Munich Personal RePEc Archive

Gain versus pain from status and ambition: Effects on growth and inequality

Tournemaine, Frederic and Tsoukis, Christopher

University of the Thai Chamber of Commerce, London Metropolitan University

February 2008

Online at https://mpra.ub.uni-muenchen.de/8670/
MPRA Paper No. 8670, posted 08 May 2008 19:23 UTC

Gain versus pain from status and ambition: Effects on growth and inequality

Frederic Tournemaine*

School of Economics and University of Chicago-UTCC Research Center

University of the Thai Chamber of Commerce

Christopher Tsoukis†

Department of Economics, London Metropolitan University

Abstract

To shed lights on growth, distribution and the relationships between the two, we develop a growth model with heterogeneous individuals who care about social status. Individuals' heterogeneity stems from two sources: their innate skills and their degree of ambition. While the willingness of individuals to accumulate wealth depends whether they experience gain or pain from loss of status, we show that ambition of individuals plays an important role regarding growth and distribution: ambition can inhibit or foster accumulation of wealth, then in turn growth. In such a context, we show that growth can be positively or negatively correlated with inequalities.

JEL Classification: D31, O34, O41.

Keywords: social aspirations, ambition, inequality, growth.

*Address: 126/1 Vibhavadee-Rangsit Road, Dindaeng, Bangkok, 10400, Thailand. Fax: +66 (0)2692 3168; E-mail: frederic.tournemaine@uc-utcc.org

†Address: Dept. of Economics, London Metropolitan University, 84 Moorgate, London EC2M 6SQ, UK. E-mail: c.tsoukis@londonmet.ac.uk

1 Introduction

The idea that the welfare of individuals depends not only on the quantity of goods consumed, but also on their social status in society is by now well established and supported by empirical evidence (Choudhary *et al.*, 2007; Maurer and Meier, 2008). Also nicknamed as "keeping up with the Joneses", this concept has been used in growth models to analyze the impact of social relations on growth performance (Corneo and Jeanne, 1997; Rauscher, 1997; Futagami and Shibata, 1998; Fisher and Hof, 2000; Tournemaine and Tsoukis, 2008), education (Fershtman, Murphy and Weiss, 1996), fertility (Tournemaine, 2008), and wealth distribution (Pham, 2005; Tsoukis, 2007). The formalization of individuals' positional concern usually consists of assuming that the social status of individuals is determined by their level of wealth, consumption or education relative to a reference standard which is taken to be, for simplicity, the arithmetic average in the economy.

One purpose of this paper is to relax this assumption. There is indeed no reason to think that the reference standard to which individuals compare themselves is the average itself or/and that this reference standard is the same for all individuals. As suggested by Duesenberry (1949) and confirmed empirically by Bowles and Park (2005), social comparisons are mostly made in an upward manner: individuals with a high level of income are likely to affect the consumption's decision of people with a low level of income because the latter are looking to climb up the social status ladder. Similarly, Falk and Knell (2004) suggest, and provide supporting empirical evidence, that the reference standard increases with ability. In what follows, we thus assume that the reference standard that individuals take into account in evaluating their position in society can be different. Specifically, different groups may weigh differently their own and other groups' performances. Taking the reference standard of individuals as a proxy for their degree of ambition, we capture the idea that individuals' level of ambition is a factor affecting their decisions regarding work effort, consumption and saving. Ceteris paribus, one aim of this paper is to investigate how individuals' level of ambition can alter growth and distribution.

To study the issue of optimal taxation, Abel (2005) has recently developed an overlapping generation model where each generation of individuals have different preferences for social status: formally, each generation of individuals has a particular reference standard regarding consumption which is defined as a weighted geometric average of the per capita consumption of the two living generations. However, in the exogenous growth model of that paper, individuals turn out to be identical. In contrast, in this paper we develop an infinite-horizon growth model where agents are heterogeneous, labour supply is endogenous and growth is the outcome of endogenous accumulation of physical capital. Heterogeneity among individuals stems not only from different levels of ambition as said above but also because they have different innate skills. As the skills of individuals affect the productivity in working activities, it allows us to generate income inequality and investigate its relationship with long-run growth.

Moreover, following Tournemaine and Tsoukis (2007), in introducing the concept of social aspirations and the way those affect utility, we distinguish between the "average" status effect which is present in the standard literature on status seeking and growth and what may be called "differential" status effects. As will be seen, differential status effects are an important aspect of heterogeneity and allow us to make the distinction between "gain from status" (when the utility of people increases faster than their relative position) and "pain" from loss of status (when utility is lost faster than relative position). In addition to the fact that these two distinctions have not been introduced in the literature before, and are another innovation of this paper, we show that they play an important role regarding the results we get.

