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Abstract

According to Werner Sombart's classic text *Luxury and Capitalism*, the status-seeking behavior of individuals may facilitate the development of capitalism and an early industrialization. In this study, we develop a growth-theoretic framework to formalize this hypothesis by introducing a status-seeking preference into the Schumpeterian growth model of endogenous takeoff. Then, we explore how this cultural preference affects the transition of an economy from pre-industrial stagnation to modern economic growth. We find that the effects of status-seeking behaviors evolve across different stages of economic development. Specifically, a stronger preference for status seeking causes an earlier takeoff and increases economic growth in the short run but has an overall negative effect on the steady-state equilibrium growth rate. Finally, we calibrate the model to US data to perform a quantitative analysis and also use cross-country data to estimate the effects of status-seeking preference on economic growth.

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> A new emphasis on the deployment of expensive, often durable manufactured objects—silks, mirrors, elegant furniture, etc.—replaced earlier ways of expressing status, such as maintaining large retinues, which did less to stimulate production. Pomeranz (2001, p. 107)

> The bourgeois who lived in a hierarchical society had to prove himself and his self-worth [...] and thus necessitated a new, heightened degree of luxury. This further increased the demand for luxury, which according to Sombart specifically resulted in the creation of new markets that expanded the economy: as the desire for luxury grew immensely, so did the markets to accommodate it. Franchetti (2013, p. 135-136)

1 Introduction

According to Sombart (1967), the status-seeking behavior of individuals may facilitate the development of capitalism and give rise to an early industrialization. In this study, we provide a growth-theoretic framework to formalize this hypothesis. Specifically, we introduce a status-seeking preference into the Schumpeterian growth model of endogenous takeoff in Peretto (2015). Then, we use the model to explore how this cultural preference affects the transition of an economy from pre-industrial stagnation to modern economic growth. In summary, we find that the effects of status-seeking behaviors evolve across different stages of economic development. Specifically, a stronger preference for status seeking leads to an earlier takeoff and a higher rate of economic growth in the short run but has an overall negative effect on the steady-state equilibrium growth rate.

The intuition of the above results can be explained as follows. The preference for status seeking encourages the accumulation of assets and mitigates the preference for discounting, which in turn reduces the equilibrium interest rate. This *interest-rate* effect from the status-seeking preference serves to stimulate the entry of firms with new products and the quality improvement of products. Therefore, the market size (which is increasing in the population size)[1] required for innovation to occur becomes smaller. As a result, a stronger preference for status seeking causes an economy to experience an earlier transition to growth with the development of new products as hypothesized by Sombart (1967). However, the increased entry of firms eventually reduces the market size of each firm. Given that the equilibrium rate of innovation also depends positively on the firm size,[2] the overall effect of status seeking on economic growth eventually becomes negative in the long run. We calibrate the model to US data to perform a quantitative analysis and also use cross-country data to estimate the effects of status-seeking preference on economic growth. In summary, we find supportive empirical evidence for the theoretical implications of status seeking on economic growth.

This study relates to the literature on economic growth and innovation. Romer (1990) develops the seminal R&D-based growth model in which the invention of new products drives innovation. Aghion and Howitt (1992) develop the Schumpeterian growth model in which

[1] Kremer (1993) provides evidence for a positive relationship between the population size and technological progress in early historical eras.

[2] See Cohen and Klepper (1996a, b) for evidence.

the quality improvement of products drives innovation.[3] A small number of studies in this literature explore how the behavioral aspects of people's preferences affect innovation and economic growth; see for example, Chu (2007) on entrepreneurial overconfidence, Furukawa *et al.* (2018, 2019) on the love of novelty, and Pan *et al.* (2018) and Hof and Prettner (2019) on status-seeking preferences. We contribute to this literature by introducing a status-seeking preference into the second-generation Schumpeterian growth model,[4] whose implications are supported by empirical evidence,[5] to explore its different implications on economic growth at different time horizons, which complement the interesting studies by Pan *et al.* (2018) and Hof and Prettner (2019) who consider status-seeking households in the Romer model and focus on economic growth in the long run.

There is also an established literature on status seeking and economic growth in capital-based growth models; see Kurz (1968), Zou (1994, 1995), Corneo and Jeanne (1997) and Futagami and Shibata (1998) for early studies and Pan *et al.* (2018) for a discussion of subsequent studies in this literature. This literature is motivated by the insight of Max Weber. According to Weber (1958), the desire to accumulate wealth stimulates the accumulation of capital, which is the engine of economic growth in capital-based growth models. This study is motivated by a related hypothesis in Sombart (1967), according to which the desire for luxury consumption stimulates the development of new products and better products, which are the engines of economic growth in the Schumpeterian growth model. Therefore, we use the Schumpeterian growth model to consider status preference and formalize Sombart's insight.

This study also relates to the literature on economic growth and endogenous takeoff. In this literature, seminal studies by Galor and Weil (2000) and Galor and Moav (2002) develop unified growth theory.[6] Unified growth theory explores the endogenous transition of an economy from stagnation to growth through a quality-quantity tradeoff in childrearing and human-capital accumulation.[7] In this literature, Galor and Michalopoulos (2012) explore the evolutionary advantage of entrepreneurial spirit at different stages of economic development. Although the transition from high fertility and low human capital investment to low fertility and high human capital investment emphasized in unified growth theory is certainly crucial for endogenous takeoff, this study considers a complementary mechanism through the acceleration of technological progress driven by the development of new products and the quality improvement of products, which relate most closely to Sombart's idea on how luxury consumption affects the development of capitalism. To formalize this idea, we introduce a status-seeking preference into the Schumpeterian growth model with endogenous takeoff developed by Peretto (2015) and explore how this cultural preference affects the endogenous transition of an economy from the pre-industrial era to modern industrial eras through technological progress. Therefore, this study also contributes to a small but growing literature on endogenous takeoff in the Schumpeterian growth model. For example, Iacopetta

[3] See also Grossman and Helpman (1991) and Segerstrom *et al.* (1990) for other early studies.

[4] Peretto (1994, 1998, 1999), Smulders and van de Klundert (1995), Dinopoulos and Thompson (1998), Young (1998) and Howitt (1999) combine the two dimensions of innovation and develop the second-generation Schumpeterian growth model, which is free from the counterfactual scale effect in the Romer model.

[5] See Laincz and Peretto (2006), Ha and Howitt (2007), Madsen (2008, 2010) and Ang and Madsen (2011).

[6] See also Jones (2001) and Hansen and Prescott (2002) for other early studies on endogenous takeoff.

