Interdependent Preferences and Aggregate Saving

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Abstract

The effect of relative consumption on aggregate saving is analyzed in a two-period model. It is assumed that people care about their rank in the consumption distribution at each date. It is shown that individuals concentrate their consumption in the period in which the distribution of consumption is the most egalitarian. As a result, a rise in consumption inequalities has a negative impact on saving compared to the case without a status-seeking motive.

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1 Introduction

The personal saving rate in the United States has markedly declined for the last fifteen years. It has fallen from 10 percent in the middle of the 1980s to 2.3 percent in 1999. This fall is commonly referred to as the low saving rate puzzle. To the extent that consumption inequality is positively correlated to income inequality, this paper suggests that one of the possible cause of a low saving rate could be the rise of income inequality experienced by this country. Indeed, the Gini coefficient of inequality for household incomes rose between 1968 and 1992 by 3.5 percentage points, which is quite significant (Atkinson (1997)). In the present paper, a link is shown between these two phenomenons by assuming that people are concerned by their relative consumption.

Relative consumption is defined as the level of personal consumption compared to the consumption level of a given reference group. This group can be neighbors or at a broader level the entire society. The idea that individual consumption may be affected by the level of consumption enjoyed by others has first been suggested by Veblen (1922) and later by Duesenberry (1949). Indeed, a relatively high consumption level may be a signal to human and physical wealth and may inform about the social position of the person who enjoys it. It may also be a direct source of social rewards insofar as it involves admiration or envy by others.

In this paper I interpret these various motivations by assuming that individuals are to some extent concerned by their ranking in the consumers' hierarchy and I derive aggregate saving implications. To do so, a simple two-period model is used in which individuals' wealth differs. People care at each date about their rank in the time-varying consumption distribution. It is shown that a rise in consumption inequalities has a negative impact on saving. The basic mechanism captured by the model is the following: one motive of saving is to increase in the future one's relative position by consuming more. However, the rise of consumption inequalities weakens this motive since it is easier to raise one's rank today than in the future.

Several empirical papers have argued that some form of interdependent utility may play an important role in determining consumption. Di Tella, MacCulloch and Oswald (1997) examine the evolution of happiness by looking at responses to survey questions in 13 industrialized countries since the early 70s. They find no trend in the US and a decline in Italy and Germany for example. Conventional models with absolute utility fail to explain these trends since meanwhile, real incomes have more than tripled over the period. Solnick and Hemenway (1998) use survey data to provide some empirical information about concerns regarding relative standing. Half of the respondents preferred to have a real income 50% smaller but high relative income. Kapteyn, Van de Geers and Van de Stadt (1985) estimate a model in which both one's own past consumption and the consumption of others influence utility. They cannot reject the proposition that utility is entirely relative (see also Kapteyn et al. (1997)).

The theoretical link between saving and status seeking has been studied by several papers. Here I report only some of them that share similarities with the present model (see Weiss and Fershtman (1998) for a general survey). Corneo and Jeanne (1997)

consider a model in which individuals derive utility from their rank in the distribution of wealth. They show that the growth rate of the economy increases with the initial equality of wealth distribution. The present model essentially departs from theirs by assuming that higher consumption rather than higher wealth confers a greater status. This difference can be motivated by the fact that consumption is easier to advertize than wealth, a point first noted by Veblen (1922). It leads to very different implications on saving. Contrary to their model the initial level of wealth inequality does not play a major role. Rather, results crucially depend on the dynamics of consumption inequalities. Corneo and Jeanne (1999) propose a second model in which the link between wealth inequalities and saving is more ambiguous. However the same remarks regarding the differences with the present model apply here.

Knell (1999) analyzes the effect of relative consumption on saving in an overlapping generation model. There are two classes of wealth, whereas in the present model there is a continuum of wealth. He shows that a concern for relative standing produces a negative link between wealth inequality and growth if two conditions are fulfilled: individuals have a higher concern for their present than for their future relative standing and they refer to people that are wealthier than they are. These restrictive conditions are not displayed here. Yet an impact of inequalities on saving still remains.

