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Wealth inequality under "keeping up with the Joneses" preferences☆

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HIGHLIGHTS

- I construct a version of the Aiyagari (1994) model.
- I assume "Keeping up with the Joneses" utility function.
- Reference consumption defined by consumption of next higher earning group.
- Wealth inequality is substantially magnified under these preferences.
- High persistence of earnings is needed to obtain this result.

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ABSTRACT

In the present paper I introduce "keeping up with the Joneses preferences" in an otherwise standard heterogeneous agent economy. The model simulations show that this kind of preferences can generate a substantial increase in wealth inequality compared to an equal model with standard expected utility.

1. Introduction

Standard heterogeneous agent models assume that utility depends on the level of personal consumption. Despite this there is a long tradition in economic thinking dating back to Veblen (1899) and Duesenberry (1949) that has recognized that interpersonal comparisons can play an important role in motivating economic actions including consumption and saving behavior. In the present paper I apply this classical insight about the role of interpersonal comparisons to a standard modern quantitative model of saving, that is, the precautionary saving model.

More precisely I propose a version of the classical model of Aiyagari (1994) where I assume that an agent's utility depends not only on her personal consumption but also on an external reference consumption level defined as the average consumption of agents in the earnings group immediately above its own. I find that the model can increase wealth inequality by a substantial amount. The magnitude of the increase depends both on the strength of the external habit motive and on the persistence of the earnings process with a high persistence needed for this magnitude to be large.

A number of recent papers have found empirical support for the old idea that interpersonal comparison of economic outcomes matter. As an example Luttmer (2005) studies the impact of average local income on self-reported well-being and finds a negative relationship as strong as the positive relationship between the latter variable and own income. His results also suggest that the channel is through utility functions that depend on relative consumption

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in addition to absolute consumption. In a slightly different vein, Bertrand and Morse (2013) and Frank et al. (2014) test empirically the relationship between other's income, as expressed by the top income shares, and different economic choices like consumption of middle-income households or bankruptcy rates at the state or county level. In all cases they find a positive relationship. The cited literature provides an empirical motivation for the present study. The distinctive contribution of this paper consists of extending the study of the role of inter-personal comparisons in consumption, that have so far been studied in empirical or theoretical settings, to a quantitative model and to explore their role in shaping wealth inequality.

2. The model

I study the steady-state properties of a neoclassical economy with no aggregate uncertainty. The economy is populated by a measure one of infinitely lived households. Households are endowed with a unit of time that they supply inelastically to the labor market. Each period they receive a shock to their efficiency units of labor that I denote with e. I assume that e belongs to a finite set $E = \{e_1, \ldots, e_n\}$ and that it follows a first-order Markov process that can described with a transition probability matrix π. Households evaluate the utility of a flow of consumption c by using the function:

$$U(c, C) = \frac{c^{1-\alpha} C^{\gamma\alpha}}{1-\alpha} \tag{1}$$

where α is the coefficient of relative risk aversion with respect to own consumption and γ defines the impact on the household's utility of the average consumption level of a reference group. When $\gamma > 0$ any addition to the consumption of the reference group raises the marginal utility of own individual consumption: consumption becomes more valuable since it helps "keeping up with the Joneses". This utility function has been used in Galí (1994) and is also a special case of the function used by Abel (1990). In those articles the reference consumption group was the set of all households in the economy. In the present context with no aggregate uncertainty the average consumption is constant and would wash out of the agents' first order conditions, making it irrelevant. It is thus assumed that for agents endowed with an earnings shock inferior to the top one, the reference group is the set of all agents with the next higher earnings shock. Agents with the highest earnings shocks on the other hand do not have an external reference group. Formally, for agents with earnings shock $i \in \{1, 2, \ldots, n\}$

$$U_i(c, C) = \frac{c^{1-\alpha} C^{\gamma\alpha}}{1-\alpha} \tag{2}$$

where $C = 1$ if $i = n$ and $C = \overline{C}(e_{i+1})$ if $i < n$ where $C = \overline{C}(e_{i+1})$ is the average consumption for agents with earnings shock $i + 1$.

The choice to use earnings one step above as the characteristic that defines reference groups seems natural given that the consumption externality plausibly arises as a consequence of exposure to other groups' consumption. In light of this it is reasonable to think that earnings poor households are not likely to be much exposed to the top earners life-styles since they are likely not to live in the same neighborhood or share the same workplace but for the same reasons they are more likely to know the consumption possibilities of other households that earn a bit more than them. Also the choice of earnings rather than wealth or income is convenient because it leads to a straightforward extension of well-known methods to solve the model.[1] Having utility depend on consumption of the earnings group immediately above implies that consumption at the top of the earnings distribution will indirectly affect consumption at all points of that distribution down to the bottom. This idea was termed "consumption cascades" by Frank et al. (2014).

There are no state contingent markets to insure household specific earnings risk. In order to save, the household has access to a single asset that pays interest at a rate r. I denote the amount of assets held by the household by a and I assume that $a \in A \equiv [\underline{a}, \infty)$. Given the preferences and asset structure specified above we directly write the household's optimization problem in dynamic programming form. The state variables of this problem are the shock to its endowment of efficiency units of labor and its assets at the beginning of the period, that is, the pair $\{a, e\}$. The problem thus reads:

$$V(a, e) = \max_{c, a'} \left\{ u(c, C) + \beta \mathbf{E} V(a', e') \right\} \tag{3}$$

subject to the resource constraint

$$a' = ew + (1 + r)a - c \tag{4}$$

a forecasting rule for the reference group's consumption

$$C = \mathbf{C}(e) \tag{5}$$

and the no-borrowing constraint

$$a \geq 0. \tag{6}$$

In the resource constraint (4) w is the rental rate for each efficiency unit of labor and r is the rental rate on capital. In the value function Eq. (3) β is the standard subjective discount factor and $\mathbf{E}$ is the expectation operator.

Aggregate output is produced by a representative firm operating under perfect competition via a standard neoclassical, constant return to scale production function $Y = F(K, L)$, where Y is aggregate output, K is the total amount of capital and L is the total amount of labor used in production. The output can be indifferently used for investment and consumption. Capital depreciates at a constant rate $\delta \in [0, 1]$.

The equilibrium for this economy can be defined in the usual way and is thus omitted for the sake of brevity.[2]

3. Parameter calibration

The model is calibrated taking a year as the length of the period. Technology is defined by a standard Cobb–Douglas production function:

$$Y = K^{\theta} L^{1-\theta} \tag{7}$$

and the capital share θ is set at 0.35. The depreciation rate of capital δ is fixed at 0.06. The Markov chain for the efficiency units of labor is obtained by discretizing an AR(1) process in logarithms:

$$\ln e_t = \rho \ln e_{t-1} + \varepsilon_t \tag{8}$$

where ε is a normal i.i.d. random variable, independently distributed across agents, with mean 0 and variance σ_ε^2. For the autocorrelation coefficient I use two values. As a baseline I set $\rho = 0.95$ which is the value estimated by Storesletten et al. (2007). I also explore the quantitative properties of the model under a lower persistence scenario where ρ is set to the value of 0.9. The value of σ_ε is set implicitly by fixing the coefficient of variation of earnings. This takes the value of 0.2 based on

[1] Defining the consumption reference by wealth groups would be problematic from a numerical point of view since it would lead to discontinuities in the value function around the thresholds defining the groups. The same applies to income which depends on wealth through the earned interest component.

[2] The only slight variation is that we need to insure consistency between the forecasting rule for the consumption of reference groups $\mathbf{C}(e)$ with the actual average consumption of those groups $\overline{\mathbf{C}}(e)$.