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# Social Status, Labor-Market Frictions and Endogenous Growth

***By* HUNG-JU CHEN, DONGPENG LIU and XIANGBO LIU***

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## Abstract

This paper develops an endogenous growth model that incorporates wealth-enhanced preferences for social status and labor-market frictions to investigate the role of social status in determining unemployment and long-run growth. We show that the increase in the desire for social status reduces the unemployment rate, but its effect on long-run growth is unclear. We then calibrate our model to the U.S. economy and find that an increase in the desire for social status lowers the unemployment rate and enhances the economic growth rate in the long run.

JEL Classification: E21, J64, O41.

Keywords: Endogenous Growth, Labor Search, Social Status, Unemployment.

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## 1. Introduction

Standard macroeconomic models usually assume that a consumer's utility is affected by consumption， which is positively related to wealth. However， in the real world， in addition to yielding a higher level of consumption， wealth also influences one's position within society and can directly affect such utility. This type of preferences has been interpreted as reflecting the desire for wealth-induced social status. There is a growing literature exploring the implications of wealth-induced social status on a wide range of issues， such as economic growth， the effects of monetary policy and income inequality. For example， Kurz (1968) and Zou (1994) examine how the presence of the desire for social status affects the long-run growth rate. Gong and Zou (2001) and Chen and Guo (2009) study how monetary policy influences capital accumulation and thus economic growth given that consumers desire for social status. Suen (2014) investigates the implications of this social status concern on wealth and income inequalities.

It has been well known that capital and labor are two important determinants to economic growth. Although there is a broad literature studying economic growth from the perspective of capital accumulation， very few studies have been conducted on the question of how labor-market performance affects economic growth. To simplify the examination， traditional growth models usually assume that there is an inelastic supply of labor and focus their analysis on the role of capital. Although some studies may allow consumers to make decisions between work and leisure， they tend to ignore the role of unemployment when determining economic growth. The fact that there are substantial informational and institutional barriers to labor search， recruiting， and job creation emphasizes the need to consider labor-market frictions when studying economic growth. For instance， Eriksson (1997) introduces labor-market frictions into an Ak-type endogenous growth model to examine how unemployment and the long-run growth rate influence each other. Based on a growth model with quality ladders， Mortensen (2005) examines the possible effects of payroll taxes and employment protection policies on unemployment and growth through innovation. More recently， Chen， Chen and Wang (2011) investigate the effectiveness of human capital policies in an endogenous growth model with labor search and human capital accumulation. While these studies have shown the importance of labor-market frictions in determining the long- run growth， the existing literature that examines how the desire for social status affects the long-run growth has made little attempt to incorporate unemployment in their studies.

Following the recent trend， in this paper， we evaluate the effect of social status in an endogenous growth model where the labor market is no longer frictionless to study how the desire for social status influences the rate of unemployment， the accumulation of capital and long-run growth. To achieve this， we add three modifications to the standard neoclassical growth model. First， we modify consumers' preferences to allow for their status-seeking motive in wealth. Second， to generate endogenous growth， we follow Romer (1986) by considering a production function where there is a positive externality effect of capital. Third， unemployment is generated due to the search and matching process in the labor market (see Diamond， 1982; Mortensen and Pissarides， 1994).

Introducing wealth-induced social status directly into consumers' preferences creates the additional benefit of accumulating capital. An increase in the desire for social status raises the motivation of capital accumulation. As the accumulation of capital increases， the marginal product of labor rises. This induces firms to create more jobs， thereby reducing the unemployment rate and the labor market becomes less tight to workers. A decrease in un- employment is beneficial to economic growth. However， an increase in the desire for social status also causes an increase in the vacancy creation cost， which is harmful for economic growth. With these additional effects， the change in the consumption-capital ratio becomes ambiguous and the effect on long-run growth also becomes ambiguous， whereas in a similar model without labor-market frictions， the change in the consumption-capital ratio is unambiguously negative and the effect on long-run growth is unambiguously positive.

To gauge the growth effect of the desire for social status， we calibrate parameters to match the U.S. economy and then simulate the model to determine the magnitude of these effects on growth. Under the benchmark parameterization， we find that an increase in the desire for social status is beneficial to the performance of the labor market and the long-run growth rate. Furthermore， to investigate the influence of the desire for social status，we consider a 5% increase in the rate of time preference， total factor productivity (TFP)， job separation rate， bargaining strength of workers or the elasticity of vacancy in job matches. We find that an increase in the TFP measure or the elasticity of vacancy in job matches increases the consumption-capital ratio， reduces the unemployment rate and raises the long- run growth rate. Our results that increasing the TFP measure can improve both labor market performance and growth rate are different from Eriksson (1997)， who argues that there is a trade-off between unemployment and growth. Therefore， the consideration of consumer's desire for social status would change the interplay between unemployment and capital accumulation. This will in turn affect the long-run growth rate. Increasing the rate of time preference and the bargaining strength of workers will generate similar effects on economic performance. Both the consumption-capital ratio and the unemployment rate will increase， and there will be an overall increase in the long-run growth rate. An increase in the job separation rate reduces the consumption-capital ratio and raises the unemployment rate， resulting in an overall decrease in the growth rate.

The current study complements the previous studies by Kurz (1968) and Zou (1994) in two different ways. First， our paper explicitly considers the importance of unemployment and identifies new channels through which the desire for social status affects long-run growth. Second， while the previous studies examine qualitatively the effects of the desire for social status, this paper assesses those effects quantitatively utilizing some realistic parameter values.

The remainder of this paper is organized as follows. Section 2 presents our model， characterizes the balanced-growth equilibrium and provides the main qualitative results. Section 3 describes the calibration procedure and presents the quantitative results for our model. Section 4 concludes.

## 2. The Model

The size of each household is normalized to one. Within each household, the number of members who are employed at time t is denoted by l(t). Hence, 1 - l(t) is the number of members who are unemployed and search for employment opportunities.

### 2.1 Household's Problem

In each period, each household derives utility from consumption and capital stock. The preferences of a household can be represented by

$$\int_0^{\infty} e^{-\rho t}[\log c(t) + s \log k(t)]dt \tag{1}$$

where c(t) is the household's consumption at time t, k(t) denotes the stock of physical capital owned by the household at time t, $\rho > 0$ is the rate of time preference, and $s > 0$ measures the desire for wealth-induced social status.

In each period, each household member faces uncertainty in his employment status and hence his labor income. If an agent is currently unemployed, then he faces a certain probability of finding a job. The rate at which unemployed workers find jobs is denoted by $\gamma(t)$. However, if an agent is currently employed, then he faces a certain probability of becoming unemployed. The rate of job separation is assumed to be an exogenous constant $\theta > 0$. At the household level, the number of working hours evolves according to

$$\dot{l}(t) = \gamma(t)[1 - l(t)] - \theta l(t) \tag{2}$$

Although each individual faces substantial risk in his labor income, we assume that members within a household can provide each other with complete insurance against this risk. Under this assumption, the household budget constraint in each period $t \geq 0$ is then given by

$$\dot{k}(t) + c(t) = w(t)l(t) + r(t)k(t) + \pi(t) \tag{3}$$

where $\omega(t)$ is the market wage rate for workers, r(t) is the effective rate of return from investment, and $\pi$ (t) is the dividend income distributed by the firms.

A household's problem is to choose a set of time paths $\{c(t), k(t)|t \geq 0\}$ to maximize the utility function in equation (1) subject to the budget constraint in equation (3) and the initial condition $k(0) > 0$. Let $\psi(t)$ be the current-value shadow price of capital. The first order conditions with respect to {c(t), k(t)} are given by

$$\frac{1}{c(t)} - \psi(t) = 0. \tag{4}$$

$$\frac{s}{k(t)} + [r(t) - \rho]\psi(t) = -\dot{\psi}(t) \tag{5}$$

The transversality condition for this problem is

$$\lim_{t \to \infty} e^{-\rho t}\psi(t)k(t) = 0$$

Combining equations (4) and (5) yields the consumption Euler equation

$$\frac{\dot{c}(t)}{c(t)} = s\frac{c(t)}{k(t)} + r(t) - \rho \tag{6}$$

This condition describes the evolution of individual consumption.

## 2.2 Production

There is a large number of identical .firms in this economy. To achieve endogenous growth, we will follow Romer (1986) to assume that capital has a positive externality effect on aggregate technology. Therefore, aggregate output y(t) is produced according to the following Cobb-Douglas production technology

$$y(t) = a[k(t)]^{\varepsilon}[l(t)\bar{k}(t)]^{1-\varepsilon}$$

where k(t) denotes each individual firm's capital input, l(t) denotes her labor input, $\bar{k}(t)$ denotes the aggregate holding of capital in the economy, $a \in (0,1)$ represents TFP measure and $\varepsilon \in (0,1)$ is the share of capital income in total output.