To summarize, to the growing literature of status and its effects on growth and distribution, we add three elements. Firstly, the idea that individuals may not look simply at the average in judging their status, but may "target" different groups differently; secondly, the idea of heterogeneity in the status motive; thirdly, the "gains" versus "pains" idea of how status affects utility. While some of these themes have to some extent been explored in previous literature, the particular contribution of this paper is to explore all these inter-related aspects of the status motive as a whole; in doing so, this paper goes beyond any of the existing papers on the macroeconomics of status. Our contribution can indeed be seen as dual as it brings together the status theme strands with growth and distribution that are themselves endogenously determined. We show in particular that the decision of individuals to accumulate wealth depends on whether they experience gain from status or pain from loss of status. In this context, the degree of ambition of individuals can either inhibit or foster their willingness to accumulate wealth. That is, the level of ambition of individuals is a crucial determinant of growth, wealth distribution and the relationship between the two.

The remainder of the paper is organised as follows. In Section 2, we present the model. In Section 3, we examine its key property regarding growth, distribution and the relation between them. We conclude in Section 4.

2 Model

The main building block of the model is taken from Romer (1986). We consider a closed economy in continuous time populated by a mass $[0,1]$ of infinitely-lived individuals. For simplicity, we assume that there are two groups of identical individuals denoted by i, $i = 1, 2$. Group 1 has a size β and group 2 has a size $1-\beta$. Each individual is initially endowed with $k_{i0} > 0$ units of capital (wealth) at date zero and T units of labour-time. She produces output, y_{it}, which can be consumed, c_{it}, or invested to give new units of capital, k_{it}. The technology for output is given by

$$y_{it} = A_i (k_{it})^{\alpha} (k_t l_{it})^{1-\alpha}, \tag{1}$$

where $0 < \alpha < 1$, $A_i > 0$ is a time-invariant productivity parameter specific to individuals of group i, l_{it} is the amount of time devoted to the production of output and $k_t \equiv \beta k_{1t} + (1-\beta)k_{2t}$ is the total stock of capital in the economy (learning by investing). Technology (1) captures the idea that individuals benefit from a different level of technology or have different innate skills, A_i, for the production of output. Without loss of generality we assume that individuals of group 1 have a higher technology than those of group 2: $A_1 \geq A_2$. In the particular case where $A_1 = A_2$, individuals of both groups have the same level of technology.

Assuming that each unit of output devoted to investments yields one new unit of capital, the resource constraint of an individual is given by

$$y_{it} = c_{it} + \dot{k}_{it}. \tag{2}$$

Individuals derive utility from their level of consumption, leisure and their social status. The social status ("relative standing") of individuals is determined by the ratio of their level of consumption, c_{it}, to a specific reference standard denoted $\overline{c_{it}}$. As mentioned, one key aspect of status heterogeneity is that the reference standard to which individuals compare themselves is not necessarily given by the average level of consumption in the economy . Furthermore, this reference standard can differ across individuals (Falk and Knell, 2004; Abel, 2005), so that heterogeneity stems from a differentiated status motive as well as different skills. Formally, the reference standard to which individuals of group i compare themselves is given by:

$$\overline{c_{it}} = (c_{1t})^{\gamma_i} (c_{2t})^{(1-\gamma_i)}, \tag{3}$$

where $0 \leq \gamma_i \leq 1$ (resp. $0 \leq 1 - \gamma_i \leq 1$) is the weight that individuals of group i put on the level of consumption of individuals of group 1 (resp. group 2) for the determination of their reference standard. The reference standard (3) can be interpreted as a proxy for the degree of ambition of an individual: under the assumption $A_1 \geq A_2$, a low value of γ_1 denotes a low level of ambition as the reference standard of high-skilled individuals is mainly determined by the level of consumption of low skills one (downward comparison). Similarly, a high value of γ_2 denotes a high level of ambition for individuals of group 2, as they mostly compare themselves to high skilled individuals (upward comparison). If we followed some of the arguments set out in the Introduction and the supporting empirical evidence of Falk and Knell (2004), we would argue that more able individuals ought to aim higher, thus $\gamma_1 > 1/2$, and $\gamma_1 > (1 - \gamma_2)$, but we choose to address the general case by not imposing such restrictions.

Preferences of the representative individual of group i are represented by the utility function

$$U_i = \int_0^\infty \left[\ln c_{it} + \ln \Psi(c_{it}/\overline{c_{it}}) + \delta\,(T - l_{it})\right] e^{-\rho t} dt, \tag{4}$$

where $\rho > 0$ is the rate of time preferences, $\delta > 0$ is a measure of the marginal disutility of work and $\Psi(\bullet)$ which is strictly increasing represents the preference of an individual regarding social status. As we will see, the crucial parameter out of the function $\Psi(\bullet)$ to be used in the analysis is its elasticity with respect to social status: $\psi_i \equiv (c_{it}/\overline{c_{it}})[\partial\Psi(\bullet)/\partial(c_{it}/\overline{c_{it}})]$. This elasticity measures how much individuals care about social status: the greater this value is, the stronger are the status motives of individuals.