The first condition of Knell (1999) for status to have a negative impact on saving is reminiscent of the papers by Franck (1985) or Corneo and Jeanne (1998). In particular Franck (1985) assumes that individuals care about their relative rank in consumption distribution. In his model saving is depressed because only first period rank matters. This straightforward mechanism is not reproduced in the present model. Indeed, contrary to these three papers I assume that individuals equally care about today's and tomorrow's status.

The paper proceeds as follows. In section 2, I describe the model. Then the link between aggregate saving and the evolution of the consumption dispersion is analyzed and the equilibrium conditions are derived in section 3. Section 4 studies the impact on saving in a linear economy. Section 5 concludes the paper.

2 Model

I consider a single-good economy with two dates: $t = 0, 1$ and a size-one continuum of agents. A period can be thought of as a half of a consumer's life. Agents differ in their first period endowment denoted by $y_0^i \geq 0$. Their second period endowment is zero but they can transfer goods from the first to the second period by using a linear production function which produces R for each unit invested at date 0[1].

The endowments are exogenous and distributed over $[\bar{y}_0, y_0^+]$ according to the cumulative distribution function $F(.)$. Let $f(.)$ denote the associated probability density function. The following properties of $f(.)$ are assumed[2]:

[1] R can be interpreted as a fixed gross interest rate. The exogeneity of R is appropriate if the economy is a small open economy or if the interest rate is controlled by the monetary authority.

[2] The hypothesis $f(\bar{y}_0) = 0$ in H1 will be necessary in the following to ensure that the second order

H1 $f(.)$ is continuously differentiable over $]\bar{y}_0, y_0^+[$, left continuous at y_0^+, right continuous at $\bar{y}_0$ and such that $f(\bar{y}_0) = 0$.

Let (c_0^i, c_1^i) be the consumption pattern of an individual endowed with $y_0^i \in [\bar{y}_0, y_0^+]$. Let $c_0 = Q_0(y_0)$ and $c_1 = Q_1(y_0)$ be the consumption rules (to be defined later) of all the consumers but i. The rules $Q_0(.)$ and $Q_1(.)$ are exogenously given for i as his consumption level is assumed to be too small to affect other consumption decisions. Let us define the set Ω_c^t, $t = 0, 1$, of individuals who consume less than c:

$$\Omega_c^t = \{y_0^i; Q_t(y_0^i) < c\}$$

The fraction $G_t(c)$ of the population which consumes less than c at date $t = 0, 1$ is expressed as:

$$G_t(c) = \int_{\Omega_c^t} f(y_0)\, dy_0$$

It is assumed that people derive utility from social status which is represented by their rank $G_t(c)$ in the consumers' hierarchy. All individuals have identical preferences which depend on consumption and on status:

H2 Let $T_t(c_t^i) : [0, \infty[\rightarrow \mathbb{R}$ denote the reduced form of the instantaneous utility function at $t = 0, 1$. $T_t(.)$ is defined by:

$$T_t(c_t^i) = u(c_t^i) + \alpha G_t(c_t^i)$$

where $u(.)$ is an increasing, concave and twice continuously differentiable function.

The rank term $G_t(c_t^i)$ captures the relative consumption motive. It is exogenously given at the individual's level. The assumption that the utility function is linear in the rank term is equivalent to assuming that the utility gain associated with a marginal increase in the rank is the same whatever the initial rank of the person[3]. The coefficient α reflects the strength of the status-seeking motive.

Let β denote the psychological discount rate. Each individual evaluates his consumption path by taking as given the evolution of the consumption distribution. The optimal consumption path (c_0^i, c_1^i) of an individual endowed with y_0^i is solution to the following problem $(\mathcal{P})$:

The slope γ is the solution of a polynomial of degree 3. A numerical determination of η and γ is performed. As an illustration, let the parameters of the economy be:

The saving decision is solved for different values of gross interest rate R. θ is taken sufficiently small in order for the marginal utility to be always positive. Given the slope

condition is a sufficient condition for the maximization problem stated below. See cases (I) and (II) in Appendix B for more details.

[3]Robson (1992) provides arguments in favor of the convex case while Corneo and Jeanne (1997) only consider the concave case. In the latter case the poor has a higher concern for status than the rich (see also the analysis in Corneo and Jeanne (1997)). Note that the present model could be extended in either direction without changing its basic results.