To hire workers, the representative firm needs to post some job vacancies in every period. Each vacancy costs q(t) units of output. To ensure the existence of balanced growth path, we assume that the vacancy posting cost q(t) is a fraction $\tilde{q} \in (0,1)$ of wage w(t).[1] The rate at which a posted vacancy is matched to an unemployed worker at time t is given by $\mu(t)$. Let v(t) be the number of job vacancies posted at time t. The firm's employment then evolves according to

$$\dot{l}(t) = \mu(t)v(t) - \theta l(t) \tag{7}$$

where $\theta l(t)$ is the number of job separations

Taking the factor prices as given, the representative firm chooses a set of time paths $\{k(t), l(t), v(t)|t \geq 0\}$ to maximize the present value of its future profit stream. Formally, this is given by

$$\max_{\{k(t),l(t),v(t)|t\geq 0\}} \int_0^{\infty} e^{-\int_0^t r(\tau)d\tau}\pi(t)dt$$

subject to the law of motion in equation (7), and

$$\pi(t) = y(t) - [r(t)+\delta]k(t) - w(t)l(t) - q(t)v(t) \tag{8}$$

The parameter $\delta > 0$ is the depreciation rate of capital. Let $\chi(t)$ be the present value shadow price of l(t). The first order conditions with respect to $\{k(t), v(t), l(t)\}$ are given by

$$a\varepsilon[k(t)]^{\varepsilon-1}[l(t)\bar{k}(t)]^{1-\varepsilon} - [r(t)+\delta] = 0 \tag{9}$$

$$\chi(t)\mu(t) - q(t) = 0 \tag{10}$$

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1 Hall and Milgrom (2008) demonstrate that the cost of maintaining a vacancy for 1 day is 0.43 day of pay. Following Pissarides (1990, Chapter 2), we assume that hiring is a labor intensive activity and thus the associated cost proportionally depends on wage rate. The same assumption has also been adopted in many related studies (among others, see Postel-Vinay (1998) and Eriksson (1997)).

$$a(1-\varepsilon)[k(t)]^{\varepsilon}[l(t)]^{-\varepsilon}[\bar{k}(t)]^{1-\varepsilon} - w(t) - [r(t)+\theta]\chi(t) = -\dot{\chi}(t) \tag{11}$$

Equation (9) is the usual condition that states that the rate of return from investment is given by the marginal product of capital net of depreciation rate. Equation (10) governs the firm's optimal vacancy decision. In any optimal solution, the marginal cost of vacancy q(t) must be equated to its marginal benefit $\chi(t)\,\mu(t)$. Equation (11) describes how the shadow price of employment $\chi(t)$ would evolve over time. Combining equations (10) and (11) yields

$$\frac{\mu(t)}{q(t)}\{a(1-\varepsilon)[k(t)]^{\varepsilon}[l(t)]^{-\varepsilon}[\bar{k}(t)]^{1-\varepsilon} - w(t)\} - \theta = r(t) + \frac{\dot{\mu}(t)}{\mu(t)} - \frac{\dot{q}(t)}{q(t)} \tag{12}$$

which is the law of motion for $\mu(t)$.

**2.3 Matching and Wage Determination**

In every period, vacant jobs and unemployed workers are randomly matched in a pair-wise fashion. The matching process is governed by a matching function that combines the total number of job vacancies v(t) and the number of unemployed workers $1 - l(t)$ to determine the number of successful job matches m(t). Following common practice, we assume that matching function takes the Cobb-Douglas form

$$m(t) = \phi[v(t)]^{\eta}[1-l(t)]^{1-\eta}$$

The parameter $\eta \in (0,1)$ is the elasticity of vacancy in job matches, and $\phi$ is a positive constant.

Define the tightness of the labor market x(t) as the ratio between vacancies and unemployed, i.e., $x(t) = v(t)/[1-l(t)]$. Given the Cobb-Douglas matching function, the vacancy-matching rate $\mu(t)$, and the job-finding rate $\gamma(t)$, are defined as

$$\mu(t) = \frac{m(t)}{v(t)} = \phi[x(t)]^{\eta-1} \tag{13}$$

$$\gamma(t) = \frac{m(t)}{1-l(t)} = \phi[x(t)]^{\eta} \tag{14}$$

Following the existing literature, we assume that the wage rate w(t) is negotiated after workers and the firm meet. A negotiation between a worker and the firm results in a wage that is a combination between the worker's opportunity income and his marginal product of labor and the marginal value of the saved vacancy cost.[2] Let $\beta \in (0,1)$ represents the bargaining power of workers. The wage rate is then given by

$$w(t) = \beta\{a(1-\varepsilon)[k(t)]^{\varepsilon}[l(t)]^{-\varepsilon}[\bar{k}(t)]^{1-\varepsilon} + q(t)x(t)\}$$

By employing $q(t) = \tilde{q}w(t)$, the wage expression is further derived as

$$w(t) = \frac{\beta a(1-\varepsilon)[k(t)]^{\varepsilon}[l(t)]^{-\varepsilon}[\bar{k}(t)]^{1-\varepsilon}}{1-\beta\tilde{q}x(t)} \tag{15}$$

To obtain a positive wage, we assume that $\beta\tilde{q}x(t) < 1$.

**2.4 Search Equilibrium**

[2] This way of wage determination has also been adopted in other studies (among others, see Eriksson (1997)). Note that the unemployment benefit is regarded as a worker's opportunity income. In this paper, since unemployment benefit is not our focus, we then assume that unemployed workers do not receive any benefits in order to simplify our analysis.

A search equilibrium for this economy consists of a set of allocations for the household $\{c(t), k(t), l(t) | t \geq 0\}$, a set of prices $\{r(t), w(t) | t \geq 0\}$, aggregate inputs $\{k(t), l(t) | t \geq 0\}$, profits and vacancies $\{\pi(t), v(t) | t \geq 0\}$, and matching rates $\{\gamma(t), \mu(t) | t \geq 0\}$ such that

1. Given the prices $\{r(t), w(t) | t \geq 0\}$, the profits $\{\pi(t) | t \geq 0\}$, and the job-finding rate $\{\gamma(t) | t \geq 0\}$, the allocation $\{c(t), k(t), l(t) | t \geq 0\}$ solves the household's problem.
2. Given the prices $\{r(t), w(t) | t \geq 0\}$ and the vacancy-matching rates $\{\mu(t) | t \geq 0\}$, the aggregate inputs $\{k(t), l(t) | t \geq 0\}$ and the vacancies $\{v(t) | t \geq 0\}$ solve the representative firm's problem. For every t $\geq$ 0, the profits $\pi(t)$ is determined by equation (8).
3. For every t $\geq$ 0, the wage rate w(t), is determined by equation (15).
4. For every t $\geq$ 0, the matching rates $\mu(t)$ and $\gamma(t)$ are determined by equations (13) and (14), respectively.

An equilibrium de.ned above can be characterized by a system of three differential equations that governs the dynamic properties of three variables $\{\varphi(t), x(t), l(t)\}$, where $\varphi(t)$ is defined as the ratio between consumption c(t) and capital stock k(t).

To derive the system, we first combine equations (3) and (8) to obtain the resource constraint

$$\begin{aligned} \frac{\dot{k}(t)}{k(t)} + \varphi(t) &= \frac{y(t)}{k(t)} - \delta - \frac{q(t)v(t)}{k(t)} \\ &= a[l(t)]^{1-\varepsilon} - \delta - \frac{\beta\tilde{q}a(1-\varepsilon)[l(t)]^{-\varepsilon}[1-l(t)]x(t)}{1-\beta\tilde{q}x(t)} \end{aligned} \tag{16}$$

Subtracting equation (16) from equation (6) yields

$$\frac{\dot{\varphi}(t)}{\varphi(t)} = (1+s)\varphi(t) - a(1-\varepsilon)[l(t)]^{1-\varepsilon} - \rho + \frac{\beta\tilde{q}a(1-\varepsilon)[l(t)]^{-\varepsilon}[1-l(t)]x(t)}{1-\beta\tilde{q}x(t)} \tag{17}$$

Plugging equation (14) into equation (2) yields

$$\dot{l}(t) = \phi[x(t)]^{\eta}[1-l(t)] - \theta l(t) \tag{18}$$

which governs the law of motion of employment in the equilibrium.

