Bequests, Taxation and the Distribution of Wealth in a General Equilibrium Model

Bossmann et al. (2007, J. Pub. E.)

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Aims

- This paper examines the role of bequests and of taxation on bequests for the distribution of wealth.

Findings

- Using the coefficient of variation as the measure of inequality, bequests per se diminish the inequality of wealth since they raise private savings and hence average wealth holdings more than the variance of wealth.
- From a policy perspective, taxing bequests and redistributing government revenue lump-sum among the young generation further decreases wealth inequality.

Literatures

- Estate taxes increase wealth inequality in the long run
    - Altruism
      Becker and Tomes (1979), Davies (1986)
    - "Joy-of-giving" bequest motives
      Atkinson (1980)

The model-Households

- A society with overlapping generations.
- Each individual lives for two periods.
- In each period t there is a large number n of families or dynasties consisting of one parent and one child.
- When young, individuals work and earn labour income. When old, parents are retired, consume their savings, and leave a bequest to the child.

Idiosyncratic shocks

- Each young worker supplies 1 unit of labor inelastically.
- Let l_{it} denote the labor productivity.
- Assume that l_{it} is $i.i.d.$ across individuals

$$E(l_{it}) = \bar{l} = 1$$

$$Var(l_{it}) = \sigma^2.$$

No aggregate uncertainty

- By the law of large numbers

$$\frac{1}{n}\sum_{i=1}^{n} l_{it} \longrightarrow 1$$

  as $n \longrightarrow +\infty$.
- Thus the average supply of labor efficiency approaches 1, as $n \longrightarrow +\infty$.
- Aggregate variables do not have uncertainty.

Individual's problem

- Preferences

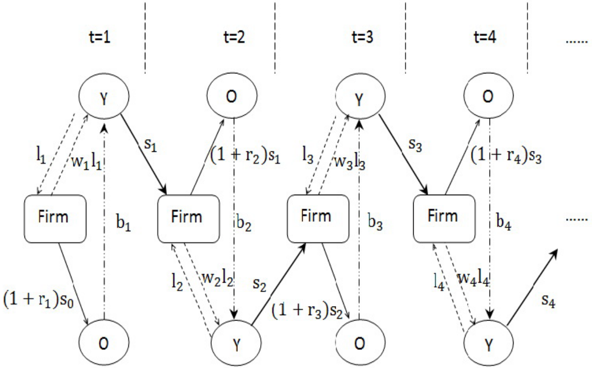
$$U_{it} = \alpha \ln c_{it}^{y} + (1-\alpha)[\beta \ln c_{it+1}^{o} + (1-\beta) \ln b_{it+1}]$$

$$s.t. \quad c_{it}^{y} + s_{it} = w_t l_{it} + b_{it} + g_t$$

$$c_{it+1}^{o} + (1+\tau) b_{it+1} = s_{it}(1 + r_{t+1})$$

with $\frac{1}{2} < \alpha < 1$, and $0 < \beta < 1$. c_{it}^{y} is consumption when young. c_{it+1}^{o} is consumption when old. b_{it+1} is the bequest for the child. s_{it} is savings. w_t is the wage rate. r_{t+1} is the interest rate. g_t is the lump-sum transfer from the government, τ is the estate tax rate.

Timing



t=1
t=2
t=3
t=4
......
Y
O
Y
O
l_1
$w_1 l_1$
s_1
$(1+r_2)s_1$
l_3
$w_3 l_3$
s_3
$(1+r_4)s_3$
Firm
b_1
Firm
b_2
Firm
b_3
Firm
b_4
......
$(1+r_1)s_0$
l_2
$w_2 l_2$
s_2
$(1+r_3)s_2$
l_4
$w_4 l_4$
s_4
O
Y
O
Y

Optimal policy functions

- Consumption, savings, and bequests

$$c_{it}^{y} = \alpha(w_t l_{it} + b_{it} + g_t)$$

$$s_{it} = (1-\alpha)(w_t l_{it} + b_{it} + g_t)$$

$$c_{it+1}^{o} = \beta s_{it}(1 + r_{t+1})$$

and

$$b_{it+1} = \frac{(1-\beta)s_{it}(1+r_{t+1})}{1+\tau}.$$

The firm

- The firm's problem

$$\max_{K_t, L_t} \{AK_t^{\gamma} L_t^{1-\gamma} - (r_t + \delta)K_t - w_t L_t\}$$

  where δ is the depreciation rate.

- F.O.C.

$$r_t = \gamma A k_t^{\gamma - 1} - \delta$$

  and

$$w_t = (1 - \gamma) A k_t^{\gamma}$$

  where $k_t = \frac{K_t}{L_t}$.

