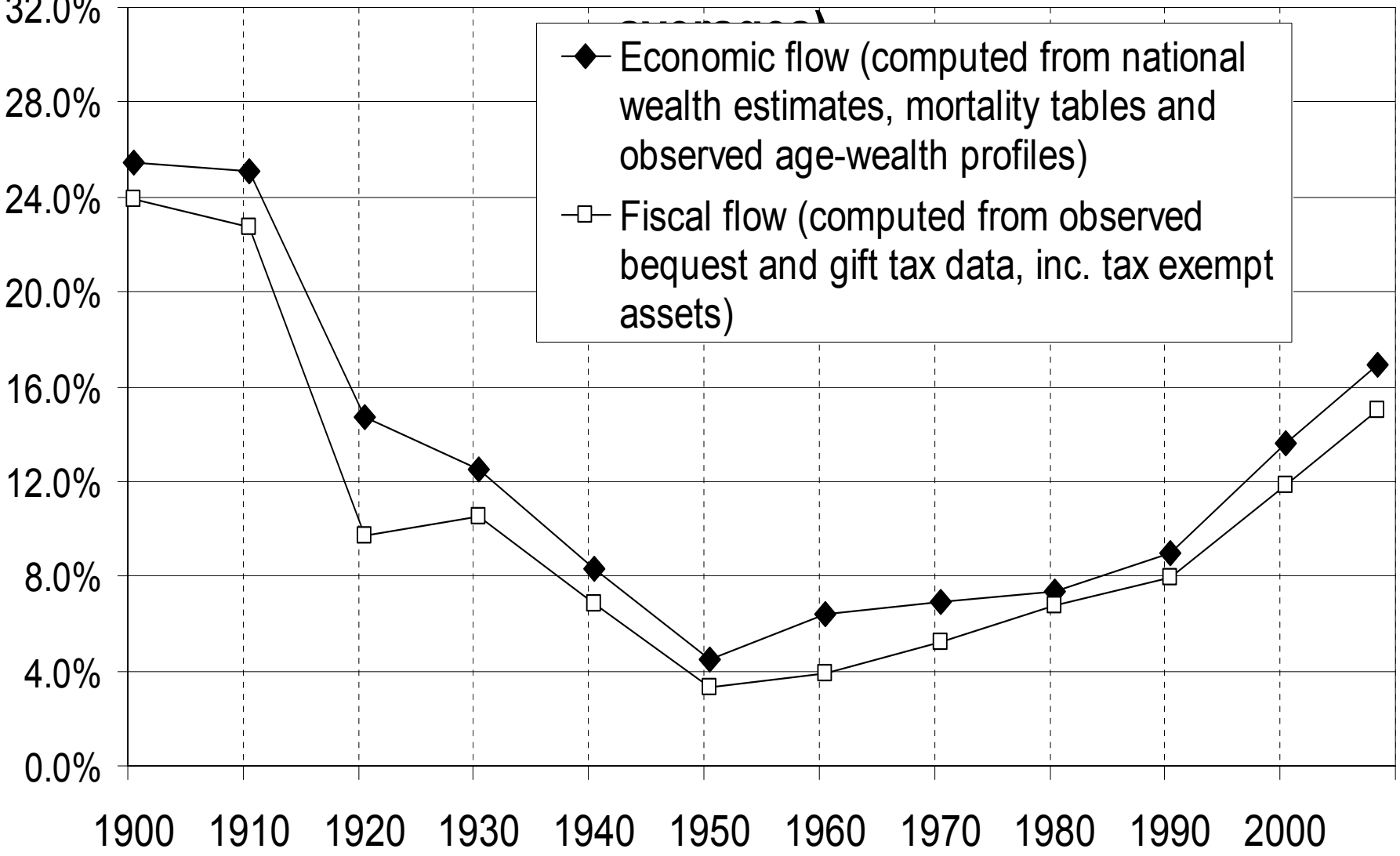
- **There are two ways to become rich**: either through one's own work, or through inheritance
- In the 19th century and early 20th, it was obvious to everybody that the 2nd channel was important: inheritance and successors are everywhere in the literature, huge inheritance flow

- **Q**: Does this belong to the past? Did modern growth kill the inheritance channel? E.g. rise of human capital and meritocracy?
- This paper answers « **NO** » to this question and attempts to explains why, taking France 1900-2050 as an illustration: capital is back!

Figure 1: Annual inheritance flow as a fraction of national income, France 1900-2008 (decennial



What this paper does

- Documents and explains this fact
- Develops a simple simulation model reproducing this fact
- Applies the model to 2010-2050: we predict B/Y returns to 1900 level
- Applications to bequest wealth, lifetime inequality, and capital taxation

Application n°1: Modigliani-Summers controversy

- Modigliani AER 1986, JEP 1988: inheritance = 20% of total U.S. wealth accumulation
- Kotlikoff-Summers JPE 1981, JEP 1988: inheritance = 80% of total U.S. wealth accumulation
- Two problems: - Bad data
- **We do not live in a stationary world: life-cycle wealth was much more important in the 1950s-1970s than it is today**

Application n°2: lifetime inequality, labor vs capital

- Top incomes literature: Piketty JPE 2003, Piketty-Saez QJE 2003, Atkinson-Piketty OUP 2007 & 2010 → 23 countries.. but too descriptive, pb with capital side
- Piketty-Postel-Vinay-Rosenthal AER 2006, « Wealth concentration in Paris 1807-1902 »

→ **This paper = aggregate analysis, but building block for future work with heterogenity and inequality**

Application n°3: socially-optimal capital taxation

- Economists have a pb with capital taxation: standard theory = optimal tax rate on all forms of capital and capital income = 0%
- Very strong result: 0% capital tax rates are socially optimal for everybody, including for individuals and dynasties with zero wealth!

… But nobody seems to take it seriously: nobody pushes for a complete suppression of corporate tax, property tax, estate tax, etc., i.e. 9.4% GDP tax revenue (EU25, Eurostat 2008)

- Atkinson-Stiglitz JPubE 1976: if wealth was entirery life-cycle, no reason to tax capital
- I.e. differential commodity taxation is useless, redistributive labor taxation is sufficient: if 1+r = relative price of period 1 vs 2 consumption, no reason to overtax $C_2=(1+r)(Y_L-C_1)$, just tax Y_L with $t(Y_L)$
- « If inequality is entirely labor-income-drivent, no need to tax capital » = very intuitive and compelling argument for 0% capital tax

- … except that life-cycle wealth plays a much less important role that what many economists tend to believe
- if bequest wealth is important, then the normative analysis is more complicated

→ **This paper = positive analysis, no normative model; but building block for future work on optimal capital taxation**

Data sources

- **Estate tax data**: tabulations by estate & age brackets 1902-1964; micro-files 1977-1984-1987-1994-2000-2006 (DMTG)
- **National wealth and income accounts**: Insee official series 1949-2009; linked up with various series 1900-1949 (Dugé, Colson, Divisia, Villa,.)
- Wealth surveys: Insee 1992-1998-2004