A third key element of our status analysis relates to how status affects utility: Following Tournemaine and Tsoukis (2007), we shall find it convenient to introduce the following approximation for the "status" elasticity:

$$\psi_i = \eta + \phi \ln\left(\frac{c_{it}}{\overline{c_{it}}}\right) > 0, \tag{5}$$

where η and ϕ are constant parameters. Parameter η represents the core of the "status" elasticity. It can be interpreted as the "average" status effect as it manifests itself whenever individuals care about their status. We assume that η is strictly positive ($\eta > 0$) to ensure that ψ_i is always positive. Parameter ϕ introduces the "differential" status effect, and is more fully and intuitively explained immediately below. The status elasticity (5) is best understood as a tractable approximation to an elasticity that is not known with any degree of certainty and that is likely to be rather complicated. Tsoukis (2007) shows that most of the status functions used in the literature can be nested in single functional form whose elasticity takes the form given by (5) and for which the values of parameters η and ϕ can be computed. The status elasticity (5) effectively re-writes the status functions as,

$$\Psi\left(\frac{c_{it}}{\overline{c_{it}}}\right) = \left(\frac{c_{it}}{\overline{c_{it}}}\right)^{\eta + \frac{\phi}{2}\ln(c_{it}/\overline{c_{it}})}. \tag{6}$$

While $\Psi(\bullet)$ is upward-sloping, the parameter ϕ regulates its curvature which can be either concave ($\phi < 0$) or convex ($\phi > 0$). A graphic illustration for $\Psi(\bullet)$ in the neighbourhood of symmetry (i.e. $A_1 = A_2$ and $\gamma_1 = \gamma_2$) is shown in Figure 1 below:

Insert Figure 1 here

While passing from $(1, 1)$, the $\phi > 0$ curve gives increasingly more utility to individuals above their reference standard, while the $\phi < 0$ one penalises more emphatically those below. In other words, the status elasticity (5) allows us to make the distinction between "gain from status" and "pain from loss of status". "Gain" from status arises if the status function $\Psi(\bullet)$ increases faster than relative position, in the sense that its elasticity increases with relative position. There is "pain" from loss of status if status is lost faster than relative position.

As mentioned, the fact that different groups' performances are weighted differently by different individuals in the construction of their reference standards, and the differential effects of status are joint aspects of heterogeneity, in addition to heterogeneity stemming from skills. Interesting special cases include: The differential status effect vanishes if individuals are identical (i.e. $A_1 = A_2$ and $\gamma_1 = \gamma_2$) or if they compare themselves exclusively to their peers (i.e. $\gamma_1 = 1$ and $\gamma_2 = 0$). In the former case, the reason is that individuals are all alike implying $c_{1t} = c_{2t} = c_t$ in equilibrium. In the latter case, the reason is that there is no cross-comparison between individuals belonging to different groups: the steady-state equilibrium is such that $c_{1t} = \overline{c_{1t}}$ and $c_{2t} = \overline{c_{2t}}$ with $c_{1t} \neq c_{2t}$ as long as $A_1 \neq A_2$. In the absence of any empirical evidence, the "differential" status effect can be either positive or negative. We only assume that it is bounded from above: $(1-\gamma_1)\phi + \gamma_2\phi < 1$. This will ensure the existence of a solution at steady-state. We will come back shortly on the interpretation of the term $(1-\gamma_1)\phi + \gamma_2\phi$ in Section 3 where it is more appropriate.

3 Equilibrium

3.1 Individuals' problem

Each individual chooses consumption, labor and wealth to maximize (4) subject to (1)-(3). In solving this problem, we assume, as is standard (e.g. Falk and Knell, 2004), that individuals take $\overline{c_{it}}$ as given. That is, we consider that individuals are so small that the change of consumption of one individual has no effect on the reference standard of individual i. In particular, individual i treats $\overline{c_{it}}$ independently of her own decision. Formally, we have $\partial\overline{c_{it}}/\partial c_{jt} = 0$, for $i, j = 1, 2$. After manipulation, the current-value Hamiltonian of this problem for an individual of group i is

$$CVH = \ln c_{it} + \ln \Psi(c_{it}/\overline{c_{it}}) + \delta\,(T - l_{it}) + \lambda_{it}[A_i\,(k_{it})^{\alpha}\,(k_t l_{it})^{1-\alpha} - c_{it}],$$

where λ_{it} is the co-state variable associated with (2). The first order conditions are $\partial CVH/\partial c_{it} = 0$, $\partial CVH/\partial l_{it} = 0$ and $\partial CVH/\partial k_{it} = -\dot{\lambda}_{it} + \lambda_{it}\rho$. The transversality condition is $\lim_{t \to \infty} \lambda_{it} k_{it} e^{-\rho t} = 0$. Rearranging the first order conditions, we get:

$$\frac{1}{c_{it}} (1 + \psi_i) = \lambda_{it}, \tag{7}$$

$$\frac{(1 - \alpha)(1 + \psi_i) y_{it}}{l_{it} c_{it}} = \delta, \tag{8}$$

$$\frac{\alpha y_{it}}{k_{it}} + \frac{\overset{\bullet}{\lambda}_{it}}{\lambda_{it}} = \rho. \tag{9}$$

Expression (7) states that the marginal utility of consumption equals the marginal benefit of wealth. Equation (8) states that the marginal benefit of an additional unit of time spent to working activities equals its marginal cost measured by utility losses. Expression (9) is an asset-pricing equation stating that the rate of return of wealth, given by the productivity of capital plus the change in the shadow price, is equal to the discount rate.

