



# **Discussion Papers In Economics And Business**

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Preference: asymmetric motivations for status

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# Wealth Distribution Dynamics with Status Preference: asymmetric motivations for status\*

Yutaro Hatta<sup>†</sup>

## Abstract

This paper explores the implications of status-seeking behavior in wealth for economic dynamics. I move away from the conventional setup of status preference. That is, individuals with higher wealth behave differently as compared to those with lower wealth; agents with different wealth have asymmetric motivations for social status: mathematically, there is a kink in status utility, which is empirically suggested. The main results are as follows: the stability of the equal steady state in an economy is determined by which agents have higher motivations for status. Depending on parameter values, whether inequality may diminish or persist is determined. Inequality and output are intricately related, due to asymmetric motivations.

**Keywords:** Status-seeking, Relative wealth, Wealth Distribution

**JEL Classification:** D91, D31, O40

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# 1 Introduction

There is much empirical support for the “relative utility hypothesis,” which emphasizes that an individual’s relative position in the society should play an important role in determining life satisfaction. Individuals care about not only the absolute level but also the relative level of various economic variables including consumption, human capital, wealth, and so on. Each paper adopts a different motivation for status along with each research interest. There are two main ways to incorporate status concern. Rauscher (1997), Fisher and Hof (2000), Liu and Turnovsky (2005), Garcia-Penalosa and Turnovsky (2008) examine the implications of consumption externalities for macroeconomic dynamics. On the other hand, the approach adopted by Futagami and Shibata (1998), Kawamoto (2009) and Long and Shimomura (2004) view wealth accumulation to be motivation for status.<sup>1</sup>

In this paper, I investigate the implications of status-seeking behavior in wealth. In particular, a kind of asymmetry is assumed in status preference, that is, individuals with higher wealth than the mean of social wealth behave differently as compared to those with lower wealth. Barnett et al. (2010) deal with this situation in a static model. In their model, individuals with heterogeneous-ability feel status-derived satisfaction from consumption. Furthermore, the status utility pays a utility premium if consumption exceeds the social mean. Hence, the status utility exhibits a kink at a particular point. In other words, the utility function is not concave over the domain and is convex for some interval. Therefore, it paves a road to risk prone consumers. In fact, their paper investigates the relationship between ex ante ability distribution and ex post income distribution. This paper goes along with their paper, but examines the implications of such a setting in a dynamic situation.

Empirical studies also support the asymmetric specification of status utility. Vendrik and Woltjer (2007) estimate the status utility function of relative income, using the German Socio Economic Panel. They find that the status utility function exhibits a kink at the average income, but the “direction” of the kink is somewhat different from the way Barnett et al. specify. Specifically, those with lower income have higher marginal utility of relative income and vice versa. Therefore, the function is entirely concave.

Along with status preference, one of the important topics in economics is capital accumulation, since the feature of status-seeking behavior in wealth seems to play a role in dynamic decisions and affects capital accumulation. This is what the present paper deals with. Furthermore, I investigate how inequality evolves in an economy and how it affects the economy as a whole.

I model an economy that consists of two types of agents. The difference between the two is only in terms of initial asset holdings. My main results can be

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<sup>1</sup>Much has been written about wealth accumulation as a source of motivation for social status. Corneo and Jeanne (2001) show that status seeking behavior can be an engine of long-run growth, even when there is no other engine such as technological spillover. Moreover, status preference of wealth can support a balanced growth path on which, even if agents with different subjective discount rates coexist, each agent holds a positive portion of the world’s wealth (Futagami and Shibata (1998)). Their results are in contrast to preceding literature which shows that the most patient agent eventually holds all of the world’s assets in a steady state (Becker (1980)).

summarized as follows. The utility premium in status utility, as in Barnett et al. (2010), results in the instability of the equal steady state. It is seen that an economy goes to an unequal steady state. On the other hand, in Vendrik and Woltjer (2007), the equal steady state is stable and an economy is likely to converge toward it.

There exists some literature discussing the dynamics of wealth distribution in the status preference model. Kawamoto (2009) investigates the status-seeking behavior of relative income and focuses on attitudes of individuals to change in reference income. If the marginal utility of individual's own income rises as the average income rises, her preference is called KUJ (keeping up with the Joneses). If the opposite is the case, I call it RAJ (running away from the Joneses). Kawamoto (2009) shows that income inequality diminishes in a KUJ economy, with any level of initial inequality. In contrast, in an RAJ economy, inequality expands, as long as initial endowments are different across agents. Using an infinitely lived agents model, Long and Shimomura (2004) show that the poor will catch up with the rich if the elasticity of the marginal utility of relative wealth is greater than the elasticity of the marginal utility of consumption. Kawamoto (2009) and Long and Shimomura (2004) specify the conditions under which an economy goes to a totally equal state or an unequal one; this paper does the same. However, these two works emphasize different aspect of status utility. Furthermore, previous literature expects an extreme situation in the long run: either all agents reach the same circumstances or some agents hold all of the world assets. In this paper, the latter case does not occur.

The connection between inequality and economic development is generally perceived as the interaction between the two: one affects the other. In this sense, this paper also relates to the studies investigating how output and inequality are jointly determined. Garcia-Penalosa and Turnovsky (2006) construct an endogenous growth model and examine the relationship between growth rate and income distribution. They find that a higher growth tends to be associated with a more unequal economy. Therefore they predict a positive relationship between growth and inequality. This paper shows that the relationship between the two variables relies heavily on the nature of status preference, as does the evolution of inequality. In some cases, when inequality is low, the relationship between inequality and output emerges as a positive correlation; when it is high, a negative correlation arises. In other cases, it may be entirely positive, regardless of the level of inequality. Because both possibilities, positive or negative correlation, are suggested by empirical evidences, this paper can explain both cases.<sup>2 3</sup> Garcia-Penalosa and Turnovsky (2008) examine the implication of status seeking behavior in consumption, using a model with infinitely-lived heterogeneous agents. In their model, the long-run output is independent of the nature of status preference, unlike with this

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<sup>2</sup>For example, Barro (2000) shows that inequality tends to retard growth in poor countries and enhance growth in rich ones, however Forbes (2000) suggests that more income inequality is associated with higher growth rate.