- French estate tax data is exceptionally good: universal, fully integrated bequest and gift tax since 1791
- Tax exempt assets: 15% in 1900s, 30%-35% in 2000s (life-insurance, unincorp.business & family firms,.)
- 350,000 estate tax returns/year in 1900s and 2000s, i.e. 65% of the 500,000 decedents (in 2000s, 20% of decedents pay tax, mostly people with no children; average tax rate <5%;top rate 40%-60%)

Computing inheritance flow

$$\mathbf{B_t/Y_t = \mu_t\ m_t\ W_t/Y_t}$$

- W_t/Y_t = aggregate wealth/income ratio
- m_t = aggregate mortality rate
- μ_t = ratio between average wealth of decedents and average wealth of the living (= age-wealth profile)

→ The U-shaped pattern of inheritance is the product of three U-shaped effects

Figure 2: Annual inheritance flow as a fraction of national income, France 1900-2008

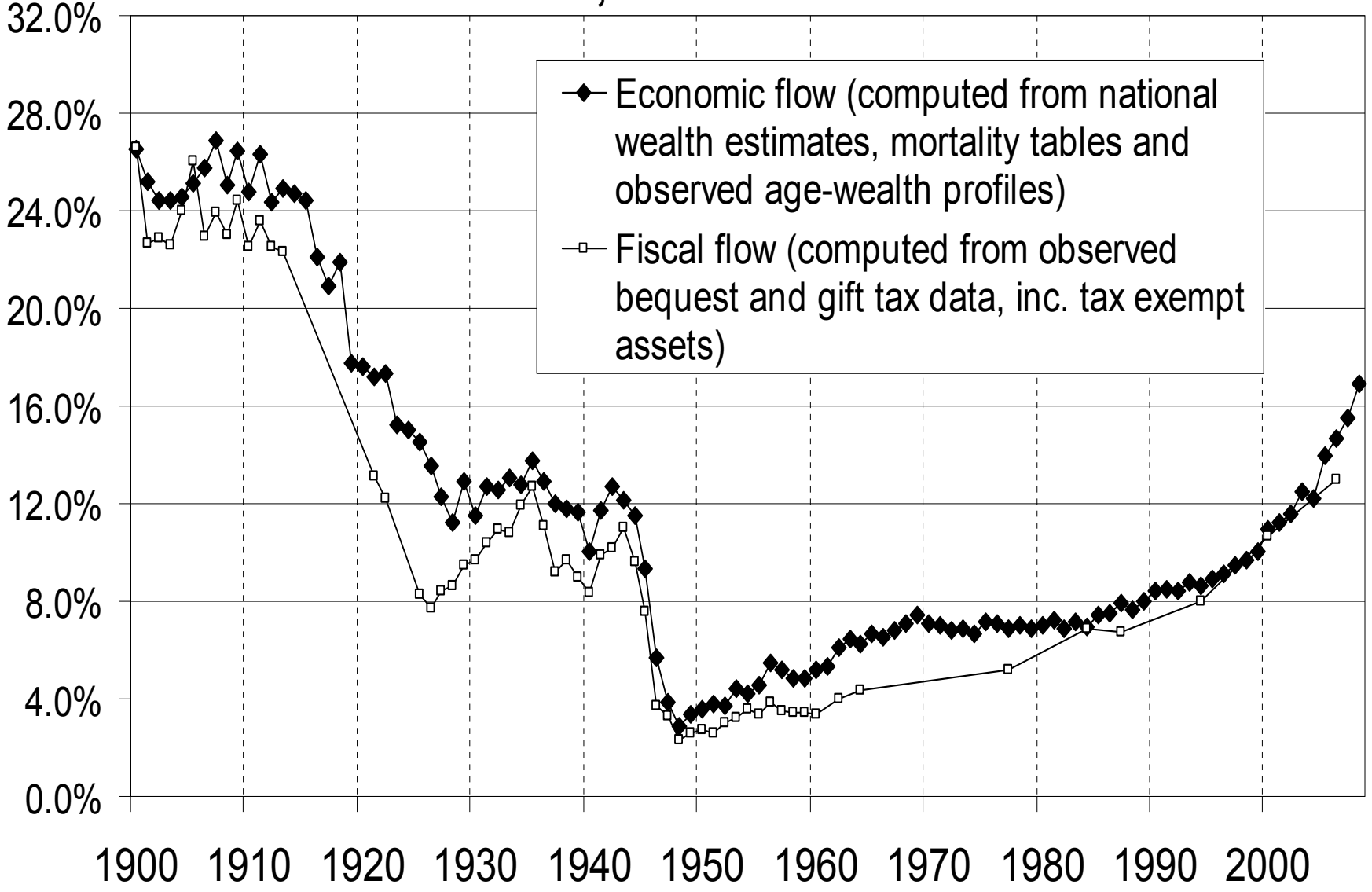
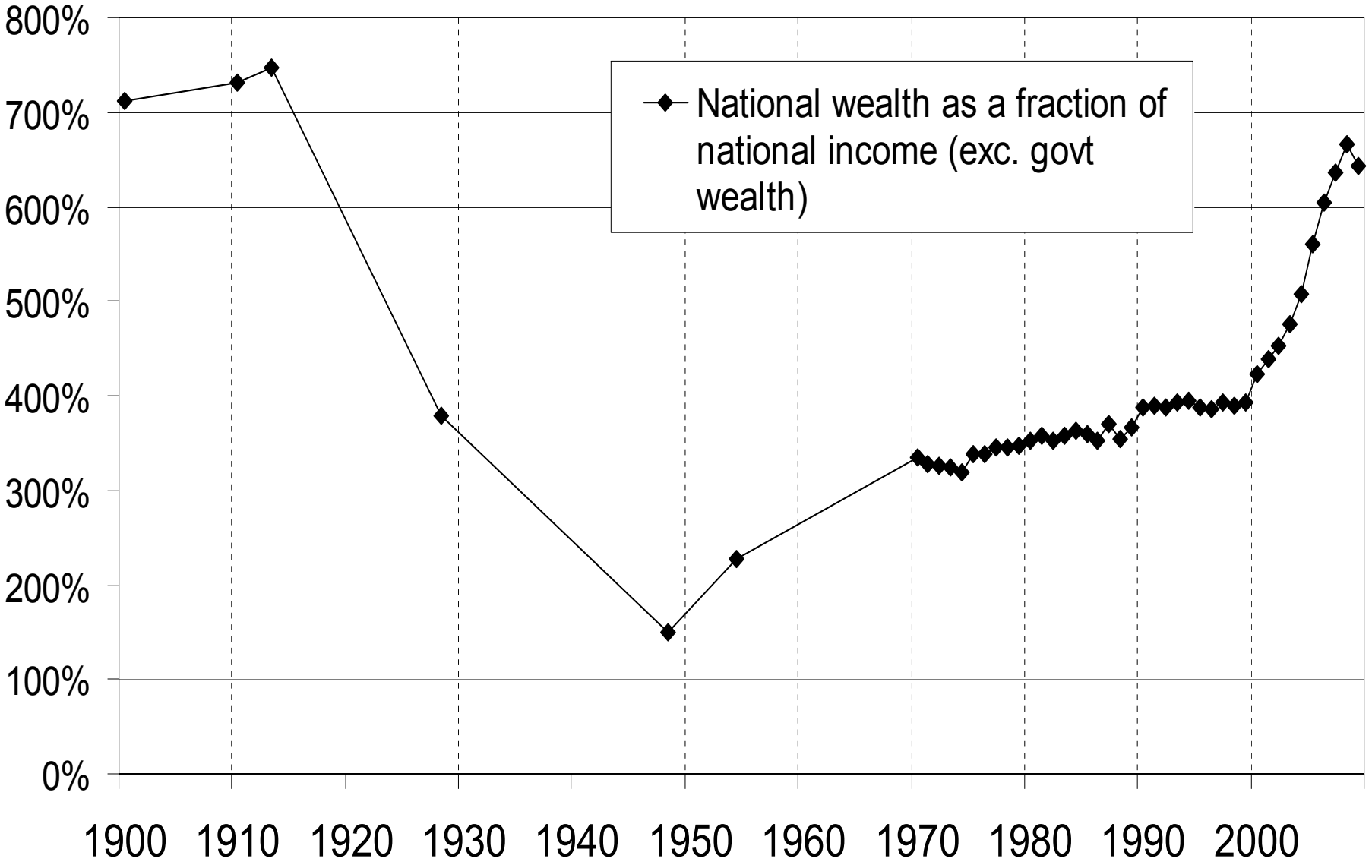


