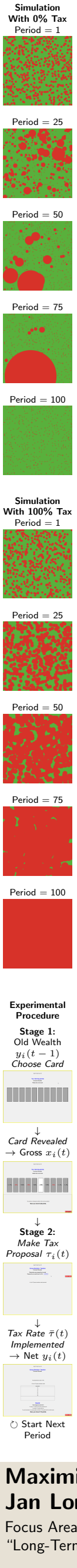
Sharing Is Growing — But We Don't See It

The Portfolio Effect of Redistribution in Laboratory Experiments



In democratic societies, redistribution evolves as people form opinions in the public sphere, and vote on desired levels of taxation and transfers. Citizens operationalized as boundedly-rational agents may act with threefold preferences to maximize their (i) *individual* outcome, (ii) *social* criteria of the outcome distribution, or (iii) *epistemically* objective criteria to maximize welfare. One objective welfare-maximising criteria is that **redistribution through taxation can spur growth** for all. The portfolio effect was discovered as an investment strategy, but is counter-intuitive and not widely known in macro-economics.

The portfolio effect exists in risky environments where growth is *stochastic* and *multiplicative*. Modern economy can be seen as such whenever success is partly self-perpetuating but only imperfectly predictable. Without redistribution everyone will be wiped out in the long run by a sufficiently long streak of bad luck. The repeated redistribution of wealth from current winners to current loosers prevents this and consequently spurs growth.

Aside from this theoretical observation, we want to understand **how people and societies really decide in risky democratic enviroments?** In particular we ask:

1. Do decisions differ under additive and multiplicative growth?
2. What rationale do people use in voting about redistribution?

Model, Rational Theory, Experiment

Growth and redistribution of wealth is modeled in a society of n agents which start with equal wealth $x_i(0)$ at time zero. In each time-step the society iterates through two stages. First, agents' wealth grows or shrinks through stochastic shocks. Second, agents decide for a tax rate. The tax revenue is redistributed in equal shares. The concrete mechanisms are

Stage 1: Stochastic growth to **gross wealth** x_i with conditions

MULT: $x_i(t) = \eta_i(t) y_i(t-1)$ **ADD:** $x_i(t) = y_i(t-1) + \zeta_i(t)$

with random factors η (MULT), or random increments ζ (ADD), representing *decline*, *no change*, and increase of wealth:

$$\eta = \begin{cases} 0.5 \\ 1 \\ 1.5 \end{cases} \qquad \zeta = \begin{cases} -0.75 & \text{with probability 0.3,} \\ 0 & \text{with probability 0.3, and} \\ +0.75 & \text{with probability 0.4.} \end{cases}$$

In both conditions growth is expected: $\mathbb{E}(\eta) = 1.05$, $\mathbb{E}(\zeta) = 0.075$

Stage 2: Collective decision on redistribution of wealth through proportional taxation and lump-sum transfer. Individuals make tax rate proposals $\tau_1(t), \ldots, \tau_N(t)$ which are averaged to the implemented tax rate $\bar{\tau}(t)$. The **net wealth** y_i is realized based on gross wealth and the average wealth $\bar{x}$ as

$$y_i(t) = \underbrace{(1-\bar{\tau}(t))x_i(t)}_{\text{Wealth after Tax}} + \underbrace{\bar{\tau}(t)\bar{x}(t)}_{\text{Lump-sum Transfer}} .$$

Experiment: Monetarily incentivized laboratory experiment with 8 groups of 10 mostly undergraduate students each starting with 4.25€ (MULT) and 6.5€ (ADD). 15 periods until pay-out.