<sup>3</sup>The theoretic relationship is also controversial. Corneo and Jeanne (2001) uses a model where individuals care about consumption and their rank in the distribution of wealth, and show that more inequality results in higher growth rate. However, Peng (2008) makes a slight change to Corneo and Jeanne model to show that the reversed relation would appear. Corneo and Jeanne (1998), and Hopkins and Kornienko (2004) point out that whether inequality fosters growth depends on when individuals are concerned with their status.

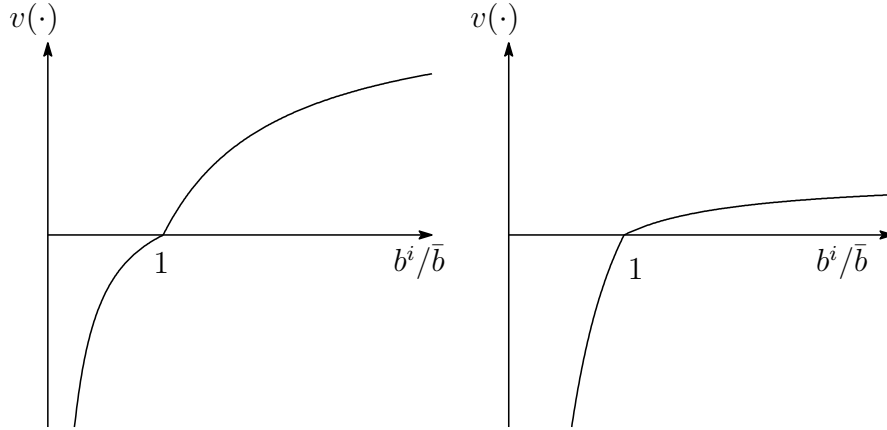


Fig. 1: Status utility function

paper. Hence, in their paper, status preference for consumption only affects the transition path to the steady state.

The rest of this paper is organized as follows. Section 2 describes the basic model. Sections 3 and 4 show the dynamics of inequality in an economy. In section 5, I investigate capital accumulation in the model and see the effect of the redistribution policy. Finally, section 6 concludes.

## 2 Model

Consider a nonoverlapping generations economy with a continuum of population of mass of 1. The economy is populated by two groups with different levels of initial asset holdings. I use H and L to denote households with higher and lower initial assets, respectively. The share of each group is half. Each household has the same utility function so that the only difference is asset holdings. Households have one unit of labor and exogenously supply to the production sector. Moreover, each household has an asset inheriting from parents as bequest. There is a single good in this economy and I assume that a single good can be either consumed or bequeathed to the offspring. Bequests are used as capital inputs for production in the subsequent generation. I do not consider population growth so that the population in the economy is constant over time.

### 2.1 Households

Agents derive utility from their own consumption and bequest for their children. However, utility from bequest is derived by a status seeking motive, that is, bequest gives satisfaction to agents in comparison to bequests made by others. Although it seems odd that agents seek status through bequeathing, I can interpret it as status-seeking behavior in wealth. The status utility of a household comes from wealth, as compared to the wealth of others. When an agent leaves the economy, his child comes to be the wealth holder.<sup>4</sup>

The utility function of an agent in generation  $t$  is given by

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<sup>4</sup>Mitsopoulos (2009) also uses the model in which agents seek status in bequeathing.

$$\begin{aligned}
U_t^i &= u(c_t^i) + v(b_{t+1}^i/\bar{b}_{t+1}) \\
&= \begin{cases} \log c_t^i + \beta_1 \frac{(b_{t+1}^i/\bar{b}_{t+1})^{1-\theta} - 1}{1-\theta} & \text{for } b_{t+1}^i \geq \bar{b}_{t+1} \\ \log c_t^i + \beta_2 \frac{(b_{t+1}^i/\bar{b}_{t+1})^{1-\theta} - 1}{1-\theta} & \text{for } b_{t+1}^i < \bar{b}_{t+1} \end{cases}. \quad (1)
\end{aligned}$$

The first term  $u(c_t^i)$  represents the utility derived by consuming goods of  $c_t^i$ . I assume that utility from consumption takes the logarithmic form. The second term  $v(b_{t+1}^i/\bar{b}_{t+1})$  represents the utility derived by giving bequest to the offspring. The bequest of agent  $i$  is indicated by  $b_{t+1}^i$  and the average bequest is given by  $\bar{b}_{t+1}$ . Therefore, agents feel satisfaction by giving bequests in comparison to social average.

As shown in Figure 1, depending on whether  $\beta_1$  is larger than  $\beta_2$  or not, a kink may arise in status utility. When  $\beta_1 > \beta_2$ , the shape of  $v(\cdot)$  is the same as what Barnett et al. (2010) assume in a static model. In this case, I can interpret that the wealth exceeding the social average pays a utility premium. Barnett et al. (2010) refer to this specification as an option that individuals can choose whether to participate in the rat race or not. On the other hand, when  $\beta_1 < \beta_2$ , the function is concave on the entire domain. Vendrik and Woltjer (2007) estimates the status utility function of relative income, using the German Socio Economic Panel. They find that the status utility function exhibits a kink at the average income in this way.