3.2 Characterization of the steady-state

For simplicity, in the rest of the paper we restrict our attention to the steady-state equilibrium. It is worthwhile to mention that in this case the growth rate of variables must be common across agents of different groups. The reason is that otherwise someone would end up owning the whole of the economy asymptotically.[1] As a result, all the key ratios, like relative consumption between groups, consumption-to-capital, and output-to-capital, are all constant. Time subscripts are dropped when quantities are constant, but kept for individual, perpetually growing, variables. We denote by g the common growth rate of capital, consumption and output.

From equation (9) we have

$$\frac{y_{it}}{k_{it}} = \frac{g + \rho}{\alpha}. \tag{10}$$

Combining (2) and (10) yields

$$\frac{c_{it}}{k_{it}} = \frac{(1 - \alpha) g + \rho}{\alpha}. \tag{11}$$

Equations (10) and (11) imply that

$$\frac{y_{it}}{c_{it}} = \frac{g + \rho}{(1 - \alpha) g + \rho}. \tag{12}$$

[1] See Barro and Sala-i-Martin (2004, ch. 3) for more details on this point.

Plugging (12) in (8) yields

$$l_i = \frac{(1-\alpha)(g+\rho)(1+\psi_i)}{\delta\left[(1-\alpha)g+\rho\right]}. \tag{13}$$

As relative consumption, and therefore the status elasticity ψ_i are constant in the steady state, so is labour. A noteworthy feature here is that heterogeneity affects labour supply only via its effect on status. Such result has implication for the relative capital in each group. Combining (1) and (10), the relative capital in each group is given by:

$$A_i\left(\frac{k_{it}}{k_t}\right)^{\alpha-1}(l_i)^{1-\alpha} = \frac{g+\rho}{\alpha}. \tag{14}$$

More formally, plugging (13) in (14), we get:

$$A_i\left(\frac{k_{it}}{k_t}\right)^{\alpha-1}\left[\frac{(1-\alpha)(g+\rho)}{\delta\left[(1-\alpha)g+\rho\right]}\right]^{1-\alpha}\left[1+\psi_i\right]^{1-\alpha} = \frac{g+\rho}{\alpha}. \tag{15}$$

Accordingly, relative capital is influenced by two factors: individuals' skills and labour supply. The total effect of skills arises both directly, and via, and mediated by, the various aspects of the status motive. In what follows, we seek to determine how heterogeneity (skills and heterogeneous skills motives) affects the relative values of these variables between groups to study the effects on growth and distribution. As shown in Appendix, manipulation of (10)-(15) yields the following Proposition:

Proposition 1 *Under the assumption* $\phi < 1/(1-\gamma_1+\gamma_2)$, *the steady-state equilibrium is characterised by a unique economic rate of growth,* g, *and unique shares of capital owned by individuals of group* 1 *and* 2 (k_{1t}/k_t, k_{2t}/k_t) *which verify:*

$$\frac{k_{1t}}{k_t} = \Omega(g)\left(A_1\right)^{\frac{1}{(1-\alpha)}}\left(\frac{A_1}{A_2}\right)^{\frac{(1-\gamma_1)\phi}{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]}}, \tag{16}$$

$$\frac{k_{2t}}{k_t} = \Omega(g)\left(A_2\right)^{\frac{1}{(1-\alpha)}}\left(\frac{A_1}{A_2}\right)^{\frac{-\gamma_2\phi}{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]}}, \tag{17}$$

$$1 = \beta\frac{k_{1t}}{k_t} + (1-\beta)\frac{k_{2t}}{k_t}, \tag{18}$$

where $\Omega(\bullet)$ *is a strictly decreasing and strictly convex function given by*

$$\Omega(g) = \left[\frac{(1-\alpha)(g+\rho)}{\delta\left[(1-\alpha)g+\rho\right]}\right]\left(\frac{g+\rho}{\alpha}\right)^{-1/(1-\alpha)}\left[\exp\eta\right]. \tag{19}$$

The amount of labour devoted to the production of output is given by:

$$l_i = \frac{(1-\alpha)(g+\rho)}{\delta[(1-\alpha)g+\rho]}\left[1+\eta+\phi\ln\left(\frac{c_{it}}{\overline{c_{it}}}\right)\right],\ i=1,2. \tag{20}$$

Examination of equations (16) and (17) shows that for a given level of growth the share of capital owned by individuals of group $i, k_{it}/k_t,\ i=1,2$, depends on two elements. The first one is the level of technology of individuals of group i, A_i, which affects positively the share of capital owned by individuals of that group. The second element (i.e. $(A_1/A_2)^{(1-\gamma_1)\phi/\{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]\}}$ in (16) and $(A_1/A_2)^{-\gamma_2\phi/\{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]\}}$ in (17) captures the effect from status comparison.