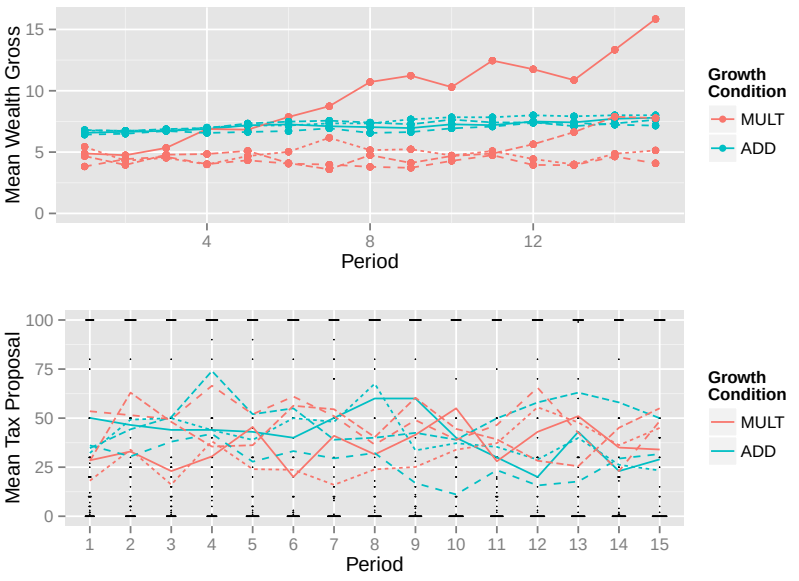
Short-sighted egoistic preferences leads to two **pure rational strategies for the tax proposal** of an individual τ_i:

wealth below average wealth $\rightsquigarrow$ $\tau_i = 100\%$,
wealth above average wealth $\rightsquigarrow$ $\tau_i = 0\%$.

For this choice subjects must infer the **expected average wealth** from their knowledge about their wealth before and after taxation, the implemented tax rate, and the probabilities of shocks.

Computer simulations reveal that **median pay-outs are comparable** at period 15 in both conditions: 7.62€ (ADD), 7.59€ (MULT). The mean implemented tax rates are a 51.6% (ADD) and 51.4% (MULT). Fixed tax rates 0% and 100% show the same median pay-outs under ADD. Under MULT 0% leads to only 2.27€ while 100% would bring subjects 7.68€.

Experimental Results



By design, growth under MULT shows more variation than under ADD. We find:

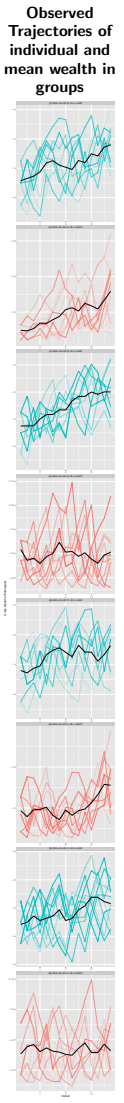
1. Implemented **tax rates** vary mostly between 20% and 60% (mean 40.2%) and are **lower** than predicted in computer simulation (mean 51.5%, mostly between 20-80%). There is **no substantial difference between MULT and ADD**.
2. **Tax proposals polarize** after the first rounds (black dots in the above panel). Players seem to learn that only tax rates 0% and 100% are rational and partly overcome socially desired central rates.

Participants' **tax proposals roughly follow the rational model** based on noisily inferred differences from the expected mean wealth in their group.

1. As people's wealth falls below the perceived mean wealth, they increasingly detect this signal and propose 100%. Analog for wealth above average and 0%.
2. This noisy response to the cognitively demanding signal is *systematically biased*: **people appear to underestimate the likely mean wealth** by, on average, 1.07€ for MULT and 0.43€ for the ADD.

Conclusion

Participants systematically **underestimate inequality to their own disadvantage**, especially when multiplicative growth skews the distribution of rewards. Such self-reinforcing and — at least partially — stochastic processes are **widespread in the developed market economy**, and if these results hold up outside the lab, people may be quite **inept at recognizing, and harvesting** portfolio effect benefits for their individual and the common good. **More research and education** on these and other *system-inherent* dynamics of inequality and growth can enhance policy-making and public acceptance of redistribution.



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