[7] See also Galor and Mountford (2008), Galor *et al.* (2009), Ashraf and Galor (2011) and Galor (2011).

and Peretto (2020) explore how corporate governance affects the endogenous transition of an economy from pre-industrial stagnation to modern economic growth, whereas Chu *et al.* (2020) explore the effects of patent protection on endogenous takeoff in the Schumpeterian growth model.

The rest of this paper is organized as follows. Section 2 describes the model. Section 3 presents our theoretical, empirical and quantitative results. Section 4 concludes.

2 A Schumpeterian model with status-seeking culture

The Schumpeterian growth model of endogenous takeoff is based on Peretto (2015). We consider two types of agents in the Peretto model: workers and asset owners. Furthermore, we introduce a status-seeking preference into the Peretto model.[8] Specifically, we assume that asset owners have a status-seeking preference to flaunt their wealth as hypothesized by Sombart (1967).[9]

2.1 Population

The population size in the economy at time t is L_t, which grows at an exogenous rate $\lambda > 0$. An exogenous share $s \in (0, 1)$ of the population is workers, and they simply consume their wage income w_t. The remaining share $1 - s$ of the population is asset owners, and they accumulate assets for consumption and status seeking.

2.2 Status-seeking households

There is a unit continuum of households, which are indexed by $h \in [0, 1]$. They have identical homothetic preferences over consumption. Household h's utility function is given by[10]

$$U(h) = \int_0^\infty e^{-(\rho-\lambda)t} u_t(h) dt = \int_0^\infty e^{-(\rho-\lambda)t} \left\{ \ln c_t(h) + \kappa \frac{[a_t(h)/a_t]^{1-1/\varepsilon} - 1}{1 - 1/\varepsilon} \right\} dt, \quad (1)$$

where $c_t(h)$ is household h's per capita consumption of the final good (numeraire) and the parameter $\rho > \lambda$ is the subjective discount rate. The parameter $\kappa > 0$ captures the household's status-seeking preference in its wealth relative to other households, and the parameter $\varepsilon > 0$ is the elasticity of intertemporal substitution. The asset-accumulation equation is given by

$$\dot{a}_t(h) = (r_t - \lambda) a_t(h) - c_t(h), \quad (2)$$

[8] See Heffetz and Frank (2011) for a survey of experimental and empirical evidence on preferences for social status.

[9] It is useful to note that although Sombart's idea is based on luxury consumption, some of these consumption items (e.g., luxurious houses) are assets with resale value.

[10] All our results are robust to a more general utility specification $u_t(h) = \ln c_t(h) + \kappa v[a_t(h)/a_t]$, where $v(.)$ is a differentiable and increasing function with $v'(1)$ being a constant.

where $a_t(h)$ is the real value of assets owned by each member of household h.

We perform dynamic optimization and obtain the growth path of consumption $c_t(h)$ as

$$\frac{\dot{c}_t(h)}{c_t(h)} = r_t - \rho + \kappa \frac{c_t(h)}{a_t} \left[\frac{a_t(h)}{a_t} \right]^{-1/\varepsilon}.$$

Although the households are heterogeneous *ex ante*, they are homogeneous *ex post* such that $c_t(h) = c_t$ and $a_t(h) = a_t$ for all $h \in [0,1]$.[11] In this case, the growth path of consumption c_t simplifies to

$$\frac{\dot{c}_t}{c_t} = r_t - \rho + \kappa \frac{c_t}{a_t}, \tag{3}$$

where the term $\kappa c_t / a_t$ captures the effect of the status-seeking behavior of households.

2.3 Final good

The production function of the final good is given by[12]

$$Y_t = \int_0^{N_t} X_t^{\theta}(i) \left[Z_t^{\alpha}(i) Z_t^{1-\alpha} L_{y,t} / N_t^{1-\sigma} \right]^{1-\theta} di, \tag{4}$$

where $\{\theta, \alpha, \sigma\} \in (0,1)$. N_t is the number of differentiated intermediate goods. $L_{y,t}$ denotes production workers and is given by $L_{y,t} = sL_t$ in equilibrium. $X_t(i)$ is the quantity of non-durable intermediate good $i \in [0, N_t]$. The productivity of $X_t(i)$ depends on its own quality $Z_t(i)$ as well as the average quality of all intermediate goods $Z_t \equiv \int_0^{N_t} Z_t(j)\, dj / N_t$, which captures technology spillovers. The parameter α determines the private return to quality, and hence, $1-\alpha$ determines the degree of technology spillovers. The parameter σ determines a congestion effect $1-\sigma$ of variety. As we will show, the social return to variety is σ.

Profit maximization yields the conditional demand functions for $L_{y,t}$ and $X_t(i)$ as

$$w_t = (1-\theta) \frac{Y_t}{L_{y,t}}, \tag{5}$$

$$X_t(i) = \left[\frac{\theta}{P_t(i)} \right]^{1/(1-\theta)} \frac{Z_t^{\alpha}(i) Z_t^{1-\alpha} L_{y,t}}{N_t^{1-\sigma}}, \tag{6}$$

where $P_t(i)$ is the price of $X_t(i)$. Perfect competition implies that final-good firms pay $(1-\theta) Y_t = w_t L_{y,t}$ for workers and $\theta Y_t = \int_0^{N_t} P_t(i) X_t(i)\, di$ for intermediate goods.

[11] This assumption can be rationalized by an equal initial wealth $a_0(h) = a_0$ such that $a_t(h) = a_t$ for all t. See Chu and Peretto (2019) for an analysis of heterogeneous households in the Peretto model.

[12] A more familiar special case of the production function is $Y_t = \int_0^{N_t} X_t^{\theta}(i) \left[Z_t(i) L_{y,t} \right]^{1-\theta} di$, which however does not capture technology spillovers $1-\alpha$ and the congestion effect $1-\sigma$ of variety. The latter feature serves to remove the scale effect for all $\sigma < 1$; see Peretto (2018) for a discussion on the robustness of scale invariance in the second-generation Schumpeterian growth model.