The parameter  $\theta$  captures the property of status preference. When  $\theta > 1$ , the cross derivative of  $v(\cdot)$  is positive, which means that as the social average rises the incentive to bequest increases. This characteristic of status preference is called KUJ. When  $\theta < 1$ , an increase in social average depresses individuals' motive to bequest. This type of preference is named RAJ.

Households earn income from their exogenous supply of labor and renting their bequests to firms as capital inputs. Therefore, they have the following budget constraint:

$$c_t^i + b_{t+1}^i \leq w_t + (1 + r_t)b_t^i, \quad (2)$$

where  $w_t$  and  $r_t$  denote labor income and the rental rate of capital at time  $t$ , respectively.

Agents allocate their income into consumption and bequest so as to maximize  $U_t^i$  subject to budget constraint (2), given the level of average bequest  $\bar{b}_{t+1}$ .<sup>5</sup>

The first-order condition for the optimization problem of high-type agents is obtained as follows:<sup>6</sup>

$$-\frac{1}{w_t + (1 + r_t)b_t^i - b_{t+1}^i} + \frac{\beta_1}{\bar{b}_{t+1}} \left( \frac{b_{t+1}^i}{\bar{b}_{t+1}} \right)^{-\theta} = 0.$$

Rearranging the terms, I get

$$w_t + (1 + r_t)b_t^i = \bar{b}_{t+1} \left[ \frac{b_{t+1}^i}{\bar{b}_{t+1}} + \frac{1}{\beta_1} \left( \frac{b_{t+1}^i}{\bar{b}_{t+1}} \right)^\theta \right]. \quad (3)$$

<sup>5</sup>It can be shown that low-type agents do not take over high-type agents in equilibrium ( $b_{t+1}^L < b_{t+1}^H$ ).

<sup>6</sup>A similar condition is obtained for low-type agents.

## 2.2 Production

There is a continuum of firms with measure one. Under a perfectly competitive environment, they produce final goods, using labor and capital as inputs, according to a neoclassical, constant-returns-to-scale technology. For simplicity, the production function is assumed to be of the Cobb-Douglas form.

$$Y_t = AK_t^\alpha L_t^{1-\alpha}.$$

Given the wage rate and the rate of return to capital, firms at time  $t$  choose the level of employment of capital,  $K_t$ , and labor,  $L_t$ . The firm's profit maximization implies that the marginal productivities of inputs are equalized to their marginal costs:

$$w_t = (1 - \alpha)AK_t^\alpha, \quad (4)$$

$$1 + r_t = \alpha AK_t^{\alpha-1}. \quad (5)$$

I use the fact that each agent's exogenous labor supply equals one and that the population size is one and constant over time. I also assume that there is full capital depreciation.

## 2.3 Equilibrium and Dynamics

Since bequests at time  $t$  are used as inputs in production, the following capital market condition holds.

$$K_t = \bar{b}_t. \quad (6)$$

Since both types of agents (L and H) have an equal share in the population, in an equilibrium,

$$\bar{b}_t = \frac{1}{2}(b_t^H + b_t^L), \quad (7)$$

is satisfied. Combining equations, (3),(4), (5), (6), and (7), yields

$$\begin{cases} \frac{A}{2}\bar{b}_t^{\alpha-1}[(1 + \alpha)b_t^H + (1 - \alpha)b_t^L] = \bar{b}_{t+1} \left[ \frac{b_{t+1}^H}{b_{t+1}} + \frac{1}{\beta_1} \left( \frac{b_{t+1}^H}{b_{t+1}} \right)^\theta \right] \\ \frac{A}{2}\bar{b}_t^{\alpha-1}[(1 - \alpha)b_t^H + (1 + \alpha)b_t^L] = \bar{b}_{t+1} \left[ \frac{b_{t+1}^L}{b_{t+1}} + \frac{1}{\beta_2} \left( \frac{b_{t+1}^L}{b_{t+1}} \right)^\theta \right] \end{cases}. \quad (8)$$

Now, define  $y_t \equiv \frac{b_t^H}{b_t}$ , which indicates the relative richness of high-type agents at time  $t$ .

Furthermore, the following equation is derived;

$$\frac{b_t^L}{b_t} = 2 - \frac{b_t^H}{b_t} = 2 - y_t. \quad (9)$$

Using (8) for both types, the following equations backwardly determine the dynamics of  $y_t$ ;



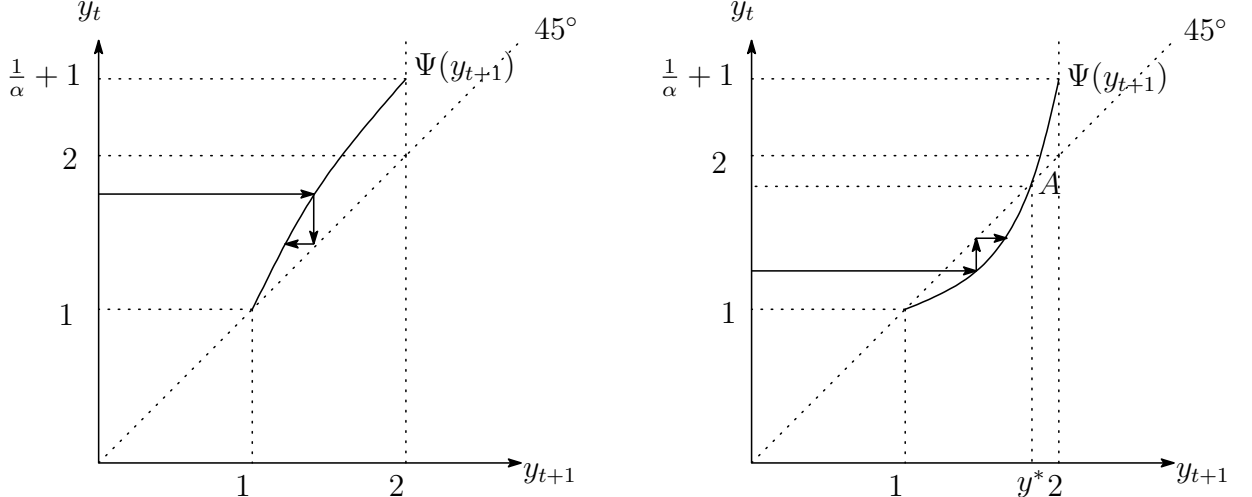


Fig. 2: Stability of the equal steady state: stable (left), unstable (right)