The government

- The government budget constraint

$$ng_t = \tau \sum_{i=1}^{n} b_{it}.$$

The capital stock

- Note that in the equilibrium

$$k_{t+1} = \frac{K_{t+1}}{L_{t+1}} = \frac{\sum_{i=1}^{n} s_{it} / n}{\sum_{i=1}^{n} l_{it+1} / n}.$$

- For a sufficiently large economy, i.e. for $n \to +\infty$, $\frac{1}{n}\sum_{i=1}^{n} l_{it} = 1$. Thus we have

$$k_{t+1} = c_1 k_t^{\gamma} + c_2 k_t$$

  where $c_1 = (1-\gamma\beta)(1-\alpha)A$ and $c_2 = (1-\alpha)(1-\beta)(1-\delta)$.
- The steady-state capital stock

$$\bar{k} = \left(\frac{c_1}{1-c_2}\right)^{\frac{1}{1-\gamma}}.$$

The evolution of wealth

- Let $a_{it+1} = s_{it}$. We have

$$a_{it+1} = c_3 l_{it} + c_4 a_{it} + c_5$$

where $c_3 = (1 - \alpha)\bar{w}$, $c_4 = \frac{(1-\alpha)(1-\beta)(1+\bar{r})}{1+\tau}$, and $c_5 = \frac{\tau(1-\alpha)(1-\beta)(1+\bar{r})}{1+\tau}\bar{k}$.

- Let $a_{i\infty}$ denote the stationary wealth distribution

$$a_{i\infty} = \frac{c_5}{1 - c_4} + c_3 \sum_{s=1}^{+\infty} c_4^{s-1} l_{is}$$

since $c_4 < 1$.

- And

$$E(a_{i\infty}) = \frac{c_3 + c_5}{1 - c_4} = \bar{k}.$$

Inequality meaure-CV

- The coefficient of variation

$$CV(X) = \frac{\sqrt{Var(X)}}{E(X)}.$$

Bequest motives and wealth inequality-i.i.d. case

- Assume that $\tau = 0$. Thus $c_5 = 0$ and

$$E(a_{i\infty}) = \frac{c_3}{1 - c_4}.$$

- Assume that l_{it} is $i.i.d.$ along time. Thus

$$Var(a_{i\infty}) = \frac{c_3^2}{1 - c_4^2}\sigma^2.$$

Bequest motives reduce wealth inequality

- Comparisons
  - Economy A, no bequest motive, i.e. $\beta = 1$. Thus $c_4 = 0$, and
    $$CV(a_{i\infty}^A) = \sigma.$$
  - Economy B, with bequest motives, i.e. $0 < \beta < 1$. Thus $0 < c_4 < 1$ and
    $$CV(a_{i\infty}^B) = \sigma\sqrt{\frac{1-c_4}{1+c_4}}.$$
  - And
    $$CV(a_{i\infty}^B) < CV(a_{i\infty}^A).$$

Bequest motives and wealth inequality-Correlated case

- Assume that $\tau = 0$. Thus $c_5 = 0$ and
$$E(a_{i\infty}) = \frac{c_3}{1 - c_4}.$$
- Assume that
$$l_{it+1} = \bar{l} + v\left(l_{it} - \bar{l}\right) + \varepsilon_{it+1}$$
with $\bar{l} = 1$, $E\varepsilon_{it+1} = 0$, and $Var(\varepsilon_{it+1}) = \sigma^2$.
- Thus
$$Var(a_{i\infty}) = c_3^2 \frac{1}{\left(1 - c_4^2\right)\left(1 - v^2\right)} \frac{1 + c_4 v}{1 - c_4 v} \sigma^2.$$

Comparisons

- Economy A, no bequest motive, i.e. $\beta = 1$. Thus $c_4 = 0$, and

$$CV(a_{i\infty}^A) = \sigma\sqrt{\frac{1}{1-v^2}}.$$

- Economy B, with bequest motives, i.e. $0 < \beta < 1$. Thus $0 < c_4 < 1$ and

$$CV(a_{i\infty}^B) = \sigma\sqrt{\frac{1-c_4}{1+c_4}}\sqrt{\frac{1+c_4 v}{(1-v^2)(1-c_4 v)}}.$$

- And

$$CV(a_{i\infty}^B) < CV(a_{i\infty}^A).$$

Estate taxes and inequality-i.i.d. case

- Note that $\bar{k}$ is independent of τ. Thus tax rates do not influence $E(a_{i\infty}) = \bar{k}$.
- Comparisons
  - An economy with tax

$$Var(a^{wt}_{i\infty}) = \frac{c_3^2}{1 - c_4^2}\sigma^2.$$

  - An economy without tax ('no tax')

$$Var(a^{nt}_{i\infty}) = \frac{c_3^2}{1 - \left(c_4^{nt}\right)^2}\sigma^2.$$

  - We have

$$Var(a^{wt}_{i\infty}) < Var(a^{nt}_{i\infty})$$

  since $c_4 = \frac{c_4^{nt}}{1+\tau} < c_4^{nt}$.

Estate taxes and inequality-Correlated case

- Note that $\bar{k}$ is independent of τ. Thus tax rates do not influence $E(a_{i\infty}) = \bar{k}$.
- We have

$$Var(a_{i\infty}) = c_3^2 \frac{1}{(1-c_4^2)(1-v^2)} \frac{1+c_4 v}{1-c_4 v} \sigma^2.$$

- We have

$$Var(a_{i\infty}^{wt}) < Var(a_{i\infty}^{nt})$$

since $c_4 = \frac{c_4^{nt}}{1+\tau} < c_4^{nt}$.

Estate taxes and inequality-The Gini coefficient

- Simulation results suggest that the Gini coefficient, like the coefficient of variation, is decreasing in τ.

Conclusion

- Different from Becker and Tomes (1979), and Davies (1986).
  - Estate tax rate reduces wealth inequality.