While the effect of the first element is straightforward (an increase in the levels of skills of individuals allows them to increase the quantity of wealth they accumulate), the effect of second one is more complex. Observe that the shares of capital owned by individuals of group i, k_{it}/k_t, can be either positively or negatively correlated with the skills-ratio, A_1/A_2. The outcome depends whether the differential status effect, ϕ, is positive or negative, thereby it depends whether individuals experience gains from status ($\phi>0$) or pains from loss of status ($\phi<0$).

Note also that the size of the differential status effect depends itself on the degree of ambitions of individuals as captured by the parameters γ_1 and γ_2. The term $(1-\gamma_1)\phi$ can indeed be interpreted as the differential status effect on utility, arising from the comparison of group 1 with group 2, and similarly $\gamma_2\phi$ is a measure of the differential status effect due to the comparison of group 2 with group 1. As such, the sum of these two terms, $(1-\gamma_1)\phi+\gamma_2\phi$, assumes a natural interpretation: It is the sum of the effects on utility of cross-boundary comparisons, and are thus an indicator of the overall effect of heterogeneous status motives on utility. For instance, a higher ambition by individuals in group 1 (captured by an increase of γ_1) or a lower ambition by individuals in group 2 (captured by a decrease of γ_2) leads to a reduction of the overall effect. It will be useful to keep this interpretation in mind in the next two sub-sections where we analyse the effects of heterogeneity on distribution and growth.

3.3 Distribution

To analyse distribution (i.e. inequalities), it is convenient to combine equations (16) and (17) in Proposition 1. Moreover, using (10), (11), (12)), we get:

$$\frac{c_{1t}}{c_{2t}} = \frac{k_{1t}}{k_{2t}} = \frac{y_{1t}}{y_{2t}} = \left(\frac{A_1}{A_2}\right)^{\frac{1}{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]}} . \tag{21}$$

Examination of (21) leads to Propositions 2 and 3 below:

Proposition 2 *For any value of the weights γ_1 and γ_2, individuals of both groups end up with the same amount of consumption, wealth and income if they have the same technology (skills): $A_1 = A_2$.*

The reason is that for $A_1 = A_2$ individuals share the same technology so that they have the same ability to produce, to consume and to save. As the source of income heterogeneity has vanished, the reference standard to which individuals compare themselves turns out to be the same although the values of γ_1 and γ_2 differ: we have $c_{1t} = c_{2t} = c_t = \overline{c_{1t}} = \overline{c_{2t}} = \overline{c_t}$. The solution we obtain is thus the same as the one with purely symmetric agents (i.e. $A_1 = A_2$ and $\gamma_1 = \gamma_2$). We can verify that the basic results depicted in the literature follow. In particular, higher status motive in consumption, captured by an increase in η, has positive effects on labour supply, wealth accumulation and growth (see Proposition 1).

In the rest of the paper, we focus on the case $A_1 > A_2$. From equation (21), we can state:

Proposition 3 *Under the assumption $A_1 > A_2$ and $\phi < 1/(1-\gamma_1+\gamma_2)$:*
a) inequalities are positively correlated with the level of technology of individuals of group 1, A_1, the differential status effect, ϕ, and the degree of ambition of individuals of group 1, γ_1;
b) inequalities are negatively correlated with the level of technology of individuals of group 2, A_2, and the degree of ambition of individuals of group 2, γ_2.

Proposition 3 establishes the properties of the model regarding distribution. The positive (resp. negative) relationship between inequalities and the level of technologies

A_1 (resp. A_2), comes from the fact that individuals of group 1 benefit initially from a better level of technology ($A_1 > A_2$). As a result, an increase in their level of technology will further increase inequalities while an increase in A_2 will reduce the gap.

The interesting result here concerns the differential status effect and the degree of ambitions of individuals. As mentioned in Section 2 and as can be verified from Proposition 1, the differential status effect, ϕ, is an indicator of heterogeneity which vanishes under symmetry. When individuals experience pains from loss of status ($\phi < 0$), we can verify that individuals' status elasticities are such that $\psi_1 < \psi_2$: low skilled individuals care more about their status than high skilled ones. This is because a reduction in the social status affects low skilled individuals' well-being in a larger extent than the high skilled ones. In this case, the pain (fear) from loss of status induces them to work harder so that: $l_1 < l_2$ (see equation (20)). Thereby, the additional amount of time that low skilled individuals spend in the production of output relative to the high skilled ones allows them to reduce the gap of inequalities initially due to the level of technologies ($A_1 > A_2$). As the differential status effect, ϕ, increases, however, the motivation of the low skilled individuals, captured by ψ_2, decreases while the motivation of the high skilled ones, captured by ψ_1, increases. As such, there is a negative correlation between differential status effect and inequalities. Observe that if individuals experience gains from status ($\phi > 0$), the preceding results are reversed: we have $\psi_1 > \psi_2$. In this case, high skilled individuals care more about their status than the low skilled ones inducing them to work harder (see equation (20)): $l_1 > l_2$.