θ	α	β	a	b
0.01	5.512	0.64	0.0004	-0.0122

of the wealth density function a, α is small enough for the condition H3 to be verified. Importantly, the qualitative results of this section are robust to any modifications of the parameters in a way that preserves H3.

There are three real roots for γ. However two roots are rejected since they do not satisfy the assumption H3. It follows that the policy rule as well as the equilibrium are unique[4].

2.1 Relative consumption and aggregate saving

Figure 1 plots aggregate saving rate as a function of the gross interest rate in the cases with and without a status-seeking motive.

It can be seen that the status-seeking motive promotes the saving rate when the gross interest rate R is greater than $1/\beta$.

This result directly comes from the link between the saving decision and the evolution of the consumption distribution. Indeed, it can be seen from the first order condition (3) that if the growth rate of the density function $g_1(c_1)/g_0(c_0)$ is smaller than βR, the last term of (3) is positive. Consequently the status-seeking motive implies less saving than in the case without status. The converse is true if $g_1(c_1)/g_0(c_0)$ is greater than βR. This result can be explained by noting that the density function of consumption $g_t(c_t)$ reflects how many individuals can be overtaken by marginally increasing consumption at period $t = 0, 1$. Therefore the status-seeking motive leads individuals to concentrate consumption in the period in which the discounted rank improvement is the strongest.

The density function growth rate is related to the evolution of consumption inequalities. If the density function decreases from date 0 to date 1 for all individuals, this means that the second period consumption distribution is a spread of the first period one, i.e. consumption inequalities increase. In other words, the first order condition reveals that individuals choose to transfer consumption in the period in which the distribution of consumption is the most egalitarian. Hence if consumption inequalities increase sufficiently (that is $g_1(c_1^i)/g_0(c_0^i)$ is greater than βR), saving is lower than in the case without status motive. This effect can be verified in Figure 2.

The consumption dispersion in period j is captured by the standard deviation of the consumption distribution and is denoted by $\sigma(c_j)$. Aggregate saving rate is plotted as a function of the ratio $\sigma(c_2)/\sigma(c_1)$ when the gross interest rate varies from 1.4 to 1.7. The greater $\sigma(c_2)/\sigma(c_1)$, the larger the consumption inequalities. This figure shows that saving decreases when inequalities increase, that is $\sigma(c_2)/\sigma(c_1) > 1$.

When $R\beta = 1$ the consumption distribution is time invariant both with and without a status-seeking motive, as demonstrated in proposition 1. In this case, individuals consume the same amount in the two dates and cannot improve their relative position

[4]This result is preserved when the parameters of the economy are modified while preserving H3.

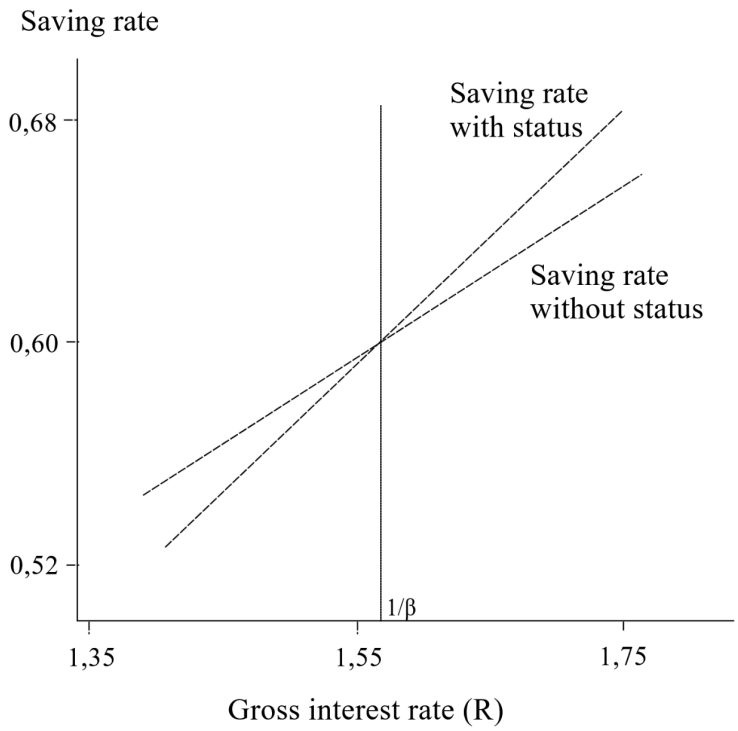

Figure 1: Saving rate and interest rate

by transferring consumption from a period to the other.