2.4 Intermediate goods and in-house R&D

The intermediate-good sector is characterized by monopolistic competition. There is a continuum of differentiated intermediate goods $i \in [0, N_t]$. A monopolistic firm produces differentiated intermediate good i with a linear technology that requires $X_t(i)$ units of the final good to produce $X_t(i)$ units of intermediate good i. In other words, the marginal cost for the monopolistic firm in industry i to produce $X_t(i)$ with quality $Z_t(i)$ is one. The monopolistic firm also needs to incur $\phi Z_t^{\alpha}(i) Z_t^{1-\alpha}$ units of the final good as a fixed operating cost. To improve the quality of its products, the firm devotes $I_t(i)$ units of the final good to in-house R&D. The process of in-house R&D is specified as

$$\dot{Z}_t(i) = I_t(i). \tag{7}$$

The firm's (before-R&D) profit flow at time t is

$$\Pi_t(i) = [P_t(i) - 1] X_t(i) - \phi Z_t^{\alpha}(i) Z_t^{1-\alpha}. \tag{8}$$

The value of the monopolistic firm in industry i is

$$V_t(i) = \int_t^{\infty} \exp\left(-\int_t^s r_u du\right) [\Pi_s(i) - I_s(i)] ds. \tag{9}$$

The monopolistic firm maximizes (9) subject to (7) and (8). We solve this dynamic optimization problem below and find that the familiar profit-maximizing price is

$$P_t(i) = 1/\theta. \tag{10}$$

Following the standard approach in the literature, we consider a symmetric equilibrium in which $Z_t(i) = Z_t$ for $i \in [0, N_t]$ and the size of each intermediate-good firm is identical across all industries $X_t(i) = X_t$.[13] From (6) and (10), the quality-adjusted firm size is

$$\frac{X_t}{Z_t} = \theta^{2/(1-\theta)} \frac{L_{y,t}}{N_t^{1-\sigma}}. \tag{11}$$

We define the following transformed variable:

$$x_t \equiv s\theta^{2/(1-\theta)} \frac{L_t}{N_t^{1-\sigma}} = \frac{X_t}{Z_t}, \tag{12}$$

which is a state variable whose dynamics depends on the ratio $L_t/N_t^{1-\sigma}$. Lemma 1 shows that the rate of return on quality-improving R&D is increasing in the firm size x_t.[14]

Lemma 1 *The rate of return on quality-improving in-house R&D is given by*

$$r_t^q = \alpha \frac{\Pi_t}{Z_t} = \alpha \left(\frac{1-\theta}{\theta} x_t - \phi\right). \tag{13}$$

Proof. See Appendix A. ■

[13] Symmetry also implies $\Pi_t(i) = \Pi_t$, $I_t(i) = I_t$ and $V_t(i) = V_t$.

[14] For a given $L_t/N_t^{1-\sigma}$, a larger s increases the firm size x_t in (12) and the rate of return on innovation in (13). As a result, a larger s also causes an earlier takeoff and a higher transitional growth rate but does not affect the steady-state growth rate due to the scale-invariant property of the model. Derivations are available upon request.

2.5 Entrants

To enter the market with a new variety of intermediate goods and set up its operation, a new firm has to pay δX_t units of the final good, where $\delta > 0$ is an entry-cost parameter. The value of a new firm at time t is V_t.[15] The asset-pricing equation can be written as

$$r_t = \frac{\Pi_t - I_t}{V_t} + \frac{\dot{V}_t}{V_t}. \tag{14}$$

When entry is positive, the entry condition is given by

$$V_t = \delta X_t. \tag{15}$$

Then, we can use (8), (10), (12), (14) and (15) to derive the rate of return on entry as

$$r_t^e = \frac{\Pi_t - I_t}{\delta Z_t}\frac{Z_t}{X_t} + \frac{\dot{X}_t}{X_t} = \frac{1}{\delta}\left(\frac{1-\theta}{\theta} - \frac{\phi + z_t}{x_t}\right) + z_t + \frac{\dot{x}_t}{x_t}, \tag{16}$$

which also uses $\dot{V}_t/V_t = \dot{X}_t/X_t = z_t + \dot{x}_t/x_t$, and $z_t \equiv \dot{Z}_t/Z_t$ is the quality growth rate. Equation (16) shows that the rate of return on entry is also increasing in the firm size x_t.

2.6 Equilibrium

The equilibrium is a time path of allocations $\{a_t, Y_t, C_t, X_t, I_t\}$ and prices $\{r_t, w_t, P_t, V_t\}$ such that

- workers supply labor and consume their wage income w_t;
- asset owners maximize utility taking r_t as given;
- competitive final-good firms produce Y_t and maximize profits taking $\{w_t, P_t\}$ as given;
- intermediate-good firms choose $\{P_t, I_t\}$ to maximize V_t taking r_t as given;
- entrants make entry decisions taking V_t as given;
- the value of all existing monopolistic firms adds up to the value of the households' assets such that $N_t V_t = a_t(1-s)L_t$;
- the labor market clears such that $L_{y,t} = sL_t$; and
- the market-clearing condition of final good holds:

  $$Y_t = C_t + N_t\left(X_t + \phi Z_t + I_t\right) + \dot{N}_t \delta X_t,$$

  where $C_t = c_t(1-s)L_t + w_t s L_t$ is the total consumption of asset owners and workers.

[15] To ensure symmetry, we assume that all new firms at time t have access to the aggregate technology Z_t.

2.7 Aggregate production function

Substituting (6) and (10) into (4) yields the aggregate production function given by

$$Y_t = s\theta^{2\theta/(1-\theta)} N_t^{\sigma} Z_t L_t. \tag{17}$$

The growth rate of per capita output $y_t \equiv Y_t/L_t$ is then

$$g_t \equiv \frac{\dot{y}_t}{y_t} = \sigma n_t + z_t. \tag{18}$$

which depends on the variety growth rate $n_t \equiv \dot{N}_t/N_t$ and the quality growth rate z_t.

2.8 Dynamics of the consumption-wealth ratio

We can use (3) to rewrite (2) as

$$\frac{\dot{c}_t}{c_t} - \frac{\dot{a}_t}{a_t} = (1+\kappa)\frac{c_t}{a_t} - \rho + \lambda,$$

which shows that the c_t/a_t ratio always jumps to the following steady-state value:

$$\frac{c_t}{a_t} = \frac{1}{1+\kappa}\left(\rho - \lambda\right). \tag{19}$$

Substituting (19) into (3) yields the interest rate as

$$r_t = \frac{\dot{c}_t}{c_t} + \rho - \frac{\kappa}{1+\kappa}\left(\rho - \lambda\right), \tag{20}$$

which shows that the preference for status seeking mitigates the preference for discounting and reduces the equilibrium interest rate (for a given consumption growth rate of the households). As we will show, this interest-rate effect from the status-seeking preference serves to stimulate the entry of firms and quality-improving R&D but also reduces the steady-state equilibrium firm size.