As shown above, the role of the differential status effect is crucial regarding distribution. As implicitly stated in Proposition 2, the reason is that the main source of heterogeneity is the difference in the level of technology. Ambition, however, can lower or foster these effects. Basically, if individuals compare mostly themselves to their peers (i.e. when γ_1 is large and γ_2 is small), the differential effect, ϕ, is reduced. If, however, individuals start comparing themselves more outside their group (i.e. ambition of individuals of group 1 decreases whereas ambition of individuals of group 2 increases), the differential status effect is fostered.

To summarise our basic findings regarding distribution, we can state:

Corollary:

a) More "pains from lack of status", $\phi < 0$, induce low skilled individuals to work harder while more "gains from status" , $\phi > 0$, have positive effects on the amount of time that high skilled individuals allocate to working activities. Thus, while more pains from status reduce inequalities, more gains from status increase inequalities.
b) The degree of ambition of individuals matters as it can foster or dampen the differential status effect.

3.4 Growth and growth-inequality relationship

In this sub-Section, we spell out the implications for growth and discuss the relationship between growth and distribution. From (16), (17) and (18), simple computations lead to an equation for growth as follows:

$$1 = \Omega(g)(\widetilde{A})^{1/(1-\alpha)}\widehat{\sigma_A^2}, \tag{22}$$

where $\widetilde{A}$ is a (geometric) weighted average of skill levels, defined as:

$$\widetilde{A} \equiv (A_1)^{\beta}(A_2)^{1-\beta}, \tag{23}$$

and $\widehat{\sigma_A^2}$, which can be interpreted as a composite measure of inequality of skills, inclusive of the various effects of status heterogeneity, is given by:

$$\widehat{\sigma_A^2} \equiv \beta \left(\frac{A_1}{A_2}\right)^{\frac{(1-\beta)(1-\gamma_2\phi)+\beta(1-\gamma_1)\phi}{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]}} + (1-\beta)\left(\frac{A_1}{A_2}\right)^{-\frac{\beta[1-(1-\gamma_1)\phi]+(1-\beta)\gamma_2\phi}{(1-\alpha)[1-(1-\gamma_1)\phi-\gamma_2\phi]}}. \tag{24}$$

The term $\widehat{\sigma_A^2}$ yields indeed an intuitive measure of the effects of heterogeneity between the two groups on economic growth. Intuitively, under the assumption $A_1 > A_2$, a higher value of A_1 means higher heterogeneity in skills while a higher value of A_2 means a reduction of heterogeneity. In equation (24), the skills ratio is corrected by the relative size of the groups, the differential status and the degree of ambition of individuals.

The reduced form of the growth rate given in equation (22) is then very useful as it allows us to decompose the effects of changes in skills heterogeneity into two fundamental components: the average skills effect measured by $\widetilde{A}$ and the differential skills effect measured by $\widehat{\sigma_A^2}$. Furthermore, this is interesting for two reasons: firstly because as shown above there is an important distinction to be made between innate skills inequality and distribution. In this respect, the crucial question is whether the original skills inequality is amplified or attenuated by the mechanisms studied here when we study economic growth. Secondly, it is interesting because the literature has not found a consensus regarding the relationship between growth and inequality. For instance, Persson and Tabellini (1994) present cross-country evidence of a negative effect of inequality on growth. In contrast, using a panel of U.S. states Partridge (1997) conclude that greater inequality is associated with greater growth. Other studies, finally, conclude that changes in income and changes in inequality are unrelated (Deninger and Squire, 1996; Chen and Ravallion, 1997).

Examination of (22) shows that growth rises unambiguously with average skills, $\widetilde{A}$. The effects of heterogeneity in skills, however, is ambiguous. The second component on the right hand side of (24) receives a negative exponent. Thus, more heterogeneity in skills in general has an ambiguous effect on economic growth. The reason is that skills heterogeneity may be amplified or attenuated when translated into economic growth, through labour supply and the mechanisms of status seeking. This is significant, as much recent literature tends to view the recent increases in inequality as the result of skills-biased technical progress - effectively, the widening gap between the demands for the high and low skills. This would be analogous to a rise in exogenous skills heterogeneity in this framework. As special cases, we can note that greater heterogeneity in skills leads to higher growth when the group of the highly skilled is sufficiently more sizable (β much higher than $1-\beta$) and "gains" from status prevail ($\phi > 0$). In this case, the more able individuals are motivated to work harder and their contribution to economic growth overcomes the negative effect induced by the reduction of time that low skilled individuals allocate to output production: skills inequality is positively related to growth. However, if the "pains" prevailed and the more able individuals were also more numerous, then growth might not increase as the able individuals may not be sufficiently motivated: in this case, skills inequality is negatively related to growth. Finally, if the less able are sufficiently more numerate and "pains" prevails, inequality also is positively correlated with growth, as inequality motivates the less able to try harder.