When $R > 1/\beta$ the distribution of the second period consumption is more concentrated than the distribution of the first period consumption in models with and without status-seeking motive. Consumption inequalities are declining. As a result, individuals can improve their position by transferring consumption from the first period to the second period as $\beta R g_2(R(y - c_1)) > g_1(c_1)$ for all level of equilibrium consumption c_1. This asymmetry provides an additional incentive to save compared to the case without status. The converse case in which $R < 1/\beta$ leads symmetrically to a rise in consumption inequalities and therefore to less saving than in the case without a status-seeking motive.

3 Concluding remarks

In this paper, it is shown how a concern for the rank in the consumption distribution may affect saving. Consumption is higher in the period in which the distribution of consumption is relatively more concentrated. Aggregate saving is therefore negatively correlated with a rise in consumption inequalities.

If a positive link between income inequality and consumption inequality is presumed and insofar as saving is the driving force of growth, the main result of the paper has potential interest for the literature which studies the link between growth and inequality.

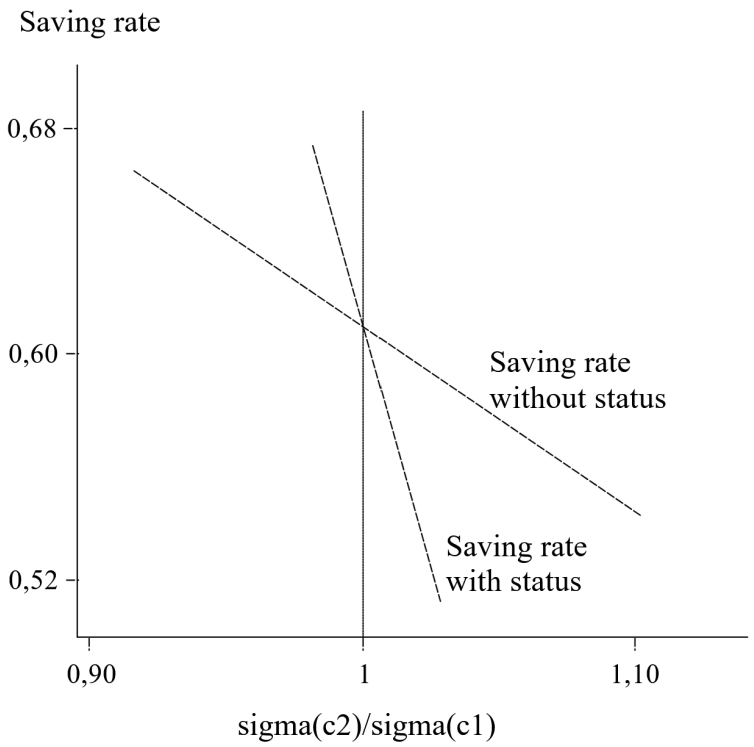

Figure 2: Saving rate and evolution of the standard deviation of consumption ($\sigma(c)$)

Person and Tabellini (1994) report a strong negative relationship between growth and inequality. However, this result has been recently challenged by Forbes (2000). She argues that there is an omitted variable bias in their regression. After correcting for this bias, she finds a positive correlation between growth and inequality. Nevertheless these empirical correlations cannot be used to test the main prediction of the paper since the dynamics of inequality matters in our model instead of a given level of inequality. I plan to test this prediction of the model in a future empirical work.

The model has other potential implications not investigated in the present paper. First, using a more realistic wealth distribution framework would allow to examine which class of people according to their wealth are the most sensitive to the status effect. Second, attitude towards risk could be analyzed in the present model by considering contingent goods instead of dated goods. The extension is not straightforward as the rank preserving property of the model does not hold anymore. Yet, integrating a relative concern into a theory of attitude toward risk could be interesting, as previously suggested by Harbaugh (1996) or Robson (1992).

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