3 Status-seeking culture and endogenous takeoff

As we will show below, the dynamics of the economy is determined by the dynamics of the firm size x_t, which is stable if the following condition holds:[16]

$$\delta\phi > \frac{1}{\alpha}\left[\frac{1-\theta}{\theta} - \delta\left(\frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}\right)\right] > \frac{1-\theta}{\theta}. \tag{21}$$

[16] In our quantitative analysis, we calibrate the model to US data and find that this condition holds under reasonable parameter values.

Given an initial value $x_0 > \phi\theta/(1-\theta)$,[17] the economy begins in a pre-industrial era in which the growth rate of output per capita is zero. As the market size of firms becomes sufficiently large, the economy enters into the first industrial era in which firms start to create new products, whereas the growth rate becomes positive and gradually rises over time. Then, as the market size of firms becomes even larger, the economy enters into the second industrial era in which firms also start to improve the quality of products, and the growth rate continues to increase. Eventually, the economy converges to the balanced growth path as the firm size and the growth rate converge to the steady state. Figure 1 plots the HP-filter trend of the per capita GDP growth rate in the US from 1801 to 2016 and shows that it is largely consistent with the pattern described above.[18] Specifically, the growth rate in the US was very low in the early 19th century, and then, it gradually increased (except for the wartime periods) until reaching around 2% before the end of the 20th century.[19]

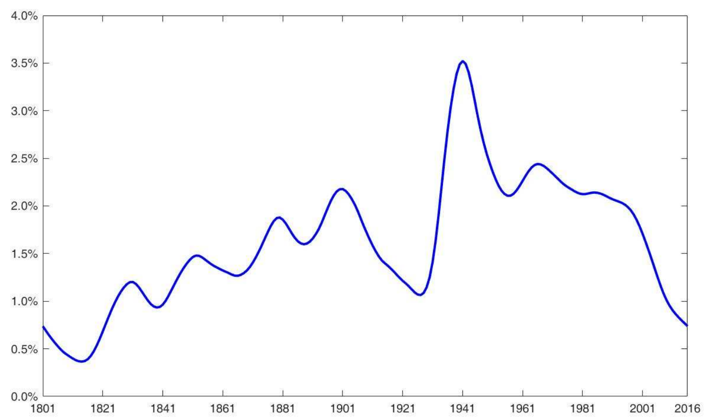

Figure 1: Economic growth in the US

In what follows, we show that a stronger preference for status seeking gives rise to an earlier takeoff of the economy (i.e., from the pre-industrial era to the first industrial era).

3.1 The pre-industrial era

In the pre-industrial era, the firm size x_t is too small for innovation to be viable. Therefore, the growth rate of output per capita is

$$g_t = \sigma n_t + z_t = 0 \tag{22}$$

because $n_t = z_t = 0$. In the pre-industrial era, the economy is in an equilibrium with zero growth because the firm size x_t is not large enough to provide sufficient incentives for

[17] This condition implies $\Pi_0 > 0$.

[18] We use a smoothing parameter of 1000 to extract a smoother trend from the annual data.

[19] The growth rate has been falling since the beginning of the 21st century, partly due to the financial crises, such as the dot-com bubble and the Great Recession.

innovation. However, the state variable $x_t = s\theta^{2/(1-\theta)} L_t / N_0^{1-\sigma}$ increases according to

$$\frac{\dot{x}_t}{x_t} = \lambda, \tag{23}$$

and the firm size x_t eventually becomes sufficiently large to trigger the transition to growth.

3.2 The first industrial era

Variety-expanding innovation becomes viable when the firm size x_t reaches the threshold:

$$x_N \equiv \frac{\phi}{(1-\theta)/\theta - \delta(\rho - \lambda)/(1+\kappa)} > x_0, \tag{24}$$

which is decreasing in the status-seeking parameter κ. Intuitively, a stronger status-seeking preference reduces the equilibrium interest rate, which in turn increases the value of monopolistic firms and provides more incentives for the entry of firms; therefore, the market size that is required for triggering entry becomes smaller.

Lemma 2 shows that the c_t/y_t ratio jumps to a steady-state value when the economy enters the first industrial era. This stationary property implies that c_t and y_t grow at the same rate; i.e., $\dot{c}_t/c_t = \dot{y}_t/y_t$.

Lemma 2 *Whenever $n_t > 0$, the c_t/y_t ratio jumps to the steady state.*

Proof. See Appendix A. ■

Given Lemma 2, we can use (16) and (20) to derive the variety growth rate as[20]

$$n_t = \frac{1}{\delta}\left(\frac{1-\theta}{\theta} - \frac{\phi}{x_t}\right) - \frac{\rho - \lambda}{1+\kappa} > 0, \tag{25}$$

which is positive given $x_t > x_N$. Substituting (25) into $\dot{x}_t/x_t = \lambda - (1-\sigma)n_t$ yields

$$\dot{x}_t = \frac{1-\sigma}{\delta}\left\{\phi - \left[\frac{1-\theta}{\theta} - \delta\left(\frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}\right)\right] x_t\right\} > 0. \tag{26}$$

Finally, the equilibrium growth rate of output per capita is

$$g_t = \sigma n_t = \frac{\sigma}{\delta}\left(\frac{1-\theta}{\theta} - \frac{\phi}{x_t}\right) - \frac{\sigma(\rho - \lambda)}{1+\kappa} > 0, \tag{27}$$

which is increasing in the status-seeking parameter κ (for a given firm size x_t). Intuitively, a stronger status-seeking preference reduces the equilibrium interest rate and provides more incentives for the entry of firms. In summary, economic growth is driven by variety-expanding innovation in the first industrial era and gradually rises as the firm size x_t increases.

[20] Here we also use $z_t = 0$, $r_t^e = r_t = \rho + g_t - \kappa c_t/a_t = \rho + \sigma n_t - \kappa c_t/a_t$ and $\dot{x}_t/x_t = \lambda - (1-\sigma)n_t$.

3.3 The second industrial era

When the firm size x_t reaches the second threshold x_Z (to be derived below), quality-improving innovation also becomes viable. In this case, the equilibrium growth rate of output per capita is given by

$$g_t = r_t - \rho + \frac{\kappa}{1+\kappa}(\rho - \lambda) = \alpha\left(\frac{1-\theta}{\theta}x_t - \phi\right) - \rho + \frac{\kappa}{1+\kappa}(\rho-\lambda) > 0, \tag{28}$$

which uses $r_t = r_t^q$ in (13) and is increasing in the status-seeking parameter κ (for a given firm size x_t). Intuitively, a stronger status-seeking preference reduces the equilibrium interest rate and provides more incentives for in-house R&D. The equilibrium growth rate g_t in (28) continues to rise gradually as the firm size x_t increases.