The degree of ambition (as captured by γ_1 and γ_2) is also an important influence as evidenced above. Thus, there are interesting interplays between size of groups, the curvature of the status function in utility (differential effects: "gains" versus "pains") and ambition in shaping the relationship between growth and inequality. Highlighting those in a clear-cut manner epitomises the contribution of our paper.

We formalise the above in Propositions 4 and 5 below:

Proposition 4 *Growth rises unambiguously with average skills but can be positively or negatively correlated with skills heterogeneity.*

Proposition 5 *Skills heterogeneity may be amplified or attenuated through labour supply as affected by the various aspects of the status-seeking motive.*

4 Conclusion

We have developed a simple growth model with heterogeneous individuals who care about their social status. Heterogeneity between individuals stems from two sources: their innate skills and their diversified ways by which they make comparisons to determine their status. Our core contribution is to analyze the various aspects of the status motive - heterogeneous reference standards, ambition, and the differential effect of status on utility ("gain" versus "pain"). In a standard AK growth model, we have highlighted the effects of these two sources of heterogeneity on growth, inequality, and the relationship between the two. In doing so, we have pointed out the ways by which these interrelated aspects of the status motive impinge on macroeconomic outcomes. We have also shown that status, and its various aspects, is crucial in understanding the ambiguous relationship between growth and (consumption) inequality pointed out in the literature.

5 Appendix: equations (16) and (17)

Using (11) and $\overline{c_{it}} = (c_{1t})^{\gamma_i} (c_{2t})^{(1-\gamma_i)}$, we get

$$\frac{c_{it}}{\overline{c_{it}}} = \frac{[(1-\alpha)g + \rho]\, k_{it}/\alpha}{(k_{1t})^{\gamma_i} (k_{2t})^{(1-\gamma_i)} [(1-\alpha)g + \rho]/\alpha} = \frac{k_{it}}{\overline{k_{it}}}, \tag{25}$$

where $\overline{k_{it}} = (k_{1t})^{\gamma_i} (k_{2t})^{(1-\gamma_i)}$. Next, to compute (16) and (17), it is convenient to approximate $\ln(1+\psi_i) \approx \psi_i$. This can be done in the neighbourhood of symmetry. In this case, from (15), (25) and the linearization of the status function (5), we get:

$$(A_i)\left(\frac{k_{it}}{k_t}\right)^{\alpha-1}\left[\frac{(1-\alpha)(g+\rho)}{\delta\left[(1-\alpha)g+\rho\right]}\right]^{1-\alpha}(\exp\eta)^{1-\alpha}\left(\frac{k_{it}}{\overline{\overline{k_{it}}}}\right)^{\phi(1-\alpha)}=\left(\frac{g+\rho}{\alpha}\right).$$

Using $\overline{k_{it}}=(k_{1t})^{\gamma_i}(k_{2t})^{(1-\gamma_i)}$ yields

$$\left(\frac{k_{1t}}{k_t}\right)^{[1-(1-\gamma_1)\phi]}=\Omega(g)\,(A_1)^{1/(1-\alpha)}\left(\frac{k_{2t}}{k_t}\right)^{-(1-\gamma_1)\phi}, \tag{26}$$

and

$$\left(\frac{k_{2t}}{k_t}\right)^{[1-\gamma_2\phi]}=\Omega(g)\,(A_2)^{1/(1-\alpha)}\left(\frac{k_{1t}}{k_t}\right)^{-\gamma_2\phi}, \tag{27}$$

where $\Omega(g)$ is defined in equation (19). Combining (26) and (27) leads to (16) and (17) in the text. Combining (16), (17), (19) and $k_t\equiv\beta k_{1t}+(1-\beta)k_{2t}$ allows us to determine the steady-state values of k_{1t}/k_t, k_{2t}/k_t and g. Computations show that a solution exists if $(1-\gamma_1)\phi+\gamma_2\phi<1$.

6 Reference

Abel A.B. (2005) Optimal Taxation when Consumers Have Endogenous Benchmark Levels of Consumption, Review of Economic Studies 72, pp. 21–42

Bowles S., Park T. (2005) Emulation, Inequality, and Work Hours: Was Thorsten Veblen Right? *Economic Journal,* 115, pp. 397-412.

Clark A.E., Oswald A.J. (1996) Satisfaction and comparison income, *Journal of Public Economics*, 61, pp. 359-381.