Figure 3: Wealth/income ratio in France 1900-2009



- 1900s: Y = 30-35 billions francs or, W = 250 billions, B = 7.5-8.5 billions

→ W/Y = 700%, B/Y = 25%

- 2009: Y = 1 500 billions € (i.e. 25 000€ per capita), W = 9 000 billions € (150 000€ per capita), B = 230 billions €

→ W/Y = 600%, B/Y = 15%

- Between 1900s and 1950s, W/Y divided by 2.5-3, B/Y divided by 5-6 → the fall in W/Y explains about half of the fall in B/Y

Figure 4: Mortality rate in France, 1900-2050

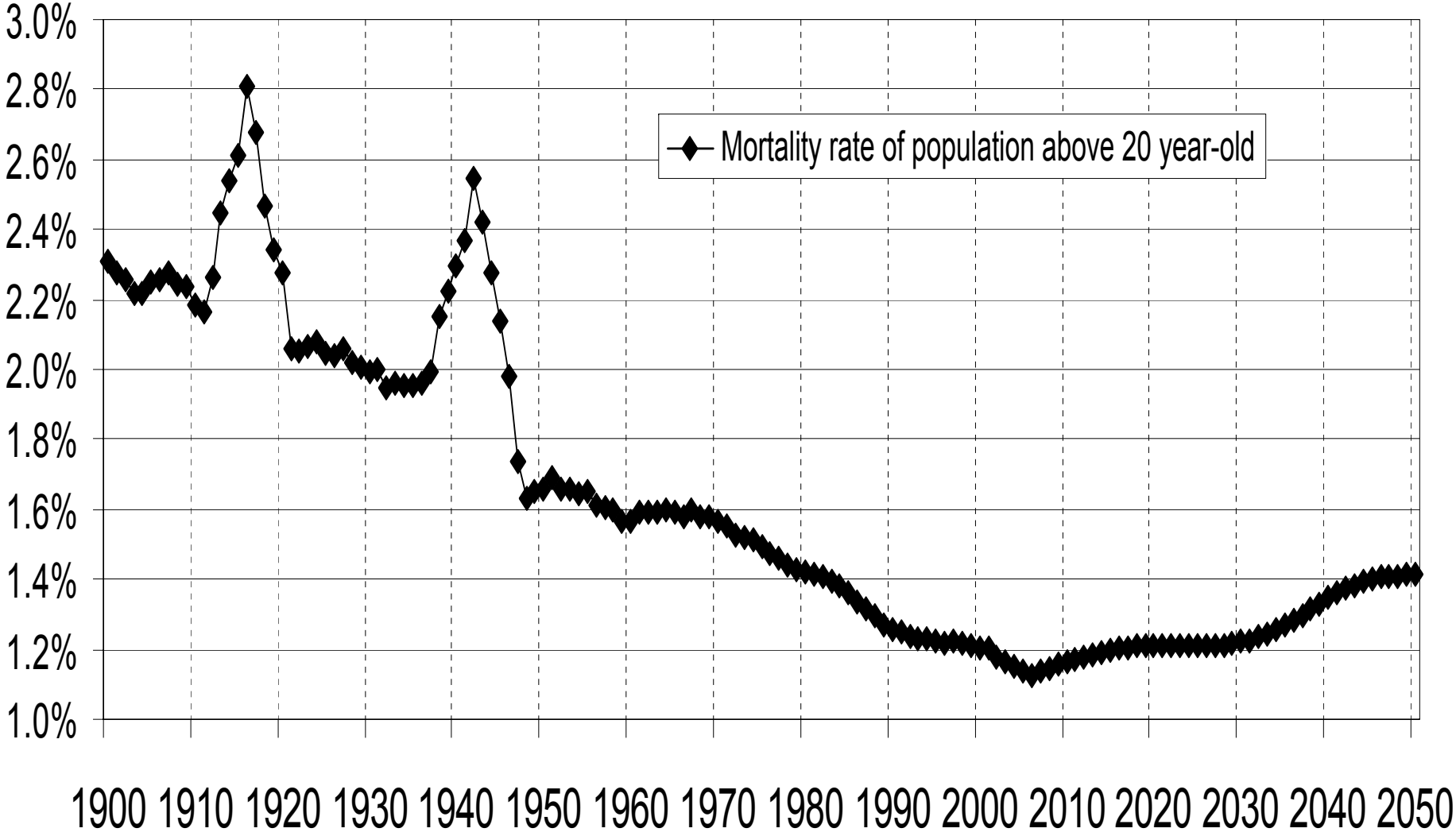
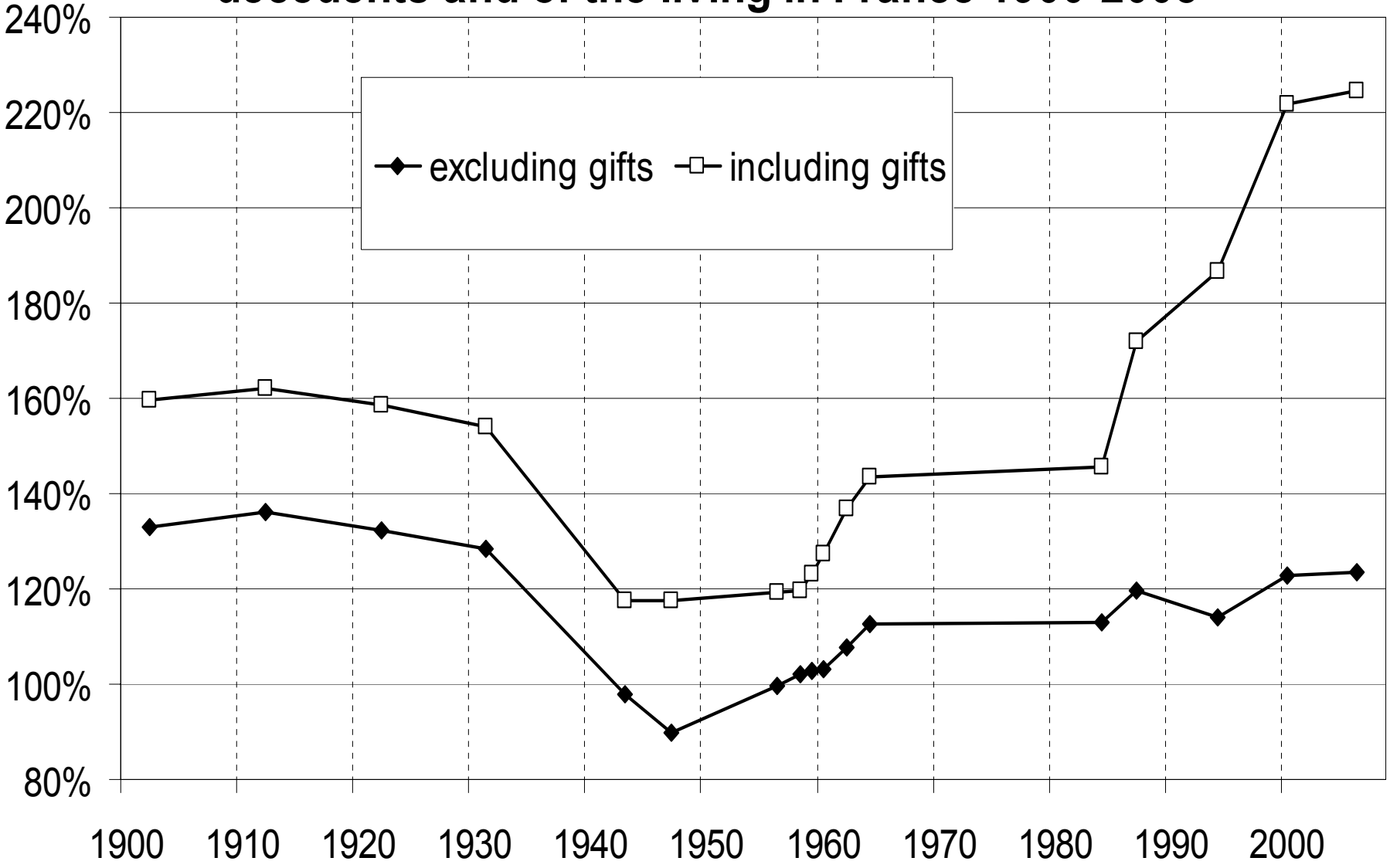