In the second industrial era, economic growth is driven by both quality-improving innovation and variety-expanding innovation. Then, (18) and (28) imply that the quality growth rate z_t is given by

$$z_t = g_t - \sigma n_t = \alpha\left(\frac{1-\theta}{\theta}x_t - \phi\right) - \rho + \frac{\kappa}{1+\kappa}(\rho-\lambda) - \sigma n_t > 0, \tag{29}$$

where the variety growth rate n_t can be derived from (16) and (20) as[21]

$$n_t = \frac{1}{\delta}\left(\frac{1-\theta}{\theta} - \frac{\phi + z_t}{x_t}\right) - \frac{\rho-\lambda}{1+\kappa} > 0. \tag{30}$$

We can use (29) and (30) to solve for the variety growth rate n_t and substitute it into $\dot{x}_t/x_t = \lambda - (1-\sigma)n_t$ to derive the linearized dynamics of x_t as

$$\dot{x}_t = \frac{1-\sigma}{\delta}\left\{(1-\alpha)\phi - \left(\frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}\right) - \left[\frac{(1-\alpha)(1-\theta)}{\theta} - \delta\left(\frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}\right)\right]x_t\right\} \geq 0, \tag{31}$$

which uses the approximation $\sigma/x_t \cong 0$ as in Peretto (2015). We can also use (29) and (30) to solve for the quality growth rate z_t as a function of x_t. The following threshold for $x_t > x_Z$ ensures $z_t > 0$:

$$x_Z \equiv \underset{x}{\arg\operatorname{solve}}\left\{\left(\frac{1-\theta}{\theta}x - \phi\right)\left(\alpha - \frac{\sigma}{\delta x}\right) = \frac{(1-\sigma)(\rho-\lambda)}{1+\kappa} + \lambda\right\}. \tag{32}$$

The following parameter restriction ensures that $x_Z > x_N$:[22]

$$\alpha < \frac{1}{\phi}\left(\frac{1-\theta}{\delta\theta} - \frac{\rho-\lambda}{1+\kappa}\right)\left[1 + \left(\frac{1+\kappa}{\rho-\lambda}\right)^2 \frac{\lambda(1-\theta)}{\delta\theta}\right]. \tag{33}$$

[21] Here we also use $r_t^e = r_t = \rho + g_t - \kappa c_t/a_t = \rho + \sigma n_t + z_t - \kappa c_t/a_t$ and $\dot{x}_t/x_t = \lambda - (1-\sigma)n_t$.

[22] Derivations are available upon request.

3.4 Balanced growth path

In the long run, the firm size x_t converges to the steady state x^* given by

$$x^*(\underset{-}{\kappa}) = \frac{(1-\alpha)\phi - \left(\frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}\right)}{(1-\alpha)(1-\theta)/\theta - \delta\left(\frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}\right)} > 0, \tag{34}$$

which is decreasing in the status-seeking parameter κ given (21) due to a higher rate of entry of firms such that the size of each firm eventually becomes smaller. The steady-state equilibrium growth rate is then

$$g^* = \alpha\left[\frac{1-\theta}{\theta}x^*(\underset{-}{\kappa}) - \phi\right] - \rho + \frac{\kappa}{1+\kappa}(\rho-\lambda) > 0, \tag{35}$$

which consists of both positive and negative effects from the status-seeking parameter κ. On the one hand, the status-seeking preference mitigates the preference for discounting and reduces the equilibrium interest rate, which stimulates quality-improving R&D. On the other hand, it also stimulates the entry of firms and decreases the equilibrium firm size, which reduces economic growth. As we will show, the negative effect dominates the positive effect rendering an overall negative effect of κ on the steady-state equilibrium growth rate.

3.5 Dynamics from stagnation to growth

Figure 2 summarizes the dynamics of the equilibrium growth rate from stagnation to growth as follows.[23] In the pre-industrial era, the growth rate of output per capita is zero. When the economy enters the first industrial era with variety-expanding innovation, the growth rate of output per capita becomes positive. After that, the growth rate rises further as the economy enters the second industrial era with both quality-improving innovation and variety-expanding innovation. Eventually, the economy converges to the balanced growth path with a steady-state equilibrium growth rate.

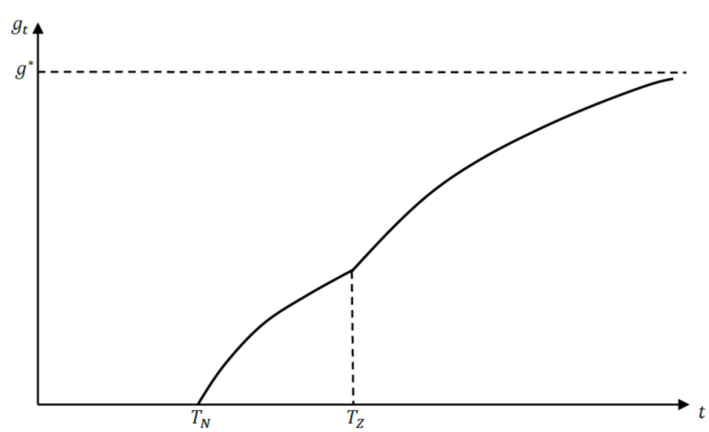

Figure 2: Dynamics of the growth rate

[23] In Figure 2, T_N (T_Z) is the time when variety-expanding (quality-improving) innovation is activated.

Figure 3 shows that a stronger preference κ for status seeking leads to an earlier takeoff of the economy because x_N in (24) is decreasing in the status-seeking parameter κ, which reduces the equilibrium interest rate and increases the value of monopolistic firms. For a given x_t, a stronger preference κ for status seeking also increases the equilibrium growth rate by reducing the interest rate and providing more incentives for the entry of firms and quality-improving R&D; see (27) and (28). This positive effect of status-seeking preference on economic growth is consistent with Pan *et al.* (2018) and Hof and Prettner (2019). However, we also find that the steady-state equilibrium firm size is decreasing in κ due to the increased entry of firms. Overall, the effect of status-seeking preference κ on the steady-state equilibrium growth rate is negative as shown in Figure 3. We summarize all these results in Proposition 1.