$$y_t = \frac{\frac{1-\alpha}{\alpha}(1 - \Phi(y_{t+1})) + 2}{1 + \Phi(y_{t+1})} \equiv \Psi(y_{t+1}), \quad (10)$$

$$\text{where } \Phi(y_{t+1}) = \frac{2 - y_{t+1} + \beta_2^{-1}(2 - y_{t+1})^\theta}{y_{t+1} + \beta_1^{-1}(y_{t+1})^\theta}. \quad (11)$$

In what follows, I investigate the properties of the above dynamic system in which  $y_t$  is the only variable.

### 3 Symmetric Case

#### 3.1 Dynamic Systems

In this section, I assume that the parameters in utility function are symmetric, that is,  $\beta_1 = \beta_2 = \beta$  holds. It can be easily verified that  $\Psi(\cdot)$  is increasing in  $y_{t+1}$  and that  $\Psi(1) = 1$  and  $\Psi(2) = \frac{1}{\alpha} + 1 > 2$  hold. As a result, the dynamics of inequality,  $y_t$ , can be described as in Figure 2. Further, note that

$$\Psi'(1) = \frac{1 + \beta^{-1}\theta}{\alpha(1 + \beta^{-1})}. \quad (12)$$

Therefore, I can say that the gradient of  $\Psi(y_{t+1})$  at  $y_{t+1} = 1$  is greater than 1, if and only if  $\beta + \theta > \alpha(\beta + 1)$ .<sup>7</sup> Under this condition, the steady state in which agents of both types hold equal amounts of assets is stable (Figure 2 (left)). Otherwise, the no-inequality steady state is unstable, and I have a steady state in which inequality between the high-type and low-type agents remains over time (point A in Figure 2 (right)).

#### 3.2 Comparative Dynamics

Now, I turn to the response of an economy to changes in the parameter values.

<sup>7</sup>Note that  $\theta > 1$  is a sufficient condition for a stable equal steady state. In other words, if all agents are KUJ, then an equal steady state must be stable.

$$\frac{\partial y_t}{\partial \beta} = \frac{-1}{(1 + \Phi(y_{t+1}))^2} \frac{2}{\alpha} \frac{\partial \Phi(y_{t+1})}{\partial \beta} > 0. \quad (13)$$

The change in the strength of status preference,  $\beta$ , causes the graph to shift up. Hence, an economy with a higher status preference tends to become equal quickly.<sup>8</sup> Intuitively, when  $\beta$  increases, both types of individuals have more incentive to accumulate wealth. However, the incentive of low-type agents generally exceeds that of high-type agents, hence lowering inequality:

$$\frac{\partial y_t}{\partial \theta} = \frac{-1}{(1 + \Phi(y_{t+1}))^2} \frac{2}{\alpha} \frac{\partial \Phi(y_{t+1})}{\partial \theta} > 0. \quad (14)$$

Recall that the parameter  $\theta$  indicates the attitude to change in reference wealth. In particular, when  $\theta > 1$ , individuals are KUJ. When  $\theta < 1$ , they are RAJ. As  $\theta$  increases, the marginal utility of wealth, in response to a change in the average wealth, increases. This triggers the interaction between the two types of agents through status seeking, and thus pushes toward equality:

$$\frac{\partial y_t}{\partial \alpha} = -\frac{1}{\alpha^2} \frac{1 - \Phi(y_{t+1})}{1 + \Phi(y_{t+1})} < 0. \quad (15)$$

A rise in capital share shifts the graph down. This is because capital share indicates the strength of intergenerational inheritance, and thus of inequality within generations. This implies that inequality in some generation is more likely to remain in subsequent generations.

## 4 Asymmetric Case

In this section, I analyze dynamic systems when the status utility parameters may differ:

$$y_t = \frac{\frac{1-\alpha}{\alpha}(1 - \Phi(y_{t+1})) + 2}{1 + \Phi(y_{t+1})} \equiv \Psi(y_{t+1}; \beta_1, \beta_2, \theta), \quad (16)$$

$$\Phi(y_{t+1}; \beta_1, \beta_2, \theta) = \frac{2 - y_{t+1} + \beta_1^{-1}(2 - y_{t+1})^\theta}{y_{t+1} + \beta_2^{-1}(y_{t+1})^\theta}. \quad (17)$$

There are three parameters  $\beta_1, \beta_2, \theta$  in the dynamic system and various dynamics may arise. However, the following argument suggests that an important implication is obtained stemming from a kink in status preference. Whether  $\Psi(1; \beta_1, \beta_2, \theta)$  is larger or smaller than unity determines the stability of the equal steady state: when  $\beta_1 < \beta_2$ , the equal steady state is stable; alternatively when  $\beta_1 > \beta_2$ , it is unstable (see Figure 3). In other words, as Barnett et al. (2010) suggest, when there is a utility premium in status ( $\beta_1 > \beta_2$ ), low-type agents can never catch up with high-type agents (see the left panel of Figure 3). Intuitively, when there is a utility premium, high-type agents try to go beyond the average to obtain the utility premium. Although low-type agents also like to do so, advantageous

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<sup>8</sup>If the unequal steady state is stable, inequality is lower in the steady state.