Plugging equations (15) and (13) into equation (12), we have the left-hand side (LHS) of equation (12) as

$$LHS = \phi[x(t)]^{\eta-1}\frac{1-\beta\tilde{q}x(t)-\beta}{\beta\tilde{q}} - \theta \tag{19}$$

Given that q(t) = $\tilde{q}$w(t), we have

$$\begin{aligned} \frac{\dot{q}(t)}{q(t)} &= \frac{\dot{w}(t)}{w(t)} = \frac{[w(t)/k(t)]^{\cdot}}{w(t)/k(t)} + \frac{\dot{k}(t)}{k(t)} \\ &= \frac{\beta\tilde{q}}{1/x(t)-\beta\tilde{q}}\frac{\dot{x}(t)}{x(t)} - \varepsilon\frac{\dot{l}(t)}{l(t)} + a[l(t)]^{1-\varepsilon} \\ &\quad -\varphi(t) - \delta - \frac{\beta\tilde{q}a(1-\varepsilon)[l(t)]^{-\varepsilon}[1-l(t)]x(t)}{1-\beta\tilde{q}x(t)} \end{aligned} \tag{20}$$

Hence, the right-hand side (RHS) of equation (12) is

$$\begin{aligned} RHS &= -a(1-\varepsilon)[l(t)]^{1-\varepsilon} - (1-\eta)\frac{\dot{x}(t)}{x(t)} - \frac{\beta\tilde{q}}{1/x(t)-\beta\tilde{q}}\frac{\dot{x}(t)}{x(t)} \\ &\quad +\varepsilon\frac{\dot{l}(t)}{l(t)} + \varphi(t) + \frac{\beta\tilde{q}a(1-\varepsilon)[l(t)]^{-\varepsilon}[1-l(t)]x(t)}{1-\beta\tilde{q}x(t)}. \end{aligned} \tag{21}$$

Combining equations (19) and (21) yields

$$\frac{\dot{x}(t)}{x(t)} = \frac{1}{[1-\eta+\frac{\beta\tilde{q}}{1/x(t)-\beta\tilde{q}}]}\{\varepsilon\frac{\dot{l}(t)}{l(t)}+\varphi(t)+\frac{\beta\tilde{q}a(1-\varepsilon)[l(t)]^{-\varepsilon}[1-l(t)]x(t)}{1-\beta\tilde{q}x(t)}$$
$$-a(1-\varepsilon)[l(t)]^{1-\varepsilon}+\theta+\phi[x(t)]^{\eta-1}[x(t)-\frac{1-\beta}{\beta\tilde{q}}]\}. \tag{22}$$

The dynamic behavior of the economy is represented by a three-dimensional dynamic system of equations (17), (18) and (22) in φ(t), l(t) and x(t).

**2.5 BGP Equilibrium**

Along the balanced-growth-path (BGP) equilibrium, c(t), y(t) and k(t) grow at a common growth rate (g), while l(t), v(t) and m(t) do not grow. Therefore, the BGP equilibrium can be obtained by setting $\dot{x}(t)$, $\dot{l}(t)$ and $\dot{\varphi}(t)$ to be zero. Let $\bar{x}$, $\bar{l}$ and $\bar{\varphi}$ be the steady-state values of x(t), l(t) and φ(t), respectively. In the steady state, equation (17) becomes

$$\bar{\varphi}=\frac{1}{1+s}[a(1-\varepsilon)\bar{l}^{1-\varepsilon}+\rho-\frac{\beta\tilde{q}a(1-\varepsilon)\bar{l}^{-\varepsilon}(1-\bar{l})\bar{x}}{1-\beta\tilde{q}\bar{x}}] \tag{23}$$

Replacing $\bar{\varphi}$ in equation (22) with equation (23), we obtain

$$\frac{s}{1+s}[a(1-\varepsilon)\bar{l}^{1-\varepsilon}-\frac{\beta\tilde{q}a(1-\varepsilon)\bar{l}^{-\varepsilon}(1-\bar{l})\bar{x}}{1-\beta\tilde{q}\bar{x}}]$$
$$=\phi\bar{x}^{\eta-1}[\bar{x}-\frac{1-\beta}{\beta\tilde{q}}]+\frac{\rho}{1+s}+\theta. \tag{24}$$

In the steady state, equation (18) becomes

$$\phi\bar{x}^{\eta}(1-\bar{l})=\theta\bar{l}. \tag{25}$$

The values of $\bar{x}$ and $\bar{l}$ can be solved by utilizing equations (24) and (25). Once one derives the solutions of $\bar{x}$ and $\bar{l}$, the value of $\bar{\varphi}$ can be derived from equation (23). In the entire paper, we make the following assumption.

**Assumption 1.** $\eta\geq\frac{1}{2}$ and $\frac{(1-\beta)(1-\eta)}{\eta\beta\tilde{q}}\left(\frac{\phi}{\theta^{1-\eta}}\right)^{\frac{1}{\eta}}\geq\frac{sa(1-\varepsilon)^2}{1+s}$

Under assumption 1, we have the following property regarding the existence and uniqueness of the BGP equilibrium.

**Proposition 1** (Existence and Uniqueness) *There exists a unique BGP equilibrium under Assumption 1.*

Proof: From equation (25), we obtain

$$\bar{x}=\bar{x}(\bar{l})=\left[\frac{\theta\bar{l}}{\phi(1-\bar{l})}\right]^{\frac{1}{\eta}} \tag{26}$$

Equation (26) indicates that $\bar{x}$ is an increasing function of $\bar{l}$ because

$$\bar{x}'(\bar{l})=\frac{d\bar{x}}{d\bar{l}}=\frac{\bar{x}}{\eta\bar{l}(1-\bar{l})}>0$$

Substituting equation (26) into equation (24), equation (24) can be written as

$$f(\bar{l})=0 \tag{27}$$

where $f(\bar{l})=\frac{s}{1+s}[a(1-\varepsilon)\bar{l}^{1-\varepsilon}-\frac{\beta\tilde{q}a(1-\varepsilon)\bar{l}^{-\varepsilon}(1-\bar{l})\bar{x}(\bar{l})}{1-\beta\tilde{q}\bar{x}(\bar{l})}]-\phi[\bar{x}(\bar{l})]^{\eta-1}[\bar{x}(\bar{l})-\frac{1-\beta}{\beta\tilde{q}}]-\frac{\rho}{1+s}-\theta$.

Then, we can derive

$$\begin{aligned}
f'(\bar{l}) &= \frac{df}{d\bar{l}} \\
&= \frac{s}{1+s}\left\{a(1-\varepsilon)^2\bar{l}^{-\varepsilon} - \beta\tilde{q}a(1-\varepsilon)\left[\frac{\bar{x}}{1-\beta\tilde{q}\bar{x}}(-\varepsilon\bar{l}^{-1-\varepsilon} - (1-\varepsilon)\bar{l}^{-\varepsilon}) + \frac{\bar{l}^{-\varepsilon}(1-\bar{l})}{(1-\beta\tilde{q}\bar{x})^2}\bar{x}'(\bar{l})\right]\right\} \\
&\quad - \left[\phi\eta\bar{x}^{\eta-1} + (1-\eta)\frac{\phi(1-\beta)}{\beta\tilde{q}}\bar{x}^{\eta-2}\right]\bar{x}'(\bar{l}) \\
&= \frac{s}{1+s}\left\{a(1-\varepsilon)^2\bar{l}^{-\varepsilon} + \frac{\beta\tilde{q}a(1-\varepsilon)\bar{l}^{-1-\varepsilon}\bar{x}}{1-\beta\tilde{q}\bar{x}}\left[\varepsilon + (1-\varepsilon)\bar{l} - \frac{1}{\eta(1-\beta\tilde{q}\bar{x})}\right]\right\} \\
&\quad - \left[\phi\eta\bar{x}^{\eta-1} + (1-\eta)\frac{\phi(1-\beta)}{\beta\tilde{q}}\bar{x}^{\eta-2}\right]\bar{x}'(\bar{l}) \\
&< \frac{s}{1+s}\left\{a(1-\varepsilon)^2\bar{l}^{-\varepsilon} + \frac{\beta\tilde{q}a(1-\varepsilon)\bar{l}^{-1-\varepsilon}\bar{x}}{1-\beta\tilde{q}\bar{x}}\left[1 - \frac{1}{\eta(1-\beta\tilde{q}\bar{x})}\right]\right\} - (1-\eta)\frac{\phi(1-\beta)}{\beta\tilde{q}}\bar{x}^{\eta-2}\bar{x}'(\bar{l}) \\
&< \frac{s}{1+s}a(1-\varepsilon)^2\bar{l}^{-\varepsilon} - (1-\eta)\frac{\phi(1-\beta)}{\eta\beta\tilde{q}}\frac{\bar{x}^{\eta-1}}{\bar{l}(1-\bar{l})} \\
&= \frac{s}{1+s}a(1-\varepsilon)^2\bar{l}^{-\varepsilon} - \frac{(1-\beta)(1-\eta)}{\eta\beta\tilde{q}}\left[\frac{\phi(1-\bar{l})^{1-2\eta}}{\theta^{1-\eta}\bar{l}}\right]^{\frac{1}{\eta}} \\
&= \bar{l}^{-\frac{1}{\eta}}\left\{\frac{s}{1+s}a(1-\varepsilon)^2\bar{l}^{\frac{1}{\eta}-\varepsilon} - \frac{(1-\beta)(1-\eta)}{\eta\beta\tilde{q}}\left[\frac{\phi}{\theta^{1-\eta}(1-\bar{l})^{2\eta-1}}\right]^{\frac{1}{\eta}}\right\}.
\end{aligned}$$

Because $0 \le \bar{l} \le 1$ and $\frac{1}{\eta} - \varepsilon > 0$, if $\eta \ge \frac{1}{2}$, we obtain

$$f'(\bar{l}) < \bar{l}^{-\frac{1}{\eta}}\left[\frac{sa(1-\varepsilon)^2}{1+s} - \frac{(1-\beta)(1-\eta)}{\eta\beta\tilde{q}}\left(\frac{\phi}{\theta^{1-\eta}}\right)^{\frac{1}{\eta}}\right].$$

Then, $f'(\bar{l}) < 0$ if $\frac{(1-\beta)(1-\eta)}{\eta\beta\tilde{q}}\left(\frac{\phi}{\theta^{1-\eta}}\right)^{\frac{1}{\eta}} \ge \frac{sa(1-\varepsilon)^2}{1+s}$.