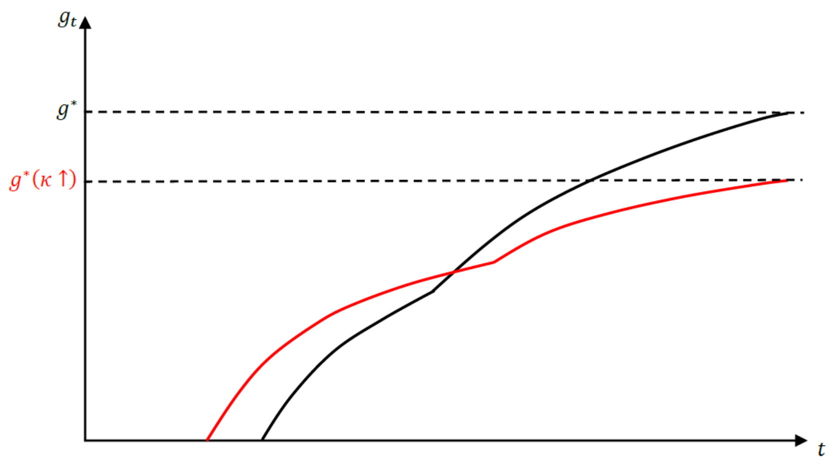

Figure 3: Status seeking and economic growth

Proposition 1 *A stronger preference for status seeking leads to an earlier takeoff and a higher rate of economic growth (for a given firm size) in industrial eras; however, it also reduces the steady-state firm size and the steady-state equilibrium growth rate.*

Proof. See Appendix A. ■

3.6 Empirical analysis

In this section, we follow Pan *et al.* (2018) to construct a country-level proxy for status preference based on the World Values Survey (WVS). The WVS provides cross-country information on people's attitudes, beliefs and values across a range of topics. It covers a time span of 30 years with five waves, corresponding to the years 1981-1984, 1989-1993, 1994-1998, 1999-2004 and 2005-2009, respectively. Respondents in this survey were asked questions that relate to the society's culture and individual preferences. Here we follow Pan *et al.* (2018) to use the fraction of respondents who select *thrift saving money and things* as an important quality as a proxy for the importance of status preference.[24]

Our theoretical model predicts that a stronger preference for status seeking generates a positive effect on economic growth in the short run and a negative effect on economic growth in the long run. Unfortunately, we do not have enough data to estimate the impulse response function of economic growth in response to a shock to the status preference. Instead, we explore an auxiliary implication of our theoretical model. Specifically, a stronger preference for status seeking generates a positive effect on economic growth at an early stage of economic development. As the country develops overtime, its effect on economic growth eventually becomes negative as Figure 3 shows.

Therefore, we use the following empirical specification to examine our theory:

$$g_{it} = \gamma_1 \kappa_{it} + \gamma_2 \kappa_{it} \times y_{it} + \gamma_3 y_{it} + \Gamma \chi_{it} + \varphi_t + \epsilon_{it},$$

where g_{it} denotes the average annual growth rate of real GDP (or the average annual growth rate of real GDP per capita) in country i at wave t, κ_{it} denotes the average value of status preference in country i at wave t, and y_{it} is the log value of per capita GDP in country i in the initial year of wave t. χ_{it} is a vector of the average value of the following control variables in each wave: the log value of population, the degree of openness,[25] the inflation rate, and the government consumption share of GDP.[26] φ_t is the wave fixed effect, and ϵ_{it} is the error term. After merging data from the WVS and the Penn World Table, we have a sample of 165 observations covering 81 countries;[27] see Table B1 in Appendix B for the summary statistics of the variables. Our theory predicts that $\gamma_1 > 0$ and $\gamma_2 < 0$. In other words, a stronger preference for status seeking generates a positive (negative) effect on economic growth at an early (later) stage of economic development.

Table 1 reports the baseline regression results. The dependent variable in columns (1)-(2) is the average annual growth rate of real GDP, whereas the dependent variable in columns (3)-(4) is the average annual growth rate of real GDP per capita. Odd columns present the baseline results without additional controls. In even columns, we further control for additional explanatory variables. As expected, in all the columns, the coefficient on status preference is significantly positive, whereas the interaction term between status preference and the income level is significantly negative. Specifically, in column (4), the estimated coefficient on status preference is 0.270, which is statistically significant at the 5% level, whereas the estimated coefficient on the interaction term is -0.031, which is also statistically significant at the 5% level. These estimates imply that increasing the status preference value by 0.1 is associated with an increase in the growth rate by 0.826% ((0.270-0.031*6.045)*0.1) for a country with minimal GDP per capita and a decrease in the growth rate by 0.650% ((0.270-0.031*10.806)*0.1) for a country with maximal GDP per capita.[28] Therefore, the effects of the status-seeking culture on economic growth are different for countries at different levels of economic development.

[24] Similarly, Dorius and Baker (2012) also choose *thrift saving money and things* as one of the proxies for capitalist value. The other proxy that they use is *hard work*.

[25] The degree of openness is measured by the average ratio of export plus import to GDP.

[26] Data source: Penn World Table 7.1.

[27] We cannot control for country fixed effects as some countries only have one wave of data in the WVS.

[28] Both of these effects are statistically significant at the 10% level.

Table 1: Effects of status preference on economic growth				
	GDP growth		per capita GDP growth	
	(1)	(2)	(3)	(4)
κ_{it}	0.281**	0.254**	0.282**	0.270**
	(0.122)	(0.123)	(0.119)	(0.119)
$\kappa_{it} \times y_{it}$	-0.034**	-0.033**	-0.032**	-0.031**
	(0.014)	(0.014)	(0.014)	(0.014)
y_{it}	0.002	0.003	0.005	0.007
	(0.005)	(0.005)	(0.005)	(0.005)
Control variables	No	Yes	No	Yes
Observations	165	165	165	165
R-squared	0.201	0.233	0.112	0.143

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors are in parentheses. The dependent variable in columns (1)-(2) is the average annual growth rate of real GDP. The dependent variable in columns (3)-(4) is the average annual growth rate of real GDP per capita. Compared with odd columns, even columns add control variables including openness, the inflation rate, (log) population, and the government consumption share.