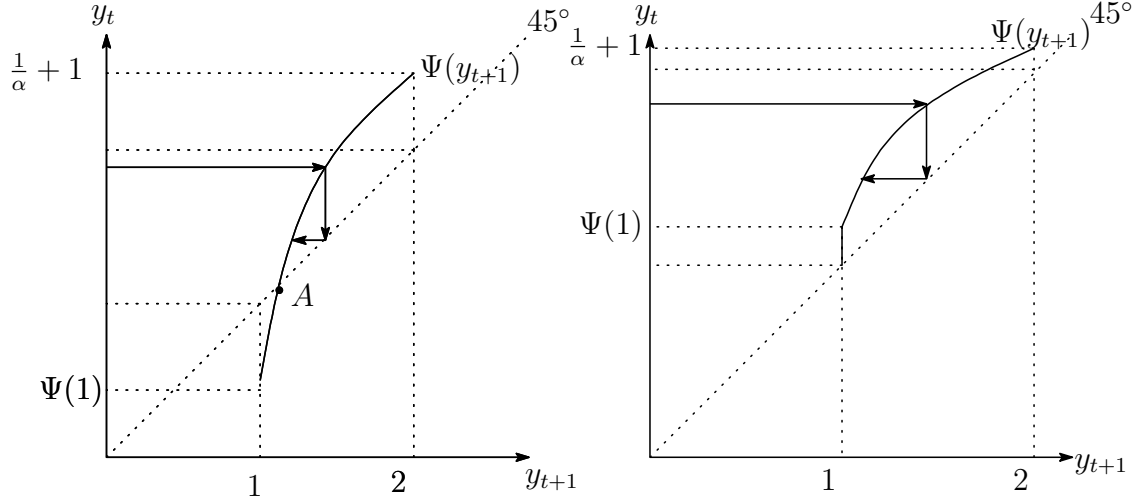


Fig. 3: Left:  $\beta_1 > \beta_2$ ; Right:  $\beta_1 < \beta_2$

agents inhibit them. On the other hand, if I stand on the empirical suggestion by Vendrik and Woltjer (2007), the equal steady state must be a stable equilibrium.<sup>9</sup> Kawamoto (2009) also investigates the implications of status seeking behavior for economic dynamics. He uses a model in which two-period living agents seek status through relative income. The two types of status-seeking behavior (KUJ or RAJ) result in totally different economy dynamics. If the marginal utility of an individual's own income rises as the average income rises, his preference is KUJ. If the opposite is the case, it is RAJ. In a KUJ economy, any difference in relative income eventually disappears. In contrast, the relative position of one of the two types goes to zero in an RAJ economy. Kawamoto (2009) emphasizes the importance of attitudes in a reference point change (KUJ or RAJ), which decides whether the steady state is equal or unequal. However, a kink in status utility also makes the equal steady state stable. In other words, Kawamoto (2009) emphasizes the role of parameter  $\theta$ . Although in this model,  $\theta$  (and  $\alpha$ ) affect the long-run distribution of wealth in a symmetric case, they do not play a significant role in the asymmetric case.

In Kawamoto (2009), the relative positions of both types in steady states will be quite extreme, in the sense that high-type agents hold all of the world's assets or both types eventually hold the same amount of assets. However, in this paper, the only steady states are those in which both types possess a positive portion of the world's assets.<sup>10</sup>

Now, I show how the inequality dynamics would change with parameters.

<sup>9</sup>Further, note that there is a parameter set under which there exist two stable steady states (and one unstable steady state). If this is the case, an initial inequality in an economy determines which equilibrium the economy converges to.

<sup>10</sup>Kawamoto (2009) shows that there exist steady states where both types hold a positive portion of the world's assets in an economy where KUJ and RAJ agents coexist. However, here too, different attitudes to change in the benchmark decide the nature of the steady state.

$$\frac{\partial}{\partial \beta_1} \Psi(y_{t+1}; \beta_1, \beta_2, \theta) = -\frac{2/\alpha}{(1 + \Phi(y_{t+1}))^2} \frac{\partial \Phi(y_{t+1}; \beta_1, \beta_2, \theta)}{\beta_1} < 0, \quad (18)$$

$$\frac{\partial}{\partial \beta_2} \Psi(y_{t+1}; \beta_1, \beta_2, \theta) = -\frac{2/\alpha}{(1 + \Phi(y_{t+1}))^2} \frac{\partial \Phi(y_{t+1}; \beta_1, \beta_2, \theta)}{\beta_2} > 0, \quad (19)$$

$$\frac{\partial}{\partial \theta} \Psi(y_{t+1}; \beta_1, \beta_2, \theta) = -\frac{2/\alpha}{(1 + \Phi(y_{t+1}))^2} \frac{\partial \Phi(y_{t+1}; \beta_1, \beta_2, \theta)}{\theta} > 0. \quad (20)$$

Because a rise in  $\beta_1$  means an increase in the utility premium, the high-type agents want to accumulate capital to obtain the premium. Hence, inequality in the economy tends to expand. The opposite argument is valid for a change in  $\beta_2$ . The same logic, as in section 3.2, applies for the interpretation of parameter  $\theta$ .

