Simulating the Driving Forces of Inequality

(Equations)

Felipe A. Motta
Advisor: Samuel Bowles

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Inheritance of Material Capital (B)

t	:	Tax
W_i^c	:	Wealth of i-th couple
B_{ji}	:	Bequest of j-th son of the i-th couple
n_i	:	Number of kids of the i-th couple

Primogeniture:

$$\begin{aligned} B_{1i} &= W_i^c(1-t) \\ B_{ji} &= 0 \quad \forall\, j \neq 1 \end{aligned}$$

Equal Inheritance:

$$B_{ji} = \frac{W_i^c(1-t)}{n_i} \quad \forall\, j$$

Inheritance of Human Capital (H)

$\overline{W}$	:	Mean wealth
$\overline{H}$	:	Mean H
H_k^i	:	H of i-parent k-th generation
H_k^j	:	H of j-parent k-th generation
ε	:	shock
b	$\sim$	random[0,1]

$$H_{k+1} = (1-\lambda)[\overline{H} + t\overline{W}] + \lambda[(1-z)(bH_k^i + (1-b)H_k^j) + zW_k^c] + \varepsilon_1$$

Assortation

$$
\begin{aligned}
r &: \text{Assortation probability} \\
A_i &: \text{i-th agent's assortation measurement}
\end{aligned}
$$

$$
\begin{aligned}
r &\Rightarrow A_i = B_i^{\gamma} H_i^{1-\gamma} \\
1-r &\Rightarrow \text{Random}
\end{aligned}
$$

Consumption and Investment

$$
\begin{aligned}
B_c &: \text{Couple Bequest} \\
B_c &= B^i + B^j \\
B_c' &: \text{Couple bequest after consumption} \\
I &: \text{Investment} \\
K_c &: \text{Normal consumption coefficient} \\
c &: \epsilon[0,1]\text{Fraction of Bequest consumed in excess of } K_c
\end{aligned}
$$

$$
\begin{aligned}
\textbf{if}(B_c <= K_c\overline{W}) \quad B_c' &= 0 \quad \text{consume entire bequest} \\
\textbf{else if}(cB_c < K_c\overline{W}) \quad B_c' &= B_c - K_c\overline{W} \\
\textbf{else}(cB_c >= K_c\overline{W}) \quad B_c' &= B_c(1-c) \\
I &= B_c'
\end{aligned}
$$

Final Wealth

$$
\begin{aligned}
W_c &: \text{Couple Wealth} \\
H_c &: \text{Couple H} \\
H_c &= H^i + H^j
\end{aligned}
$$

$$
\begin{aligned}
\textbf{if}(B_c' >= 1) \quad W_c &= B_c'^{\rho} H_c^{\delta} + \varepsilon_2 \\
\textbf{else}(B_c' < 1) \quad W_c &= H_c^{\delta} + \varepsilon_2
\end{aligned}
$$

Reproduction

$$
\begin{aligned}
N &: \text{Total population} \\
n_i &: \text{No. of kids of the i-th couple} \\
\alpha_i &: \frac{W_i^c}{\sum_j^{N/2} W_j^c} \\
n_i &= (1-\mu)2 + \mu(\alpha_i N)
\end{aligned}
$$

Progressive Tax Function

$$
\begin{aligned}
\text{x} &: \text{Parent's wealth} \\
\text{f(x)} &: \text{Bequest as a function of parent's wealth} \\
K_e &: \text{Minimum taxable wealth coefficient} \\
K_a &: \text{Maximum bequest coefficient} \\
\text{f}(k_e\overline{W}) &= K_e\overline{W} \\
\text{f'}(k_e\overline{W}) &= 1 \\
\lim_{x \to \infty} \text{f(x)} &= k_a\overline{W}
\end{aligned}
$$

$$
f(x) = \frac{(x - k_e\overline{W})(k_a\overline{W} - k_e\overline{W})}{(x + k_a\overline{W} - 2 * k_e\overline{W})} + k_e\overline{W}
$$

Parameters

$$
\begin{aligned}
\mu &: \text{Weight of wealth in reproduction} \\
\lambda &: \text{Weight of H inheritance from parents} \\
\gamma &: \text{ Relative importance of B in assortation} \\
\rho &: \text{Importance of Investment on wealth} \\
\delta &: \text{Importance of H on wealth} \\
\text{r} &: \text{Assortation Probability} \\
K_e &: \text{Minimum taxable wealth coefficient} \\
K_a &: \text{Maximum bequest coefficient} \\
K_c &: \text{Normal consumption coefficient} \\
c &: \epsilon[0,1]\text{Fraction of Bequest consumed in excess of } K_c \\
\text{z} &: \text{Weight of parent's wealth on the inheritance of H} \\
\varepsilon_1 &: \text{Shock to H} \\
\varepsilon_1 &: \text{Shock to wealth}
\end{aligned}
$$