3.7 Quantitative analysis

In this section, we calibrate the model to US data to perform a quantitative analysis. The model features the following parameters: $\{\rho, \sigma, \lambda, \theta, \delta, \phi, \alpha, \kappa\}$.[29] We set the discount rate ρ to a conventional value of 0.05. We follow Iacopetta *et al.* (2019) to set the social return of variety σ to 0.25.[30] The long-run population growth rate in the US is 1.8%.[31] Furthermore, we calibrate $\{\theta, \delta, \phi\}$ by matching the following moments of the US economy: 60% for the labor income share of GDP, 64% for the consumption share of GDP, and 2% for the long-run growth rate of output per capita. Equation (35) shows that the strength of the negative effect of κ on g^* is increasing in α, which is the inverse of the degree of technology spillovers. Given that the strength of the negative effect (relative to the positive effect) of status preference κ on long-run growth depends on α, we consider a range of values for $\alpha \in [0.05, 0.50]$.[32] Finally, we consider $\kappa = 0$ as our benchmark and simulate the steady-state growth rate as κ increases.

Table 2: Calibrated parameter values						
α	ρ	σ	λ	θ	δ	ϕ
0.050	0.050	0.250	0.018	0.400	7.813	3.352
0.200	0.050	0.250	0.018	0.400	7.813	0.802
0.350	0.050	0.250	0.018	0.400	7.813	0.438
0.500	0.050	0.250	0.018	0.400	7.813	0.292

[29] It is useful to note that ε does not affect the equilibrium conditions.
[30] We also consider $\sigma = 0.40$ as a robustness check and report the results in Appendix C.
[31] Data source: Maddison Project Database.
[32] According to Iacopetta *et al.* (2019), the empirically relevant range for α is from 0.17 to 0.33.

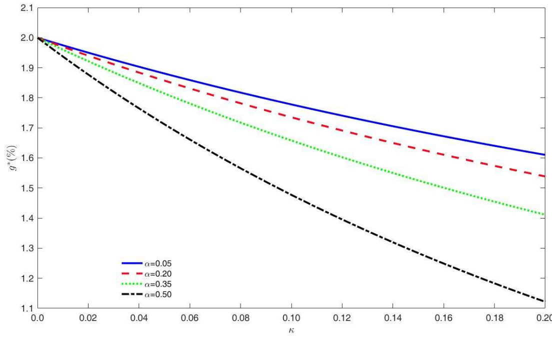

Figure 4: Status seeking and long-run growth

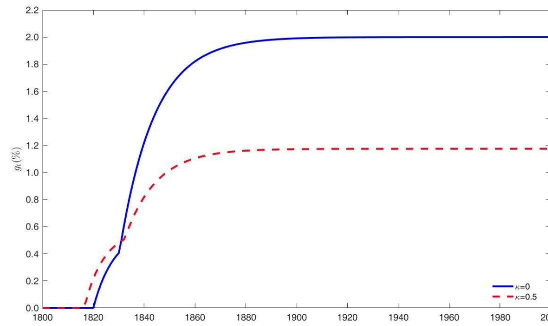

Figure 5: Simulated path of the growth rate

Figure 4 simulates the effects of the status-seeking preference κ on the steady-state equilibrium growth rate g^* under different values of α. As expected, for all values of α, the steady-state growth rate g^* is decreasing in κ. We see that as the value of α increases (i.e., the degree of technology spillovers $1-\alpha$ decreases), the negative effect of κ becomes stronger. We stop at the value of $\alpha = 0.50$ because a larger value of α corresponds to a smaller calibrated value of ϕ in Table 2, and the inequality in (21) requires a sufficiently large ϕ. Iacopetta *et al.* (2019) find that the empirically relevant range of values for α is from 0.17 to 0.33. Therefore, we consider the set of parameter values that correspond to $\alpha = 0.2$. Figure 5 simulates and compares the dynamic paths of the equilibrium growth rate from pre-industrial stagnation to modern economic growth for the following values of $\kappa \in \{0, 0.5\}$. The larger value of κ reduces the long-run growth rate from 2% to 1.2% but leads to an earlier takeoff by about 4 years. Finally, Figure 6 simulates the effects of the status-seeking preference κ on how much earlier the takeoff would occur and shows that the number of years is increasing in κ but independent of α.

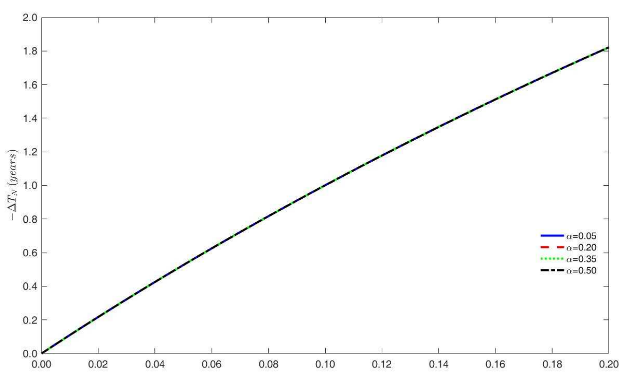

Figure 6: Status seeking and takeoff

4 Conclusion

In this study, we have introduced a status-seeking preference into the Schumpeterian growth model to explore how this cultural preference affects the endogenous transition of an economy from pre-industrial stagnation to modern economic growth. We find that a stronger preference for status seeking leads to an earlier takeoff by increasing the entry of firms with new differentiated products. This theoretical finding formalizes the hypothesis on status-seeking luxury and capitalism proposed by Sombart (1967).

Furthermore, a stronger preference for status seeking causes a higher rate of economic growth in the short run by increasing the entry of firms and quality-improving R&D. However, due to the increased entry of firms, the market size of each firm eventually becomes smaller and causes also a negative effect on economic growth. The overall effect of a stronger status-seeking preference on long-run economic growth is negative. These contrasting effects on economic growth at different time horizons highlight the importance of endogenous firm size (which removes the scale effect) for the analysis of status seeking and economic growth.

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Appendix A: Proofs

Proof of Lemma 1. We use the Hamiltonian to solve the firm's dynamic optimization. The current-value Hamiltonian of firm i is given by

$$H_t(i) = \Pi_t(i) - I_t(i) + \zeta_t(i)\dot{Z}_t(i), \tag{A1}$$

where $\zeta_t(i)$ is the costate variable on $\dot{Z}_t(i)$. We substitute (6)-(8) into (A1) and derive

$$\frac{\partial H_t(i)}{\partial P_t(i)} = \frac{\partial \Pi_t(i)}{\partial P_t(i)} = 0, \tag{A2}$$

$$\frac{\partial H_t(i)}{\partial I_t(i)} = 0 \Rightarrow \zeta_t(i) = 1, \tag{A3}$$

$$\frac{\partial H_t(i)}{\partial Z_t(i)} = \alpha\left\{[P_t(i) - 1]\left[\frac{\theta}{P_t(i)}\right]^{1/(1-\theta)}\frac{sL_t}{N^{1-\sigma}} - \phi\right\}\frac{Z_t^{1-\alpha}}{Z_t^{1-\alpha}(i)} = r_t\zeta_t(i) - \dot{\zeta}_t(i), \tag{A4}$$

where $Z_t(i)$ is a state variable. It can be shown that $\partial\Pi_t(i)/\partial P_t(i) = 0$ yields $P_t(i) = 1/\theta$. Substituting (A3), (10) and (12) into (A4) and imposing symmetry yield (13). ■