## 5 Dynamics of Inequality and Output

### 5.1 Joint Determination of Inequality and Output

In the previous section, I show how the dynamics of inequality are affected by the status utility parameters. In particular, the existence of a kink determines the stability of an equal steady state. In this section, I turn to the joint determination of inequality and output in the long-run. Further, I investigate capital accumulation in the transition path and the effect of a redistribution policy. It will be seen that the kink in status utility not only affects the dynamics of inequality, but changes the transition of output. Furthermore, due to the kink, inequality becomes intricately correlated with the level of output. In this section, I focus on the cases wherein the unequal steady state is stable ( $\beta_1 > \beta_2$ ). Summing the equations of (8), I get the dynamics of capital accumulation as follows:

$$\bar{b}_t^\alpha = \frac{\bar{b}_{t+1}}{2A} f(y_{t+1}), \quad (21)$$

$$\text{where } f(y_{t+1}) \equiv 2 + \beta_1^{-1}(y_{t+1})^\theta + \beta_2^{-1}(2 - y_{t+1})^\theta.$$

From (16), (17), and (21), the phase diagram can be depicted as in Figure 4.

Figure 4 shows that any economy with an arbitrary initial condition will converge to a unique steady state. Depending on parameter  $\theta$ , somewhat different phase diagrams are described. The  $\Delta \bar{b}_t = 0$  line is described as

$$\begin{aligned} \Delta \bar{b}_t = \bar{b}_{t+1} - \bar{b}_t = 0 &\Leftrightarrow \\ \bar{b}_t^{1-\alpha} &= \frac{2A}{f(y_{t+1})}. \end{aligned}$$

When  $\theta > 1$ , the  $\Delta \bar{b} = 0$ -locus is hump-shaped as shown in the left panel of Figure 4. On the other hand, when  $\theta \leq 1$ , it is an upward curve (see the right panel of Figure 4). The shape of  $\Delta \bar{b}_t = 0$  is explained as follows.<sup>11</sup> The key to understand is the force of Joneses preference to equality. A KUJ preference

<sup>11</sup>In the Appendix, the shape of  $\Delta \bar{b} = 0$  is mathematically investigated.

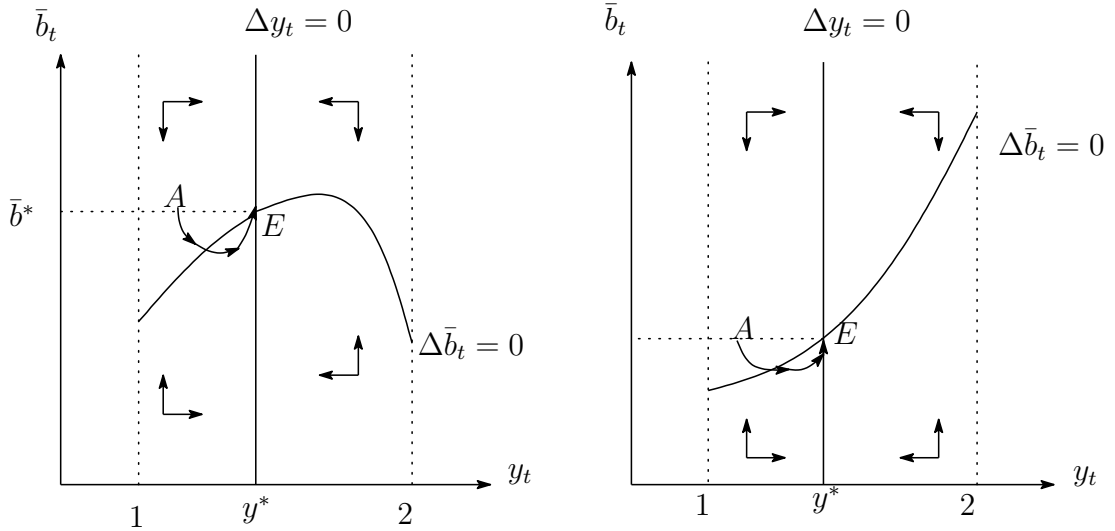


Fig. 4: Phase diagram:  $\theta > 1$  (left);  $\theta \leq 1$  (right)

( $\theta > 1$ ) is defined as a status preference wherein an increase in the reference level raises the marginal utility from status. This effect differs for unequal agents: the effect on poorer agents is stronger.<sup>12</sup> This causes the economy to be equal. On the other hand, with an RAJ preference ( $\theta < 1$ ), both agents will be less willing to bequeath as the reference level rises. However, the effect on poorer agents is stronger than richer ones. Figure 4 (right) shows it graphically. As the social average  $\bar{b}_t$  increases, the difference between the two groups expands (high  $y_t$ ). Next, consider the case of  $\theta > 1$ . The opposite logic seems to apply: a higher inequality is now associated with a lower output. An increase in the average raises both types' incentive for accumulation, but the incentive of the low-type agents is higher. As such, the  $\Delta \bar{b}_t = 0$ -locus should be decreasing. However, a kink has an adverse effect. When  $\beta_1 > \beta_2$ , the high-type agents have a higher marginal utility of bequest. Consequently, a rise in the social average may have a bigger effect on the high-type agents. This results in the increase in  $\Delta \bar{b}_t = 0$  (see the left panel of Figure 4). According to this observation, the correlation between inequality and output is not monotonic and is complex. With a small inequality (lower  $y^*$ ), a positive relationship arises. However, when inequality is high (larger  $y^*$ ), a positive or negative relation may appear. Depending on inequality, the correlation would change. There are empirical studies that regress the growth rate on inequality. They have not provided a conclusive correlation between the two, and suggest that both directions of the correlation seem possible. This paper allows for both possibilities.

Next, I explore how a change in status parameter changes the level of output in the steady state. It will be seen that stronger motive for status may or may not lead to greater output.<sup>13</sup> The steady state in this economy is characterized by the

<sup>12</sup>The reason for this is the different responses in the agents' marginal utility of status due to a change in the average level (see Kawamoto (2009)).