Furthermore, $\lim_{\bar{l}\to 0} f(\bar{l}) = \infty$ and $\lim_{\bar{l}\to \bar{l}_{\max}} f(\bar{l}) = -\infty$, where $\bar{l}_{\max}$ is $\bar{l}$ satisfying $1-\beta\tilde{q}\bar{x}(\bar{l}) = 0$. Therefore, there exists a unique solution of $\bar{l}$ for equation (27) if $\eta \ge \frac{1}{2}$ and $\frac{(1-\beta)(1-\eta)}{\eta\beta\tilde{q}}\left(\frac{\phi}{\theta^{1-\eta}}\right)^{\frac{1}{\eta}} \ge \frac{sa(1-\varepsilon)^2}{1+s}$. Once one derives the solution $\bar{l}$, the values of $\bar{x}$ and $\bar{\varphi}$ can be derived from equations (26) and (23), respectively. Q.E.D.

Employing equation (16), the growth rate of k(t) along the BGP equilibrium is

$$g = -\bar{\varphi} + a\bar{l}^{1-\varepsilon} - \delta - \frac{\beta\tilde{q}a(1-\varepsilon)\bar{l}^{-\varepsilon}(1-\bar{l})\bar{x}}{1-\beta\tilde{q}\bar{x}} \tag{28}$$

Equation (28) indicates that the long-run growth rate is affected by the rate of employment, the vacancy creation cost and the consumption-capital ratio.

We are now ready to study the impact of social status on the long-run economic performance.

**Proposition 2** *If Assumption 1 holds, then an increase in s will raise both $\bar{l}$ and $\bar{x}$.*

Proof: Totally differentiating equation (27) with respect to $\bar{l}$ and s yields

$$\frac{d\bar{l}}{ds} = -\frac{a(1-\varepsilon)[\bar{l}^{1-\varepsilon} - \frac{\beta\tilde{q}\bar{l}^{-\varepsilon}(1-\bar{l})\bar{x}}{1-\beta\tilde{q}\bar{x}}] + \rho}{(1+s)^2 f'(\bar{l})}.$$

If Assumption 1 holds, then $f'(\bar{l}) < 0$ and $\frac{d\bar{l}}{ds} > 0$ indicating that an increase in s will raise $\bar{l}$. From equation (26), we derive $\frac{d\bar{x}}{ds} = \bar{x}'(\bar{l})\frac{d\bar{l}}{ds} > 0$ indicating that an increase in s will raise $\bar{x}$. Q.E.D.

From equation (28), we obtain

$$\frac{dg}{ds} = -\frac{d\bar{\varphi}}{ds} + a(1-\varepsilon)\bar{l}^{-\varepsilon}\frac{d\bar{l}}{ds} - \frac{a(1-\varepsilon)\beta\tilde{q}\bar{x}\bar{l}^{-\varepsilon-1}}{(1-\beta\tilde{q}\bar{x})^2\eta}\{1-[\varepsilon+(1-\varepsilon)\bar{l}]\eta(1-\beta\tilde{q}\bar{x})\}\frac{d\bar{l}}{ds} \quad (29)$$

The motive for social status affects the long-run growth rate through three channels as indicated in equation (29). First, the growth rate is negatively correlated with consumption-capital ratio. Second, an increase in the desire for social status enhances the motivation for capital accumulation. The increase in capital accumulation enhances economic growth and raises the marginal product of labor, leading firms to create more jobs. As a consequence, the labor market becomes less tight to workers (an increase in $\bar{x}$), and the employment rate increases (an increase in $\bar{l}$). The increase in the rate of employment is beneficial to economic growth. Third, the increase in capital accumulation induces firms to post more vacancies, resulting in a higher vacancy creation cost. Less resources are available for output production. Therefore, the increase in the vacancy creation cost hampers economic growth.

Note that existing works examine growth models with either desire for social status or labor-market frictions, but not both. Therefore, the current analysis nests the analysis in previous studies as a special case. In particular, in the absence of labor-market frictions, the long-run growth rate would be only affected by the motive for social status through a subset of these forces, namely, the consumption-capital ratio. Similarly, in a growth model without the motive for social status, the long-run growth rate would not be dependent on consumption-capital ratio (see equation (30) below).

To study the effect of the desire for social status on the growth rate, we need to examine how it affects the consumption-capital ratio. From equation (23), we derive

$$\frac{d\bar{\varphi}}{ds} = \frac{1}{1+s}\{-\bar{\varphi} + a(1-\varepsilon)^2\bar{l}^{-\varepsilon}\frac{d\bar{l}}{ds} - \frac{a(1-\varepsilon)\beta\tilde{q}\bar{x}\bar{l}^{-\varepsilon-1}}{(1-\beta\tilde{q}\bar{x})^2\eta}\{1-[\varepsilon+(1-\varepsilon)\bar{l}]\eta(1-\beta\tilde{q}\bar{x})\}\frac{d\bar{l}}{ds}\}$$

The increase in the desire for social status motives individuals to accumulate more capital and causes a reduction in consumption-capital ratio. As firms are willing to create more jobs, job vacancies increase and the rate of employment increases. The increase in the job vacancy creation cost reduces consumption-capital ratio while the increase in the rate of employment causes an increase in the consumption-capital ratio. Therefore, the effect of s on $\bar{\varphi}$ is ambiguous. Because $0 \le \eta, \bar{l}, (1-\beta\tilde{q}\bar{x}) \le 1$ and $\frac{d\bar{l}}{ds} > 0$, then we obtain

$$\frac{d\bar{\varphi}}{ds} < \frac{1}{1+s}[-\bar{\varphi} + a(1-\varepsilon)^2\bar{l}^{-\varepsilon}\frac{d\bar{l}}{ds}]$$

This implies that $\frac{d\bar{\varphi}}{ds} < 0$ if $\frac{d\bar{l}}{ds}$ is small enough (that is, an increase in s causes a sufficiently small increase in $\bar{l}$).

Employing the steady-state condition described in equation (23), we can re-write the
growth rate

$$g = s\bar{\varphi} + a\varepsilon\bar{l}^{1-\varepsilon} - \delta - \rho \tag{30}$$

From equation (30), we obtain

$$\frac{dg}{ds} = \bar{\varphi} + s\frac{d\bar{\varphi}}{ds} + a\varepsilon(1-\varepsilon)\bar{l}^{-\varepsilon}\frac{d\bar{l}}{ds}$$

Because the sign of $\frac{d\bar{\varphi}}{ds}$ is ambiguous, we are not able to determine the sign of $\frac{dg}{ds}$. Because $\frac{d\bar{l}}{ds} > 0$, then $\frac{dg}{ds} > 0$ if $\frac{d\bar{\varphi}}{ds} > 0$. However, if $\frac{d\bar{\varphi}}{ds} < 0$ and such a decrease is significantly large, then $\frac{dg}{ds} < 0$.

Due to the complexity of the system, we cannot find a simple intuitive condition to guarantee stability of the equilibrium. Therefore, we resort to numerical methods and study the local property of the dynamic behavior at the equilibrium by assigning reasonable parameter values. Because there are two jump variables (φ(t) and x(t)) and one non-jump variable (l(t)) in the model, the equilibrium is stable if there are two eigenvalues with positive real parts and one eigenvalue with negative real part. In all of the simulations conducted over a wide range of plausible parameter sets in the following section, two positive eigenvalues and one negative eigenvalues are obtained, implying that the BGP equilibrium exhibits saddle-path stability.

## 3 Quantitative Analysis

This section explores the quantitative implications of our model. To achieve this, we first calibrate parameters to match some data to and then simulate the model to perform numerical analysis. In the quantitative exercises, we focus on the impact of social status on the consumption-capital ratio, labor-market tightness, the rate of unemployment, and the long-run growth rate.

### 3.1 Parameterization

There are 10 model parameters that need to be determined: the preference parameters (ρ and s), the production parameters (a and ε), matching function parameters (ϕ and η), bargaining power of workers β, job separation rate θ, depreciation rate δ, and the unit cost of vacancy q̃. We assume that one period in the model economy represents one quarter, so all of the parameters are interpreted quarterly.