Figure 5: The ratio between average wealth of the decedents and of the living in France 1900-2008



How can we account for these facts?

- WW1 & 2 capital shocks played a major role, and it took a long time to recover
- Key question: why does the age-wealth profile become upward-sloping again? Clearly people don't annuitize
- **Key parameter: r > g or r < g ?**
- r > g implies that old wealth matters a lot and upward-sloping profiles (for given savings behavior)

Simulations

- The observed dynamics of the age-wealth profile can be reproduced almost perfectly with a simple model based upon uniform savings rate across age groups, given observed r_t and g_t
- I start from the observed age-wealth profile $W_t(a)$ in 1900
- I take $Y_t = Y_{Lt} + Y_{Kt}$ from national accounts, and define $r_t = Y_{Kt}/W_t$

- I take $s_t = S_t/Y_t$ from national accounts, and assume uniform savings rates
- The transition equation for a given cohort is simply:

$$W_{t+1}(a+1) = W_t(a) + s_t \; [\, Y_{Lt}(a) + r_t \, W_t(a) \,]$$

- I apply observed mortality rates by age group, and observed age structure of heirs, donors and donees

Figure 6: Age of decedents vs heirs in France, 1900-2050

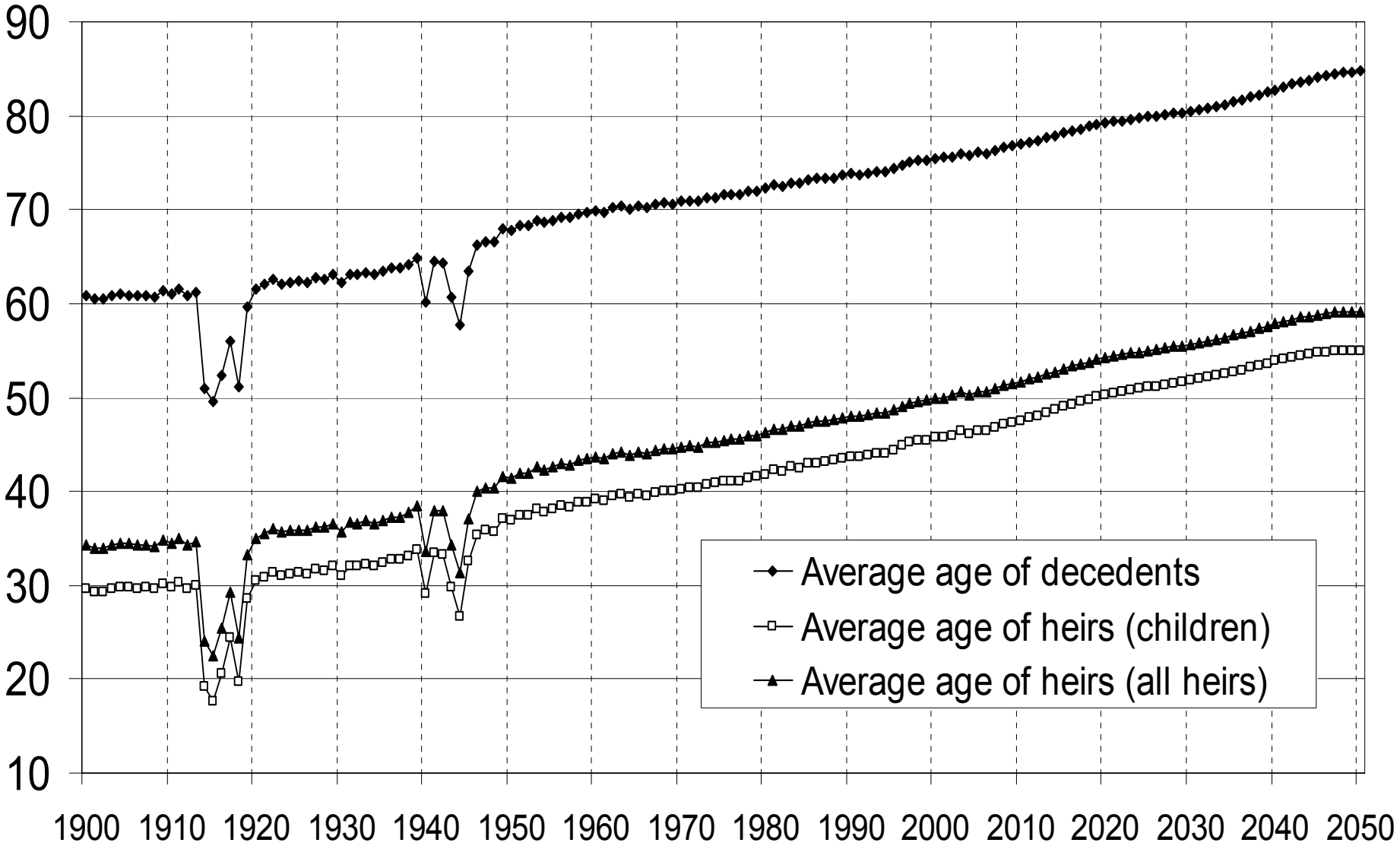
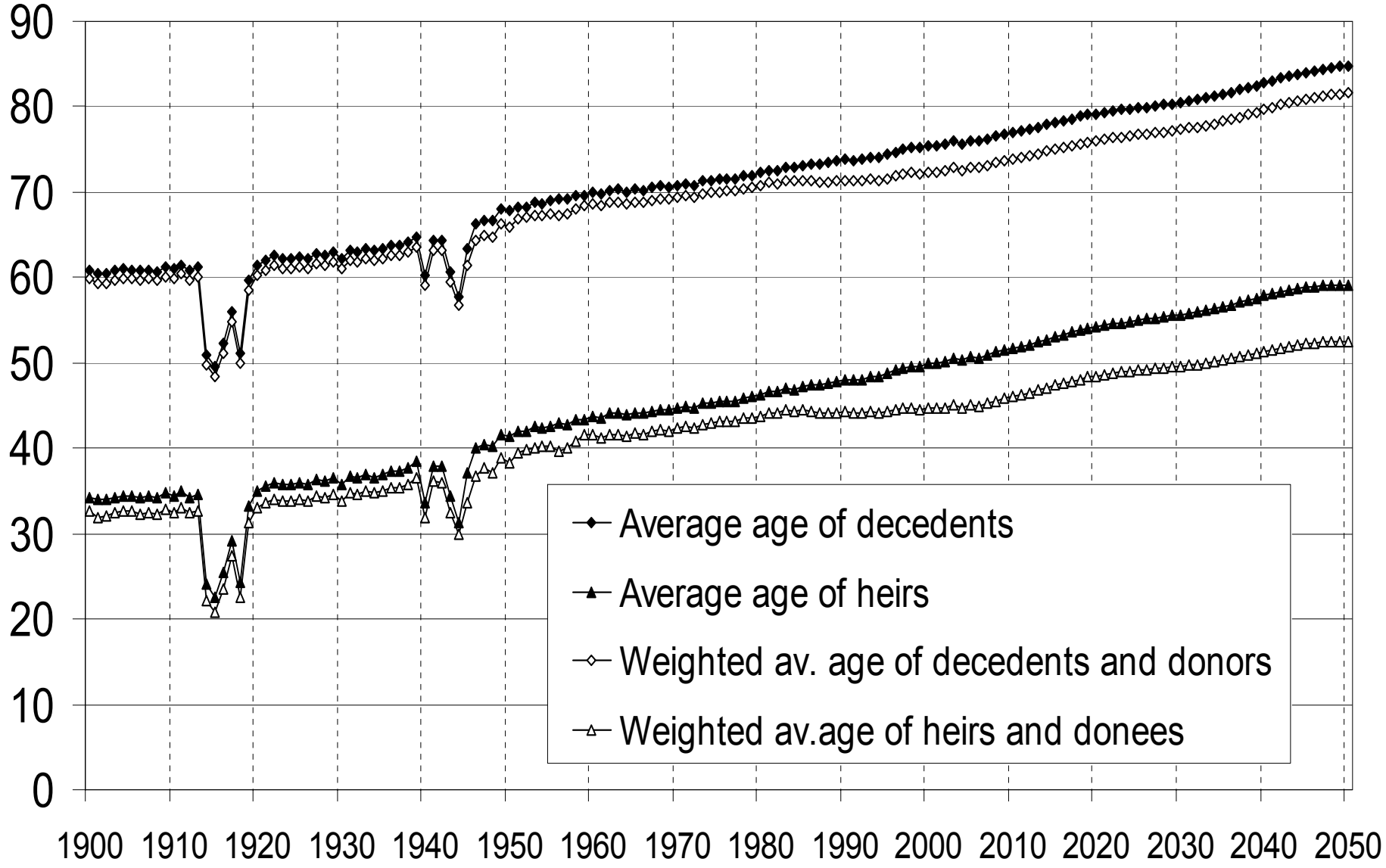
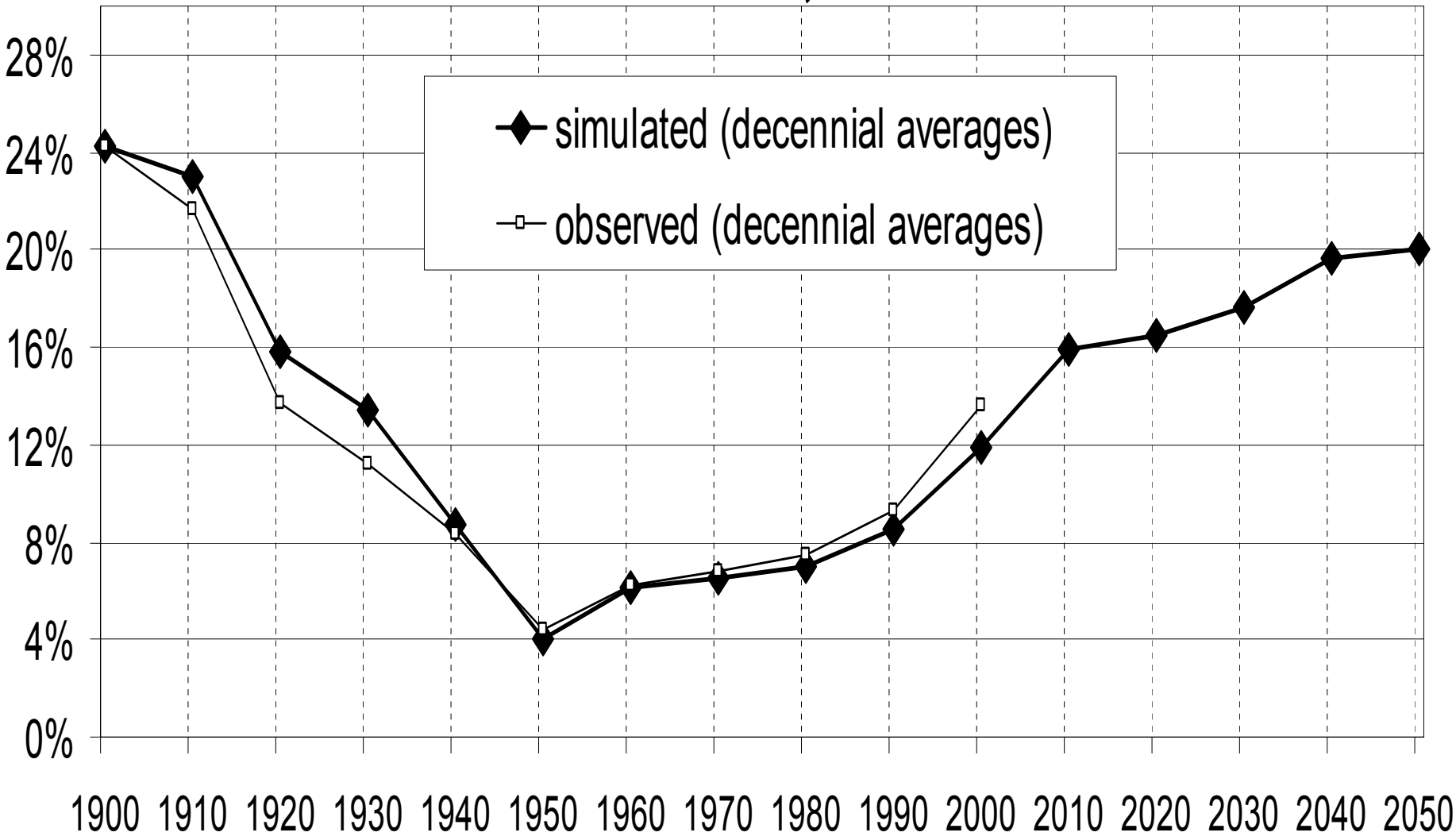