<sup>13</sup>Liu and Turnovsky (2005) uses a standard representative agent model to show that consumption externalities cause excessive long-run capital accumulation. However, employing a continuous-time overlapping generations model, Fisher and Heijdra (2009) show that the reverse is true. Moreover, Wendner (2010) uses a continuous-time overlapping generations model with age-dependent productivity and shows that the effect of conspicuous consumption on output is

following equations;

$$y^* = \frac{\frac{1-\alpha}{\alpha}(1 - \Phi(y^*)) + 2}{1 + \Phi(y^*)}, \quad (22)$$

$$\text{where } \Phi(y^*) = \frac{2 - y^* + \beta_1^{-1}(2 - y^*)^\theta}{y^* + \beta_2^{-1}(y^*)^\theta},$$

and

$$(\bar{b}^*)^{1-\alpha} = \frac{2A}{2 + \beta_1^{-1}(y^*)^\theta + \beta_2^{-1}(2 - y^*)^\theta} \equiv \frac{2A}{f(y^*)}. \quad (23)$$

Certainly the long-run levels of inequality and output depend on the nature of status preference ( $\beta_1$ ,  $\beta_2$  and  $\theta$ ). Thus inequality and output are jointly determined in this model, and the different attitudes in status preference change the relationship between the two. Using a Ramsey model with infinitely-lived heterogeneous consumers, Garcia-Penalosa and Turnovsky (2008) investigate the implications of status seeking behavior in consumption. They find that the level of output in the steady state is independent of the properties of status preference, unlike in this model.

I now consider changes in the strength for status seeking to see the effect on the output level in the steady state:

$$\frac{\partial f(y^*)}{\partial \beta_1} = \underbrace{-\frac{1}{\beta_1^2}(y^*)^\theta}_{\text{direct effect (negative)}} + \underbrace{\frac{\partial y^*}{\partial \beta_1} \underbrace{[\theta\beta_1^{-1}(y^*)^{\theta-1} - \theta\beta_2^{-1}(2 - y^*)^{\theta-1}]}_{\text{positive/negative}}}_{\text{indirect effect through inequality}}. \quad (24)$$

Note that an increase in  $f(y^*)$  implies a decrease in the output level in the steady state, and vice versa (see (23)). There are two effects on output as the strength of status preference ( $\beta_1$  or  $\beta_2$ ) changes. Consider a rise in  $\beta_1$  as an example. First, the direct effect of the change is an increase in the motivation of high-type agents for accumulation. This results in a higher level of output in the steady state. In turn, the indirect effect is due to a change in inequality, and thus, a status seeking behavior. I observe that an increase in  $\beta_1$ , that is, a higher utility premium, results in more inequality in the economy. This alters the capital accumulation of households through status seeking. Whether this effect is positive or negative is not clear and depends on the parameters, especially  $\theta$ . When  $\theta \leq 1$ , more inequality is associated with higher output. As such, more inequality because of a rise in the utility premium raises output. Based on this observation, a rise in  $\beta_1$  increases the steady-state level of output via both direct and indirect effects.<sup>14</sup>

## 5.2 Redistribution Policy

Now, I turn to the effect of a redistribution policy. I consider two types of redistributive policies (one-time redistribution and inheritance tax). The conventional

ambiguous.

<sup>14</sup>When  $\theta \leq 1$ , the square bracket term in equation(24) is negative. Hence,  $\partial f(y^*)/\partial \beta_1 < 0$ , and thus  $\partial \bar{b}^*/\partial \beta_1 > 0$

view for redistribution concerns fairness in a society. However, the by-products of such a policy need to be specified and a number of previous researches address this. That is, the implemented policy may decrease the economic pie (output). First, I focus on a particular form of redistribution policy. Suppose that the economy is initially in the steady state and some level of wealth is redistributed from the rich to the poor. At the date of policy implementation, the economy jumps to  $A$  from  $E$  in Figure 4. In Figure 4, the redistribution policy results in the same qualitative consequence. On the path to the steady state, the capital level of the economy declines first and then gradually regains. Therefore aggregate capital decreases due to such a redistribution policy, as does the output.<sup>15</sup> The intuition underlying this transition is straightforward. The direct impact of the policy is the changes in the wealth of both high-type and low-type agents. Although low-type agents accumulate more assets for their children, high-type agents become less willing to do so. When  $\beta_1 > \beta_2$ , the negative effect of high-type agents exceeds the positive effect.

Next, I introduce a redistributive policy (inheritance tax) such that a proportion of the bequeath is collected by the government as tax and the revenue is redistributed among citizens. The budget constraints of households and the government become

$$\begin{aligned} c_t^i + b_{t+1}^i &\leq w_t + (1 + r_t)[b_t^i(1 - \tau) + T_t], \\ T_t &= \frac{1}{2}\tau(b_t^H + b_t^L), \end{aligned}$$

where  $\tau$  and  $T_t$  indicate the tax rate and lump-sum transfer, respectively. Note that the levying of tax does not distort resource allocation. The tax system purely makes some transfers from the rich to the poor.

The inequality dynamics are derived in the same manner and one can obtain

$$y_t = \frac{\frac{1-\alpha+\alpha\tau}{\alpha-\alpha\tau}[1 - \Phi(y_{t+1})] + 2}{1 + \Phi(y_{t+1})} \equiv \Psi(y_{t+1}; \tau).$$

As Compared to the no-tax case, the function  $\Psi(\cdot)$  shifts up, as the tax rate increases. By introducing inheritance tax, inequality tends to diminish, as expected. The long-run level of capital accumulation is unchanged and determined by (23). Despite no distortion by tax, such a policy may increase or decrease output through status seeking behavior. The property of status seeking determines which case will arise.