Chen S., Ravallion M. (1997) What Can New Survey Data Tell Us about Recent Changes in Distribution and Poverty?, *The World Bank Economic Review*, 11, pp. 357-382.

Choudhary, A., P. Levine, P. McAdam, P. Welz (2007) Relative Preferences, Happiness and Corrective Taxation, mimeo, University of Surrey.

Corneo G., Jeanne O. (1997) On relative wealth effects and the optimality of growth, *Economics letters*, 54, pp. 87-92.

Deninger K., L. Squire (1996) A New Data Set Measuring Income Inequality, *The World Bank Economic Review*, 10, pp. 565-591.

Diener E., Fujita, F. (1997), Social Comparison and Subjective Well-being, in B. P. Buunk and R. Gibbons (eds.), Health, Coping and Well-being: Perspectives from Social Comparison Theory, Lawrence Erlbaum Associates, Inc., Mahwah, NJ, 329–357.

Dusenberry J. (1949) Income, Saving, and the Theory of Consumer Behavior, Cambridge: Harvard University Press.

Falk A., M. Knell (2004) Choosing the Joneses: Endogenous Goals and Reference Standards, *Scandinavian Journal of Economics*, 106 (3), pp. 417-435.

Fershtman C., K.M. Murphy, Y. Weiss (1996) Social Status, Education and Growth, *Journal of Political Economy*, 104, pp. 108-132.

Fisher W.H., Hof F.X. (2000) Relative consumption, economic growth and taxation, *Journal of Economics*, 73, pp. 241-262.

Futagami K., Shibata A. (1998) Keeping one step ahead of the Joneses: Status, the distribution of wealth, and long run growth, *Journal of Economic Behavior & Organization*, 36, pp. 109-126.

Maurer J, A Meier (2008) Smooth it Like the Joneses? Estimating Peer-Group Effects in Intertemporal Consumption Choice, *The Economic Journal,* 118, pp. 454-476.

Partridge M. (1997) Is Inequality Harmful For Growth? Comment, *American Economic Review*, 87, pp. 1019-1032.

Persson T. and G. Tabellini (1994), Is inequality harmful for growth? *American Economic Review*, 84, pp. 600-621.

Pham T. K.C. (2005) Economic growth and Status-seeking through personal Wealth, *European Journal of Political Economy*, 21, pp. 404-427.

Rauscher M. (1997) Conspicuous consumption, economic growth and taxation, *Journal of Economics*, 66, pp. 35-42.

Romer P. (1986) Increasing Returns and Long-run Growth, *Journal of Political Economy*, 94, pp. 1002-1037.

Tournemaine F. (2008) Social aspirations and choice of fertility: why can status motive reduce per-capita growth?, *Journal of Population Economics* 21, pp. 49-66.

Tournemaine F., C. Tsoukis (2007) Status Jobs, Human Capital and Growth: the effects of heterogeneity, mimeo.

Tournemaine F., C. Tsoukis (2008) Relative Consumption, Relative Wealth and Growth. Economics Letters, forthcoming.

Tsoukis C. (2007) Keeping up with the Joneses, Growth, Distribution and optimal taxation. *Scottish Journal of Political Economy,* 54, pp. 575-600.

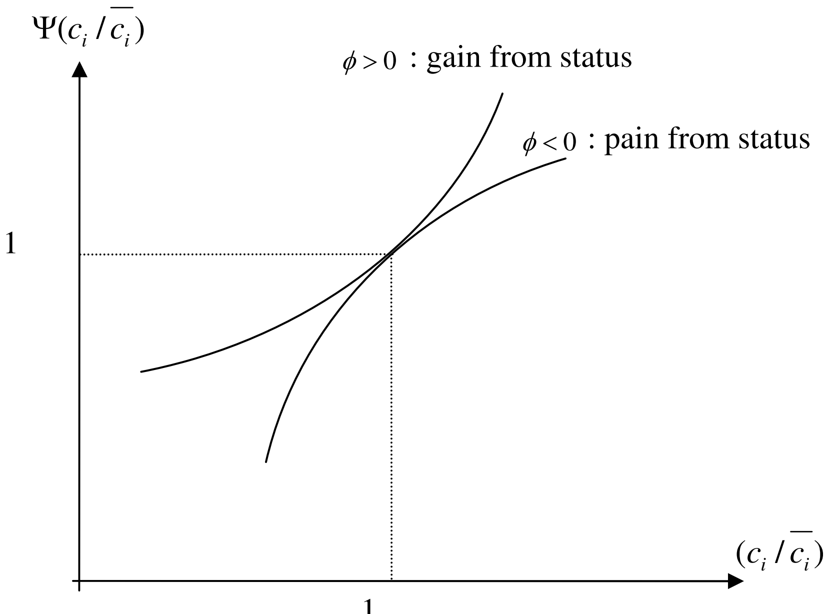

Figure 1: *The status function* $\Psi(.)$