Figure 7: Age of givers vs receivers in France, 1900-2050



- 1900-1913: r=4.1%, g=1.4%
  (W/Y=700%, α=28.5%, s=10.2%)
- 1948-1978: r=4.9%, g=5.2%
  (W/Y=278%, α=13.5%, s=13.7%)
- 1978-2008: r=4.2%, g=1.8%
  (W/Y=422%, α=17.9%, s=11.1%)
  (exc. capital gains: 1978-2008: 2.1% above CPI; 78-98 : 0.2%; 98-08 : 7.1%)
- Simulations 2010-2050: **r=4.0%, g=2.0%**
  (W/Y=600%, α=24%, s=12%)

Figure 8: Simulations of annual inheritance flow as a fraction of national income, France 1900-2050



Some theory

- Why is B/Y around 20%-25% a magic number? What does it imply for W_B/W?
- To simplify: deterministic demographic structure: everybody becomes adult at age A, has a kid at age P, inherits at age I, and dies at age D
- 1900: A=20, P=30, D=60 $\rightarrow$ I=D-H=30
- 2050: A=20, P=30, D=80 $\rightarrow$ I=D-H=50
- mortality rate: $m_t(20+) = 1/(D-A)$

(1900: about 2.5%; 2050: about 1.5%)

- $Y_t = F(K_t , H_t) = F(K_t , \exp(gt)L_t)$
- g = exogenous productivity growth rate
- E.g. Cobb-Douglas: $F(K,H) = K^{\alpha} H^{1-\alpha}$
- $Y_t = Y_{Kt} + Y_{Lt}$, with $Y_{Kt} = r_t K_t = \alpha_t Y_t$

- Define $\beta_t = K_t/Y_t$ = capital/output ratio

(= W_t/Y_t) (closed economy, no govt)

- Then $\alpha_t = r_t \beta_t$
- E.g. if β_t = 600%, r_t = 4%, then α_t =24%

- Assume $S_t = sY_t = s_K Y_{Kt} + s_L Y_{Lt}$

→ Harrod-Domar steady-state: $sY = gK$

i.e. $\beta^* = s/g$ (and $r^* = \alpha/\beta^*$)

e.g. if g=2%, s=10%, then $\beta^* = 500\%$

- Dynastic model: $U = \int \exp(-\theta t)\, C_t^{1-\sigma}/(1-\sigma)$

→ Ramsey steady-state: $r^* = \theta + \sigma g$

- In effect: $s_L^* = 0\%$, $s_K = g/r^*\%$
- Intuition: Y_{Lt} grows at rate g, workers don't need to save; but capitalists need to save a fraction g/r% of $Y_{Kt} = r_t W_t$, so that W_t grows at rate g

- What about $b_t = B_t/Y_t = \mu_t \ m_t \ \beta_t$?
- If s_L=0%, then the age-wealth profile $W_t(a)$ is very simple:

- If a<I, then $W_t(a) = 0$

- If a≥I,then $W_t(a) = W_t$ (growing at rate g)

$\rightarrow \mu = 1/[(D-I)/(D-A)] = (D-A)/(D-I) > 100\%$

(1900:μ=40/30=133%; 2050:μ=60/30=200%)

$\rightarrow$ since $m = 1/(D-A)$, **$b^* = \beta^*/(D-I)$**

- **I.e. if β*=600%, D-I=30, then b*=20%, irrespective of life expectancy D**

- More generally, take any s_L, s_K; then:

Proposition 1: In steady-state:

(i) $\mu = (1-\exp[-(g-s_K r)(D-A)])/(1-\exp[-(g-s_K r)(D-I)])$

(ii) If $s_K = g/r$, then $\mu = (D-A)/(D-I)$

(iii) More generally, $\mu>100\%$, $\mu'(r)>0$, $\mu'(g)<0$

$\rightarrow$ steady-state inheritance flow $b=\mu\beta/(D-A)$ rises with r and declines with g

Proposition 2: In steady-state, corrected capital share α^*= weighted average between b and α

From bequest flow to bequest wealth

- W_{Bt} = capitalized bequest wealth at time t
- $W_{Bt} / Y_t = \int_{s<t} B_{st} / Y_s \exp(r_{st} - g_{st})\, ds$
- B_{st} = bequests received at time s by individuals alive at time t
- r_{st} = cumulated return to capital between time s and time t
- g_{st} = cumulated growth rate between time s and time t

- Deterministic demographic structure:

$B_{st} = B_s$ for t-(D-I)<s<t, $B_{st} = 0$ for s<t-(D-I)

→ **$W_B/Y = B/Y\ (\exp[(r–g)(D-I)]-1) / (r-g)$**

- Combined with $B/Y = \mu\ m\ W/Y$, one gets a simple formula for inheritance share in total wealth accumulation :

→ **$W_B/W = \mu\ m\ (\exp[(r–g)(D-I)]-1) / (r-g)$**

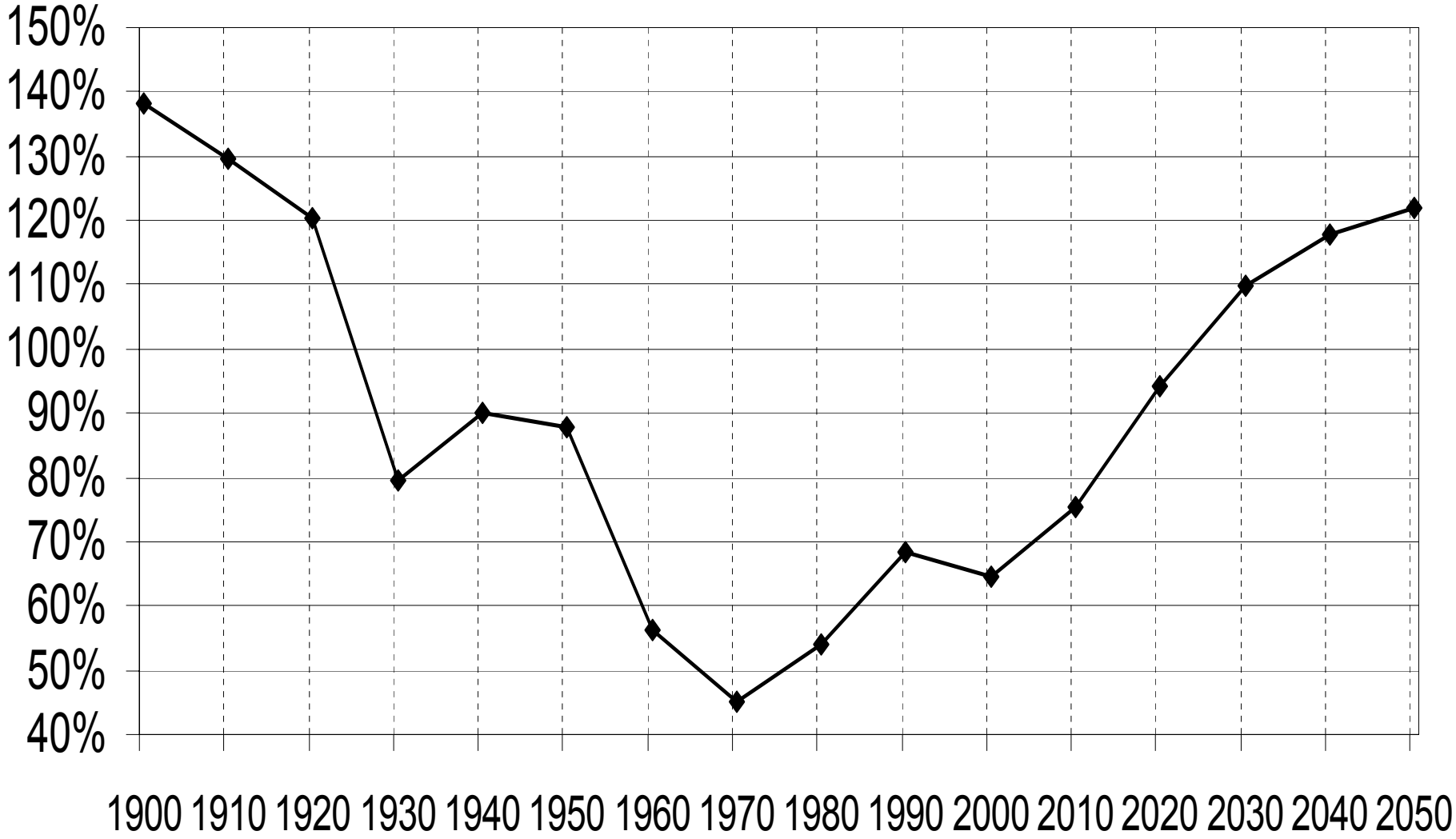
→ if r-g=0%, then $W_B/W = \mu\ m\ (D-I)$

If μ=200%, m=1.5%, D-I=30: **W_B/W=90%**

But if r-g=2%, then W_B/W=123%;

if r-g=4%, then W_B/W=174%

Figure 9: The share of capitalized bequests in aggregate wealth accumulation France 1900-2050



Application to lifetime inequality

- 1900s: Top 1% = 50% of wealth; Top 10% = 90%; Bottom 50% = 0%-5%
- 2000s: Top 1% = 20% of wealth; Top 10% = 50%; Bottom 50% = 5%-10%

→ B/Y might return to 20%-25%, but wealth concentration still much lower than 1900

… except that (net Y_L)/Y is now much smaller than in 1900: one needs to introduce taxes and transfers