## 6 Conclusion

I have shown that whether inequality in an economy will persist may depend on the “direction” of the kink in status utility. The status utility that Barnett et al.

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<sup>15</sup>Consider the case wherein  $\theta > 1$  and  $\beta_1 = \beta_2$  (no utility premium). Now, the  $\Delta\bar{b}_t = 0$  line is decreasing. In this case, the one-time redistribution increases the output level at implementation. Because of a kink in status utility, the transition to the steady state changes.

(2009) assume, interpreted as one wherein there is a utility premium exceeding the social average, leads to an inequality-persistent steady state. This is because richer agents try to inhibit poorer ones from going beyond the social average, although both types want to do so. In contrast, following the empirical study of Vendrik and Woltjer (2007), a no-inequality steady state must be stable and the economy is likely to move to it.

The model used in this paper is quite simple for tractability. One of the simplifying assumptions is that there are only two types of agents. Although this simplifies the analysis, an emergence of a third type of agent generally plays an important role in an economic model. For example, consider the behavior of the middle class in a model with utility premium. The decision of the middle class on going beyond the social average affects aggregate capital accumulation and thereby influences the behaviors of other agents through status seeking. Furthermore, the literature on status preference typically models economies without social mobility, although status seeking behavior seems to represent competition among agents. Incorporating these ingredients is left for the future work.

## Appendix

### *Shape of $f(y)$*

In this section, I examine function  $f(y)$ , when  $\beta_1 > \beta_2$ . (see equation (23)), I check the following statements.

- when  $\theta > 1$ ,  $f(y)$  is U-shaped, and then  $\Delta \bar{b} = 0$  is hump-shaped.
- when  $\theta \leq 1$ ,  $f(y)$  is decreasing, and then  $\Delta \bar{b} = 0$  is increasing.

First, taking the derivatives of  $f(y)$ , I obtain

$$f(y) \equiv 2 + \beta_1^{-1}y^\theta + \beta_2^{-1}(2 - y)^\theta, \quad (\text{A.1})$$

$$f'(y) = \theta[\beta_1^{-1}y^{\theta-1} - \beta_2^{-1}(2 - y)^{\theta-1}], \quad (\text{A.2})$$

$$f''(y) = \theta(\theta - 1)[\beta_1^{-1}y^{\theta-2} + \beta_2^{-1}(2 - y)^{\theta-2}]. \quad (\text{A.3})$$

Now consider the two cases.

Case 1:  $\theta > 1$

$$\begin{cases} f'(1) &= \theta[\beta_1^{-1} - \beta_2^{-1}] < 0, \\ f'(2) &= \theta\beta_1^{-1}2^{\theta-1} > 0. \end{cases} \quad (\text{A.4})$$

I thus have

$$f''(\cdot) > 0. \quad (\text{A.5})$$

Therefore, when  $\theta > 1$ , the function is entirely convex and starts with a negative slope at  $y = 1$ , and ends with a positive slope (see Figure 5). Because  $f(y)$  is concave,  $\Delta \bar{b} = 0$  is convex as in the left panel of Figure 4. In case 1, if  $\beta_1 = \beta_2$ , function  $f(y)$  is monotonically increasing. Hence, the negative slope at  $y = 1$  is due to the kink in status utility.



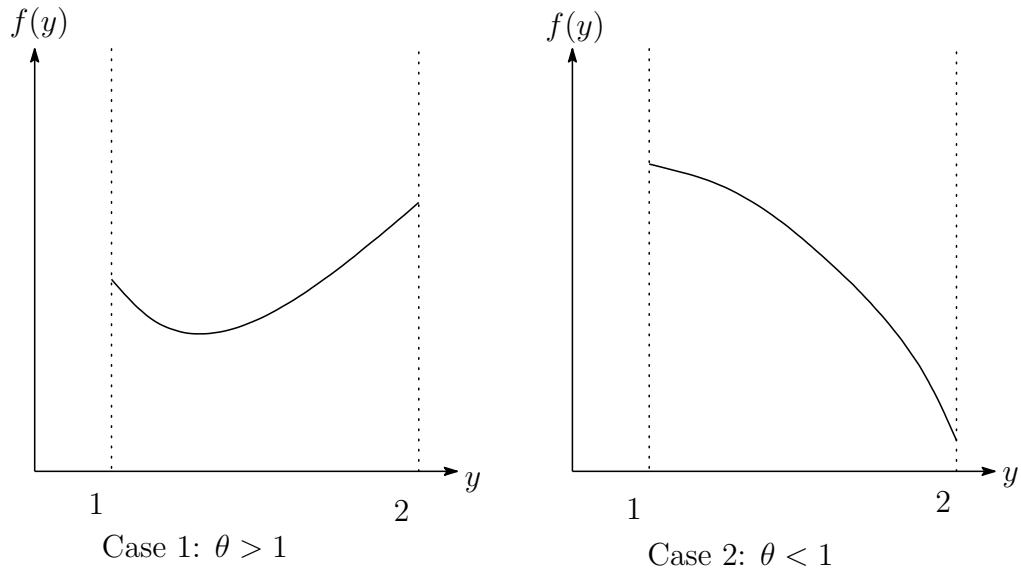


Fig. A. 1: Shape of  $f(y)$

Case 2:  $\theta < 1$

$$\begin{cases} f'(1) &= \theta[\beta_1^{-1} - \beta_2^{-1}] < 0, \\ f'(2) &= -\infty. \end{cases} \quad (\text{A.6})$$

I thus have

$$f''(\cdot) < 0. \quad (\text{A.7})$$

In case 2, the function is concave and decreasing in  $y$ . I thus obtain an upward slope of  $\Delta \bar{b}_t = 0$  as in the right panel of Figure 5.

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