In the benchmark calibration, we first set ρ= 0.01 so that the annual interest rate in the steady state is approximately 4%. The share of capital income in total output ε is commonly set to 0.33. The parameter δ is taken to be 0.025. This implies that the annual depreciation rate is approximately 10%. The value of bargaining power of workers β is set to be 0.5, a value commonly employed in the literature.[3] Furthermore, the elasticity of vacancy in job matches η is 0.5 so that the Hosios' (1990) rule holds. According to Job Openings and Labor Turnover Survey (JOLTS), the average

[3] The same value of bargaining strength has also been used in Albercht and Vroman (2002).

quarterly separation rate from 2001Q1 to 2015Q1 is 10.45%. Hence, we set $\theta = 0.1045$. Hall and Milgrom (2008) demonstrate that the cost of maintaining a vacancy for 1 day is 0.43 day of pay. Hence, we set $\tilde{q} = 0.43$.

The average quarterly unemployment rate from 1948Q1 to 2015Q2 is 5.8%. The efficiency parameter $\phi$ is set to 1.1483 to match this rate in the steady state. According to equation (9), it follows that a = 0.1104. The social status preference parameter s is set to 0.0693 to match a 2% annual growth rate of output. The benchmark parameterization is summarized in Table 1.[4]

Table 1: Benchmark parameter values

| | |
|---|---|
| Preference | $\rho = 0.01$, $s = 0.0693$, |
| Production | $a = 0.1104$, $\varepsilon = 0.33$, |
| Matching | $\phi = 1.1483$, $\eta = 0.5$, |
| Others | $\beta = 0.5$, $\theta = 0.1045$, $\delta = 0.025$, $\tilde{q} = 0.43$. |

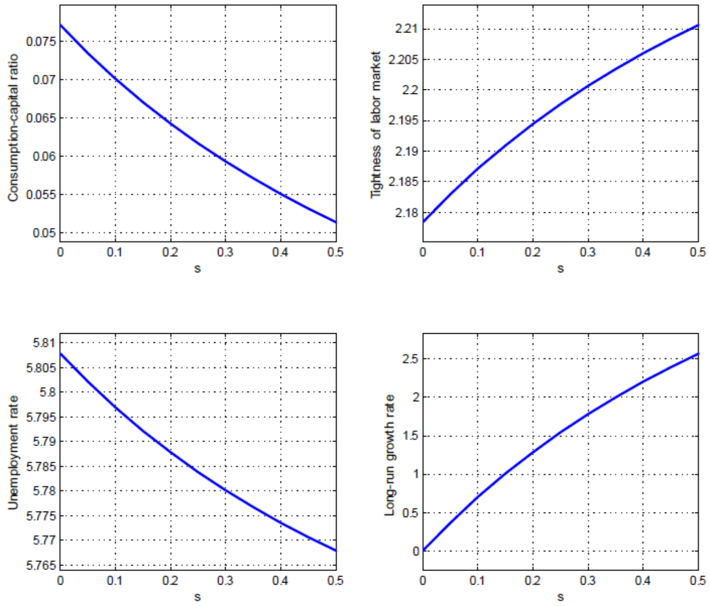
### 3.2 Simulation Results

Under our benchmark parameterization, the steady-state values are $\bar{l} = 0.942$, $\bar{x} = 2.185$, $\bar{\varphi} = 0.0722$ and g = 0.005. Figure 1 presents the effects of an increase in the desire for social status (s) from 0 to 0.5 on the consumption-capital ratio ($\bar{\varphi}$), labor-market tightness ($\bar{x}$), unemployment rate ($1 - \bar{l}$) and growth rate (g).[5] To study the stability around the equilibrium, we compute the Jacobian matrix of the dynamical system of (17), (18) and (20) evaluated at the steady state and calculate its eigenvalues. In all numerical exercises we perform, two positive eigenvalues and one negative eigenvalue are obtained. Our numerical results illustrate that an increase in the desire for social status in the preference reduces the consumption-capital ratio and unemployment rate while raising the tightness of labor market. An increase in s raises consumers' willingness to accumulate capital, inducing a decrease in $\bar{\varphi}$. This increases the marginal product of labor, leading firms to create more jobs. As a consequence, the labor market becomes less tight to workers (an increase in $\bar{x}$) and the unemployment rate falls.

[4] All of the parameterizations employed in the numerical exercises (the benchmark, Figure 1 and Table 2) satisfy the sufficient conditions for the existence and uniqueness of steady state presented in Proposition 1.

[5] Under our parameterization, the long-run growth rate when s = 0 of Figure 1 is 0. This is because under our parameterization, the interest rate equals the rate of time preference; i.e., $r = \rho = 0.01$. Therefore, when s = 0, the long-run growth rate is $r - \rho$ and thus is 0.

Figure 1: Long-run effects of an increase in the desire for social status




Equation (29) indicates that the increase in the desire for social status affects the long-run growth rate by affecting the employment rate, the job vacancy creation cost and the consumption-capital ratio. The decreases in consumption-capital ratio and unemployment rate raise the long-run economic growth rate while the increase in vacancy creation cost reduces it. Under the benchmark parameterization, we find that an increase in the desire for social status could enhance the economic growth rate in the long run.

To examine the influence of the desire for social status, we perform comparative-static analysis by allowing $\rho$, a, $\theta$, $\beta$, $\eta$ and $\tilde{q}$ to increase by 5% under the benchmark value of s = 0.0693.[6] The results are reported in Table 2.[7] We find that for parameters $\rho$, $\theta$, $\beta$, $\eta$ and $\tilde{q}$, our results are qualitatively consistent with those in Eriksson (1997) based on a model without preference for social status. In particular, when the parameter of rate of time preference $\rho$ is 5% above its benchmark value, the labor market becomes tighter to workers, and the rate of unemployment increases. Together with an increase in the consumption-capital ratio, the long-run growth rate decreases. Similar results could also be found when the bargaining power of workers ($\beta$) increases.

When we increase the job separation rate $\theta$ by 5%, the labor market becomes tighter to workers, and the unemployment rate increases. The consumption-capital ratio decreases, and there is an overall decrease in the long-run growth rate. Similar results could also be found when the vacancy posting cost ($\tilde{q}$) increases.

The results in Table 2 indicate that with a 5% increase in the TFP measure a, the

[6] We consider a different value of s = 0.4 and find that directions of changes of variables $\{\bar{\psi}, \bar{x}, 1-\bar{l}, \bar{g}\}$ are the same as those in the model of s = 0.0693. The results are available upon request.

[7] In Appendix A, Figures A1 – A7 present the effects of the increase in the desire for social status on $\bar{\varphi}$, $\bar{x}$, $(1-\bar{l})$ and g under different values of a, $\theta$, $\beta$, $\eta$, $\phi$, $\rho$ and $\tilde{q}$. We find that changes in these parameter values do not change our results qualitatively.

consumption-capital ratio increases. The labor market becomes less tight to workers and the unemployment rate decreases, causing an increase in the long-run economic growth. Our findings in the labor market performance are very different from Eriksson (1997), who shows that an increase in the TFP measure will make the labor market become tighter and cause an increase in the unemployment rate in an endogenous growth model with labor-market frictions but without preference for social status. The main reason is that the results found in Eriksson (1997) rely on the condition of a sufficiently low elasticity of intertemporal substitution. With the setting of utility function as $c^{1-\sigma}/(1-\sigma)$, most of the results in his study then hinge on the assumption that $\sigma > 1-\tau$, where $\tau$ is the tax rate of capital income. Note that under his setting, the labor market performance is immune to the changes in the TFP measure when $\sigma = 1-\tau$. This implies that in the simplified model with a logarithmic instantaneous utility function ($\sigma = 1$) and zero capital income tax rate ($\tau = 0$) employed in this paper, changes in the TFP measure will not affect labor market performance. Therefore, our results indicate that the desire for social status provides a channel for the TFP measure to affect labor market performance and its interplay with capital accumulation. The result of Eriksson (1997) demonstrates that an increase in the TFP measure would cause a trade-off between unemployment and growth. However, we show that in the presence of the desire for social status, both the labor market performance and the growth rate could benefit from the increase in the TFP measure in the long run and this result appears to be more consistent with the data that there is no long-term crowding-out effect from the technology factor to unemployment (Maddison, 1991). Table 2 also provides results for a case with no social status ($s = 0$). The results show that the change in a will not affect steady-state levels of labor market tightness and unemployment if the desire for social status is absent. When the desire for social status is absent, in the BGP equilibrium, equation (24) indicates that the tightness of labor market does not depend on a and hence unemployment is not affected from equation (25).

An increase in the elasticity of vacancy in job matches $\eta$ by 5% causes similar effects on the performance of labor market and long-run economic growth as those obtained in the case of an increase in the TFP measure.