Figure 10: Labor income share in national income, France 1900-2008

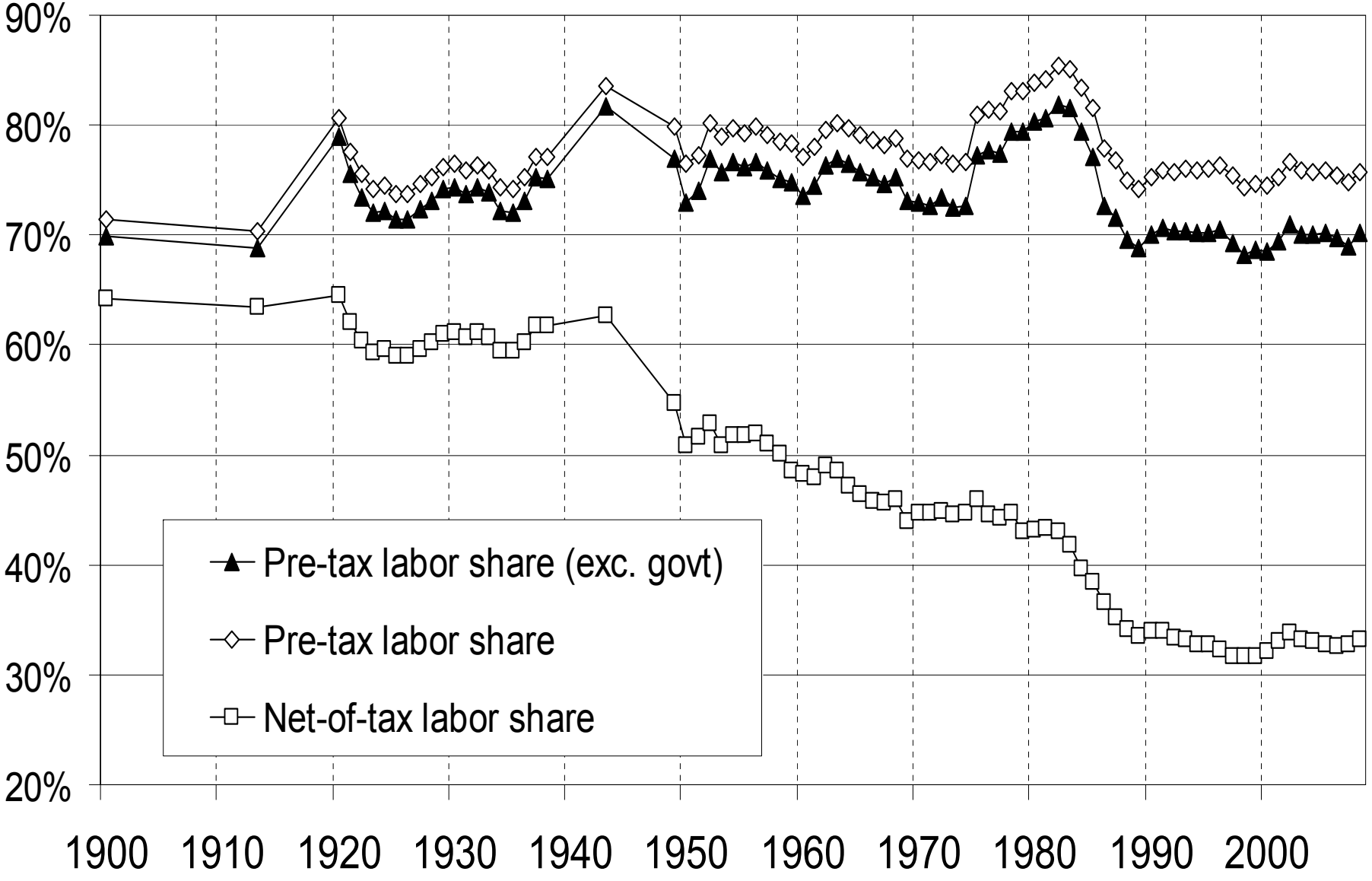
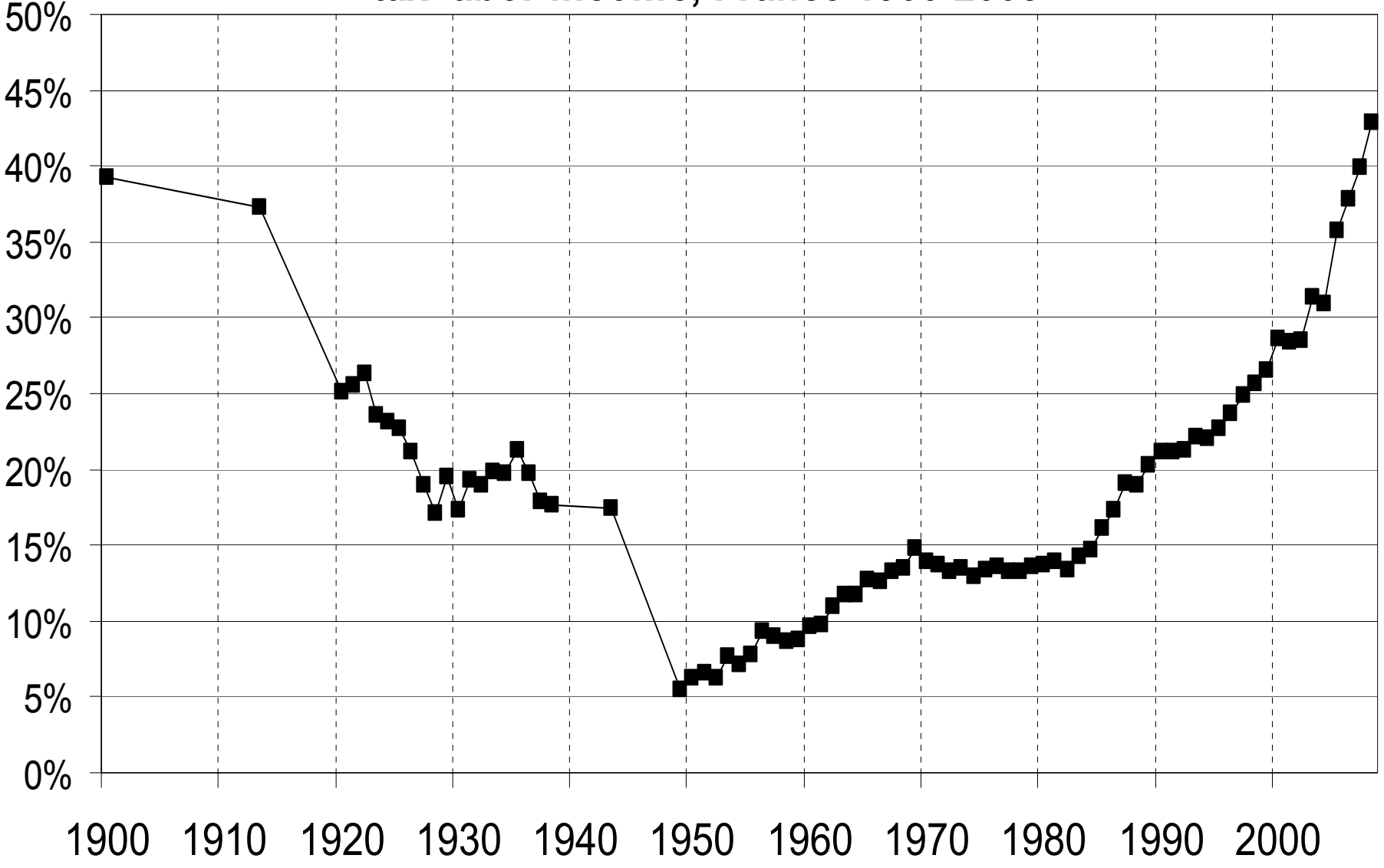


Figure 11: Annual inheritance flow as a fraction of net-of-tax labor income, France 1900-2008



What have we learned?

- Inheritance is likely to be a big issue in the 21st century
- Modern economic growth did not kill inheritance; the rise of human capital and meritocracy simply did not happen
- But no normative model… and life-cycle saving still exists: huge heterogenity in savings behavior across individuals

- Main lesson: capital accumulation takes time… one should not look at the past 10 or 20 yrs and believe this is steady-state…
- Predictions: a lot depends on r vs g+n

→ China/India: inheritance doesn't matter

→ US: inheritance smaller than in France

→ Italy, Spain, Germany ($n<0$): U-shaped pattern even bigger than France

→ world, very long run: $g+n=0\%$ (global warming): inheritance and past capital will dominate evrything; back to Marx