Proof of Lemma 2. When the economy enters into the first industrial era, variety-expanding innovation is activated. Then, we can apply the entry condition $V_t = \delta X_t$ to

$$a_t = \frac{V_t N_t}{(1-s)L_t} = \frac{\delta X_t N_t}{(1-s)L_t} = \frac{\delta\theta^2}{1-s}y_t, \tag{A5}$$

which also uses $\theta Y_t = P_t X_t N_t = X_t N_t/\theta$. Differentiating (A5) with respect to t yields

$$\frac{\delta\theta^2}{1-s}\dot{y}_t = \dot{a}_t = (r_t - \lambda)\frac{\delta\theta^2}{1-s}y_t - c_t. \tag{A6}$$

Then, we can use (3) and (A5) to rearrange (A6) as

$$\frac{\dot{c}_t}{c_t} - \frac{\dot{y}_t}{y_t} = (1+\kappa)\frac{1-s}{\delta\theta^2}\frac{c_t}{y_t} - \rho + \lambda, \tag{A7}$$

which shows that the c_t/y_t ratio jumps to its steady-state value when the economy enters the first industrial era. ■

Proof of Proposition 1. First, use (24) to show that x_N is decreasing in κ. Second, use (27) and (28) to show that g_t is increasing in κ for a given x_t. Third, use (34) to show that x^* is decreasing in κ. Finally, one can use (35) to show that[33]

$$sgn\left(\frac{\partial g^*}{\partial\kappa}\right) = sgn\left\{\left[(1-\alpha)\frac{1-\theta}{\theta} - \delta\Omega\right]^2 - \alpha(1-\alpha)\left(\delta\phi - \frac{1-\theta}{\theta}\right)\frac{1-\theta}{\theta}\right\}, \tag{A8}$$

where $\Omega \equiv \frac{\rho-\lambda}{1+\kappa} + \frac{\lambda}{1-\sigma}$. Finally, the inequality in (21) implies that

$$\left[(1-\alpha)\frac{1-\theta}{\theta} - \delta\Omega\right]^2 < (1-\alpha)\frac{1-\theta}{\theta}\left[(1-\alpha)\frac{1-\theta}{\theta} - \delta\Omega\right] < \alpha(1-\alpha)\left(\delta\phi - \frac{1-\theta}{\theta}\right)\frac{1-\theta}{\theta},$$

which in turn implies $\partial g^*/\partial\kappa < 0$ from (A8). ■

[33] Derivations are available upon request.

Appendix B: Data

In this appendix, we present the summary statistics of the data for the empirical analysis.

Table B1: Summary statistics

variable	obs	mean	std. dev.	min	max
Growth of real GDP	165	0.039	0.032	-0.088	0.171
Growth of real GDP per capita	165	0.027	0.030	-0.081	0.138
Status preference	165	0.350	0.146	0	0.673
Log real GDP per capita	165	8.884	1.114	6.045	10.806
Log population	165	10.170	1.604	6.522	14.086
Openness	165	0.689	0.427	0.143	3.724
Government consumption share	165	0.086	0.041	0.018	0.269
Inflation rate	165	1.530	6.384	0.840	83.034

Appendix C: Robustness check

In this appendix, we present the calibration/simulation results for the case of $\sigma = 0.4$. Here we report the results for $\alpha \in [0.05, 0.45]$ under which the inequality in (21) holds. The following figures show that the results here are qualitatively the same as our benchmark results. Figure C2 reports the result for $\alpha = 0.2$ as before.

Table C1: Calibrated parameter values

α	ρ	σ	λ	θ	δ	ϕ
0.050	0.050	0.400	0.018	0.400	7.813	2.911
0.200	0.050	0.400	0.018	0.400	7.813	0.709
0.350	0.050	0.400	0.018	0.400	7.813	0.395
0.450	0.050	0.400	0.018	0.400	7.813	0.301

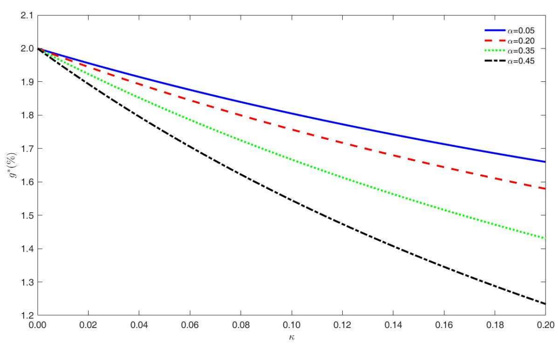

Figure C1: Status seeking and long-run growth

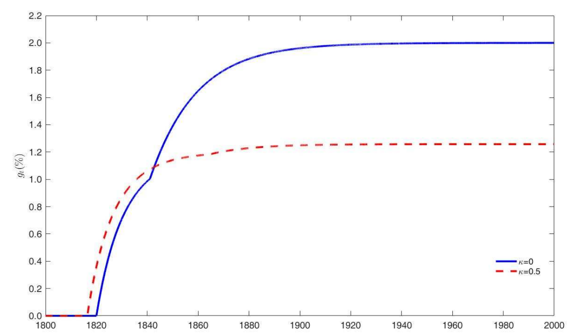

Figure C2: Simulated path of the growth rate

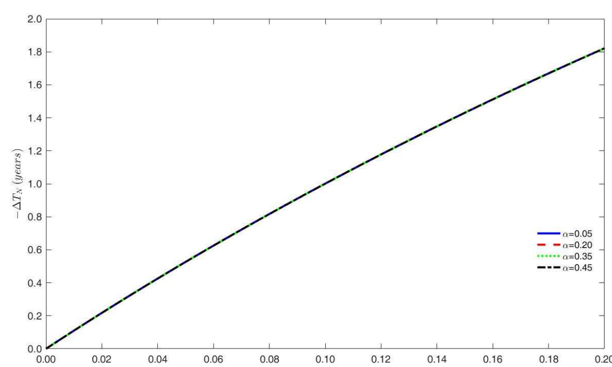

Figure C3: Status seeking and takeoff