Table 2: Long-run effects of some parameter changes

| | percentage change in $\bar{\psi}$ | | | percentage change in $\bar{x}$ | | |
|---|---|---|---|---|---|---|
| | benchmark | $s = 0$ | no friction | benchmark | $s = 0$ | no friction |
| $\rho \uparrow 5\%$ | 0.649 | 0.578 | 0.617 | -0.027 | -0.029 | N/A |
| $a \uparrow 5\%$ | 4.352 | 4.424 | 4.438 | 0.012 | 0 | N/A |
| $\theta \uparrow 5\%$ | -0.403 | -0.408 | N/A | -0.299 | -0.297 | N/A |
| $\beta \uparrow 5\%$ | 0.060 | 0.059 | N/A | -9.813 | -9.826 | N/A |
| $\eta \uparrow 5\%$ | 0.157 | 0.158 | N/A | 0.122 | 0.126 | N/A |
| $\tilde{q} \uparrow 5\%$ | -0.202 | -0.201 | N/A | -4.909 | -4.915 | N/A |
| | percentage change in $1-\bar{l}$ | | | percentage change in $g$ | | |
| | benchmark | $s = 0$ | no friction | benchmark | $s = 0$ | no friction |
| $\rho \uparrow 5\%$ | 0.013 | 0.013 | 0 | -9.355 | -10.005 | -9.383 |
| $a \uparrow 5\%$ | -0.006 | 0 | 0 | 39.353 | 40.000 | 39.384 |
| $\theta \uparrow 5\%$ | 4.835 | 4.843 | N/A | -1.802 | -1.599 | N/A |
| $\beta \uparrow 5\%$ | 4.977 | 4.985 | N/A | -1.378 | -1.646 | N/A |
| $\eta \uparrow 5\%$ | -1.884 | -1.879 | N/A | 0.701 | 0.620 | N/A |
| $\tilde{q} \uparrow 5\%$ | 2.398 | 2.401 | N/A | -0.846 | -0.792 | N/A |

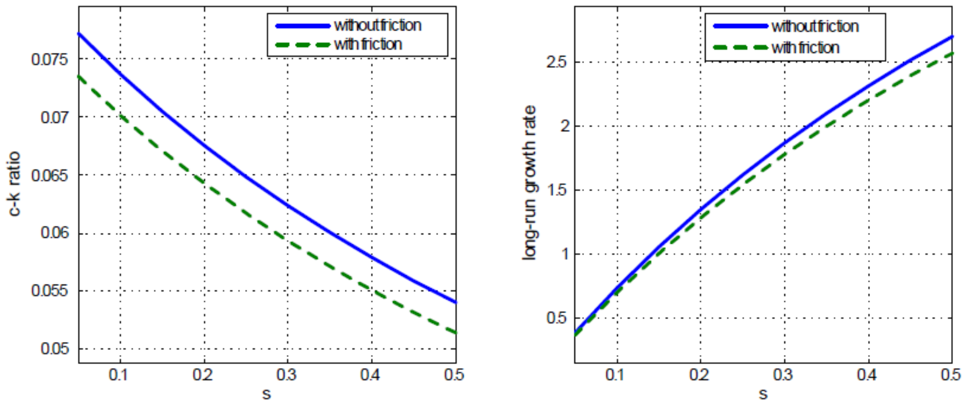
We also perform similar analysis for a case with no social status (s = 0) and a case with no labor-market frictions. The results are also given in Table 2. For the case with no social status, the magnitude and direction of the effects of a 5% increase of the parameter values are similar to those in the benchmark case, except that the change in a does not affect steady-state levels of labor market tightness and unemployment. For the case with no labor-market frictions, some parameters ($\theta$, $\beta$, $\eta$ and $\tilde{q}$) and labor market tightness are absent and full employment is restored in equilibrium.[8] The results in Table 2 show that variables such as consumption-capital ratio ($\bar{\psi}$) and long-run growth rate (g) in this case exhibit similar responses to changes of parameter values compared to the benchmark model.

Moreover, we also study the long-run effects of an increase in the desire for social status on consumption-capital ratio and long-run growth rate and compare the results with those in the benchmark model in Figure 2: According to equations (B12) and (B13) in Appendix B, for any given value of s, when labor-market frictions are absent, an increase in the desire for social status deliver theoretically unambiguous results, i.e., the change in the consumption-capital ratio is unambiguously negative and the effect on long-run growth is unambiguously positive. Furthermore, according to our calculation, with no labor-market frictions, the long-run growth rate (g) is roughly overvalued by 5%. Comparing equation (28) with equation (B13) in Appendix B implies that the difference in g under the two cases is determined by three parts. First, with labor-market frictions, employment $\bar{l}$ is an increasing function of s. However, when frictions are absent, $\bar{l}$ is fixed regardless of the value of s. Second, when the labor market is frictionless, firms do not need to post vacancies and hence the third term of (28) is absent. This leads to a higher level of g. Third, the desire for social status (s) affects consumption-capital ratio ($\bar{\psi}$) differently in these two cases. Equation (23) indicates that the last term in equation (23) is absent when the labor market is

[8] See Appendix B for the details of the model with no labor-market frictions and calibration.

frictionless.

Figure 2: Long-run effects of an increase in the desire for social status (benchmark vs. frictionless labor market)




Finally, since the bargaining power (β) used in Shimer (2005) is 0.72 and in Shi and Wen (1999) is 0.4, we then consider the cases for $\beta = 0.72$ and 0.4. The effects of an increase in the desire for social status are given in Figures C1 and C2 in Appendix C. We find that our results do not change qualitatively.

## 4 Conclusion

Existing studies have explored various implications of wealth-induced social status. However, the effect of social status on unemployment has not been well studied. To complement the literature, in this paper, we construct a dynamic general equilibrium model that incorporates wealth-enhanced preferences, unemployment and endogenous growth to investigate the role of social status in determining unemployment as well as long-run growth. We find that an increase in the desire for social status is beneficial to the performance of the labor market. The labor market becomes less tight to workers, and the rate of unemployment decreases. However, its effect on the consumption-capital ratio is ambiguous. With an ambiguous change in the consumption-capital ratio and an increase in the vacancy creation cost, the long-run growth rate may not increase with the desire for social status. To determine the growth effect of social status, we simulate the model and perform comparative-static analysis. Our numerical results demonstrate that social status reduces the unemployment rate while enhancing the long-run growth rate. Furthermore, we compare the effects of a 5% increase in the rate of time preference, total factor productivity, job separation rate, bargaining strength, the elasticity of vacancy in job matches and the vacancy posting cost under different cases to examine the influences of the desire for social status or labor-market frictions.

Our paper can be extended into a variety of studies, and we point out two possible directions. First, in the literature of social status, some studies consider the relative wealth-enhanced social status in the representative household's preference formulation, i.e., replacing k(t) with k(t)=K(t) in equation (1), where K(t) represents the economy-wide capital stock. One may wonder if this change in the setting of social status would change our results. Second, by incorporating capital and wage income tax in the model, we can study the effects of fiscal policy.

## Appendix A: Sensitivity Analysis

Similar to Figure 1, we draw a series of figures to examine the effects of the motive of social status s. In each figure, we consider different values of a, $\theta$, $\beta$, $\eta$, $\phi$, $\rho$ and $\tilde{q}$, allowing them to vary by $\pm 5\%$. Results are summarized in Figures A1 to A7. We find that our results are quite robust.

Figure A1: Long-run effects of an increase in the desire for social status (different values of a)

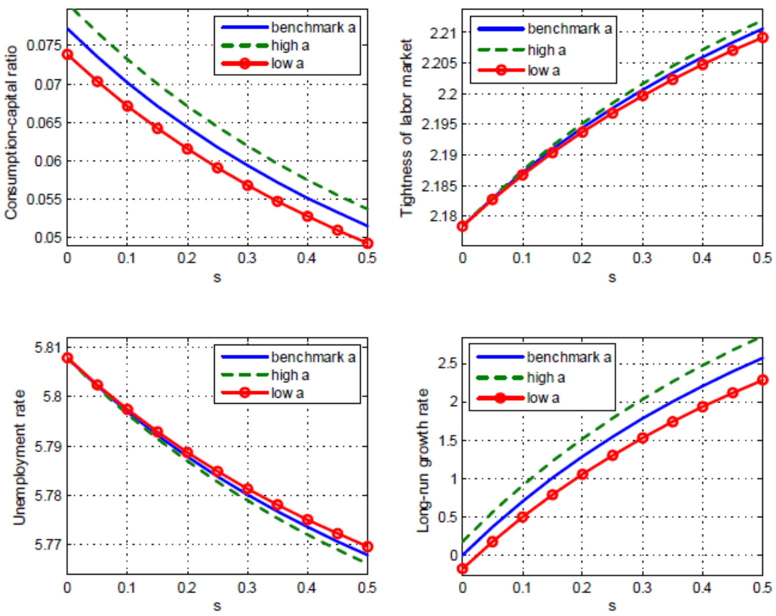



Figure A2: Long-run effects of an increase in the desire for social status (different values of $\theta$)

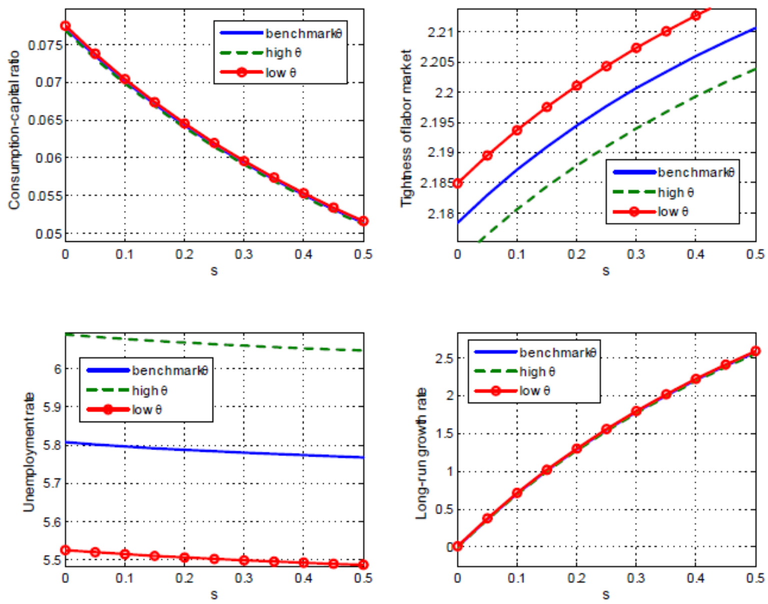


Figure A3: Long-run effects of an increase in the desire for social status (different values of β)

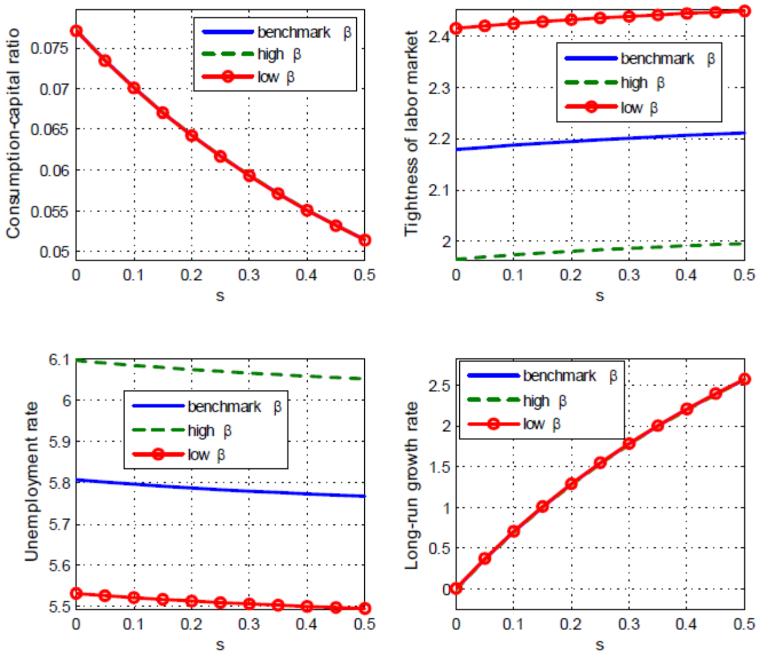



Figure A4: Long-run effects of an increase in the desire for social status (different values of η)

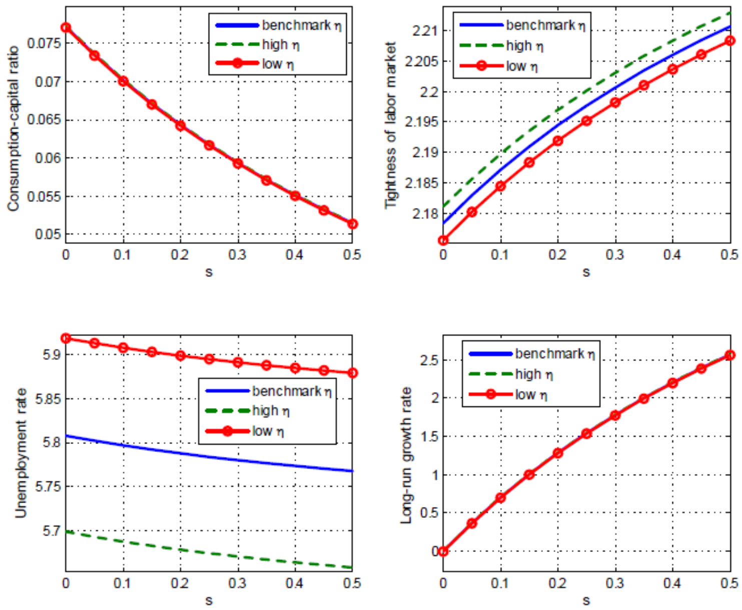


Figure A5: Long-run effects of an increase in the desire for social status (different values of $\phi$)

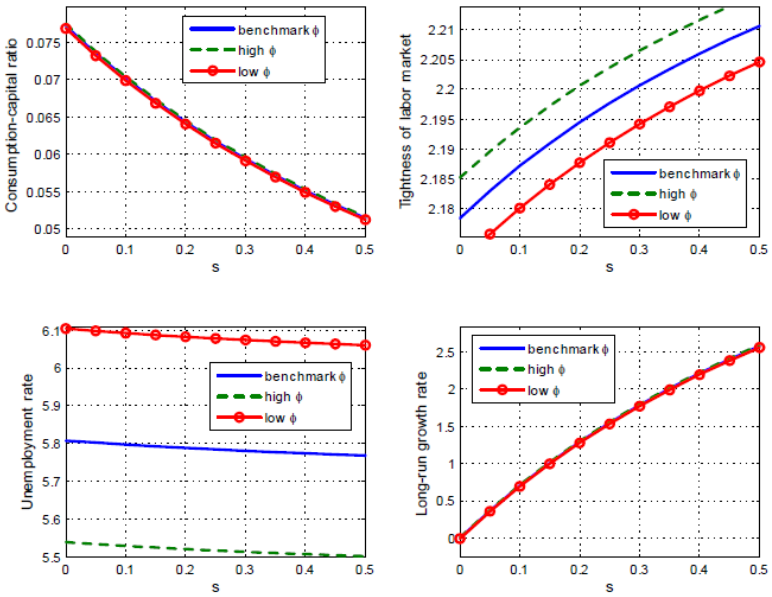



Figure A6: Long-run effects of an increase in the desire for social status (different values of $\rho$)

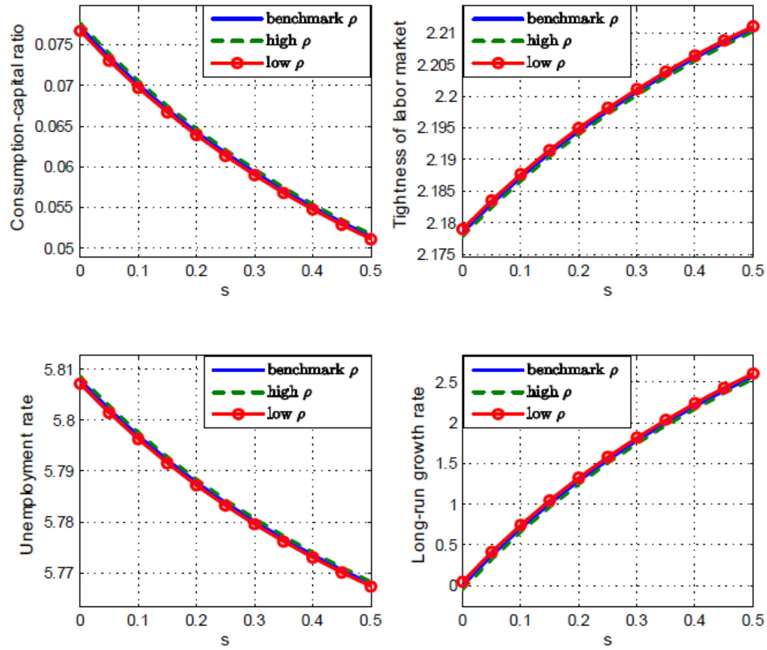
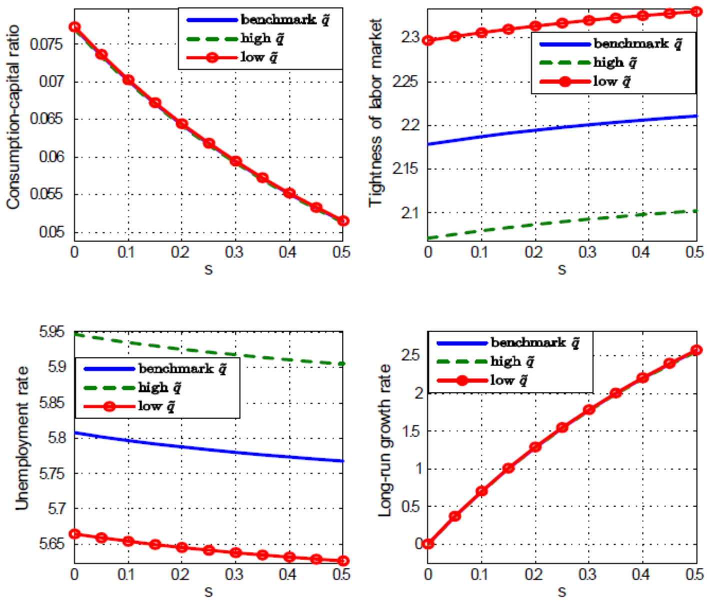


Figure A7: Long-run effects of an increase in the desire for social status (different values of $\tilde{q}$)




## Appendix B: A Model without Labor-market Frictions

We use the notations as those in the main body of the paper. Following the existing literature, we assume that the preference of the representative household is given by

$$\int_0^\infty e^{-\rho t}[\log c(t) + s \log k(t)]dt \tag{B1}$$

The budget constraint of the representative household is given by

$$\dot{k}(t) = w(t)l + r(t)k(t) - c(t) \tag{B2}$$

where l is the measure of labor force. We assume that in each period, an individual is endowed with one unit of time which is inelastically supplied to the labor market. The household's problem is then to choose a set of time paths $\{c(t), k(t)|t \geq 0\}$ to maximize the utility function in equation (B1) subject to the budget constraint in equation (B2) and the initial conditions k(0) > 0. The consumption Euler equation is derived as

$$\frac{\dot{c}(t)}{c(t)} = s\frac{c(t)}{k(t)} + r(t) - \rho \tag{B3}$$

The production technology is

$$y(t) = a[k(t)]^{\varepsilon}[l(t)\bar{k}(t)]^{1-\varepsilon} \tag{B4}$$

The firm's problem is to choose a set of time path $\{k(t), l(t)|t \geq 0\}$ to maximize the profits given by

$$\pi(t) = y(t) - [r(t) + \delta]k(t) - w(t)l(t) \tag{B5}$$

The first order conditions are given by

$$r(t) = a\varepsilon[k(t)]^{\varepsilon-1}[l(t)\bar{k}(t)]^{1-\varepsilon} - \delta \tag{B6}$$

and

$$w(t) = a(1-\varepsilon)[k(t)]^{\varepsilon}[\bar{k}(t)]^{1-\varepsilon}[l(t)]^{-\varepsilon} \tag{B7}$$

In equilibrium, we have $\bar{k}(t) = k(t)$ and l(t)=l.

Plugging (B6) and (B7) into (B2) yields the resource constraint

$$\dot{k}(t) = ak(t)l^{1-\varepsilon} - \delta k(t) - c(t) \tag{B8}$$

Hence, it follows that

$$\frac{\dot{k}(t)}{k(t)} = al^{1-\varepsilon} - \delta - \varphi(t) \tag{B9}$$

Plugging (B6) into (B3) yields

$$\frac{\dot{c}(t)}{c(t)} = s\varphi(t) + a\varepsilon l^{1-\varepsilon} - \delta - \rho \tag{B10}$$

Hence, the consumption-capital ratio evolves according to

$$\frac{\dot{\varphi}(t)}{\varphi(t)} = \frac{\dot{c}(t)}{c(t)} - \frac{\dot{k}(t)}{k(t)} = (1+s)\varphi(t) - a(1-\varepsilon)l^{1-\varepsilon} - \rho \tag{B11}$$

In the BGP equilibrium, it follows that

$$\bar{\varphi} = \frac{1}{1+s}[a(1-\varepsilon)l^{1-\varepsilon} + \rho] \tag{B12}$$

$$g = al^{1-\varepsilon} - \delta - \bar{\varphi} \tag{B13}$$

Note that in the growth model without labor-market frictions, the motive for social status affects the long-run growth rate only through the channel of consumption-capital ratio.

In regard to calibration, we first normalize the size of labor force to 0.942, which is the steady state level of employment in the benchmark model. Following the same calibration strategy stated in Section 3.1, we set $\rho = 0.01$, $\varepsilon = 0.33$, $\delta = 0.025$ and $a = 0.1104$. The desire for social status s is calibrated to 0.0657 to match the annual growth rate of 2%.

## Appendix C: Robustness Checks (Shimer 2005, Shi and Wen 1999)

We now consider the cases where $\beta = 0.72$ (Shimer 2005) and $\beta = 0.4$ (Shi and Wen 1999) as a robustness check. To make the results directly comparable, we adopt the same calibration strategy presented in Section 3.1. Specifically, we follow Shi and Wen (1999) and Shimer (2005) and set $\beta + \eta = 1$ such that the Hosios condition is met. Therefore, when we set $\beta = 0.4$ (0.72), then we have $\eta = 0.6$ (0.28). The parameter $\phi$ is calibrated to match the average quarterly unemployment rate of 5.8% and the parameter s is calibrated to match the annual growth rate of 2%. We set $\rho = 0.01$, $\varepsilon = 0.33$, $\delta = 0.025$, $a = 0.1104$, $\theta = 0.1045$, and $\tilde{q} = 0.43$, which are the same values calibrated in Section 3.1. Tables C1 and C2 present the parameter values for cases of $\beta = 0.72$ and $\beta = 0.4$.

Table C1: Parameter values ($\beta = 0.72$)

| | |
|---|---|
| Preference | $\rho = 0.01,\ s = 0.0671,$ |
| Production | $a = 0.1104,\ \varepsilon = 0.33,$ |
| Matching | $\phi = 1.7764,\ \eta = 0.28,$ |
| Others | $\beta = 0.72,\ \theta = 0.1045,\ \delta = 0.025,\ \tilde{q} = 0.43.$ |

Table C2: Parameter values ($\beta = 0.4$)

| | |
|---|---|
| Preference | $\rho = 0.01,\ s = 0.0710,$ |
| Production | $a = 0.1104,\ \varepsilon = 0.33,$ |
| Matching | $\phi = 0.8326,\ \eta = 0.6,$ |
| Others | $\beta = 0.4,\ \theta = 0.1045,\ \delta = 0.025,\ \tilde{q} = 0.43.$ |

Figures C1 and C2 show the steady-state values of consumption-capital ratio, tightness of labor market, unemployment rate and long-run growth rate for a series of s under β = 0.72 or β = 0.4. Note that our results do not change qualitatively.

Figure C1: Long-run effects of an increase in the desire for social status (β = 0.72)

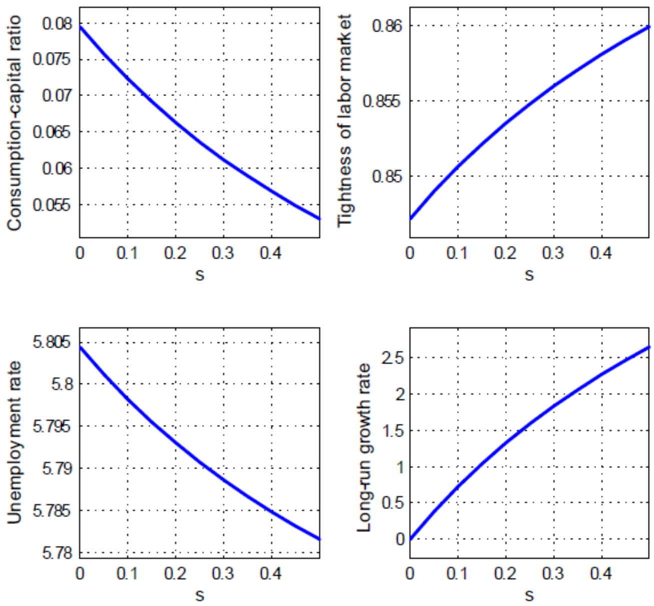
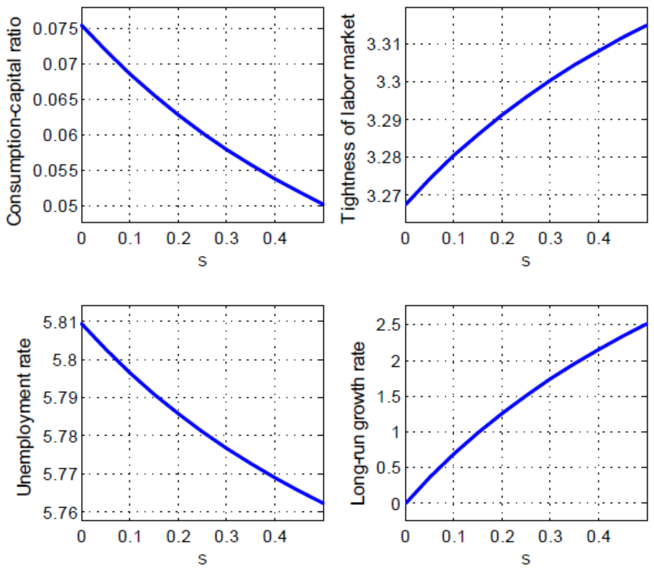



Figure C2: Long-run effects of an increase in the desire for social status (β = 0.4)



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