Social Status and Optimal Income Taxation*

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Abstract

This paper examines the socially optimal (first-best) fiscal policy in a stochastic, infinite-horizon representative agent model that exhibits consumption-enhanced as well as wealth-enhanced social status in the household utility. We show that the optimal labor tax rate is a positive constant that is used to correct negative consumption externalities. The optimal capital tax rate is also positive in order to overturn agents' status-seeking capital over-accumulation. Moreover, we find that in contrast to a conventional automatic stabilizer, the optimal capital tax moves in the opposite direction with shocks to firms' production technology. This result turns out to be qualitatively consistent with the discernible empirical evidence that many countries have implemented procyclical fiscal policies.

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1 Introduction

There is now an extensive literature that examines the macroeconomic effects of agents' quest for social status (or concern for their relative position in the society) within neoclassical models of capital accumulation, economic growth, and asset pricing. Specifically, an individual household's status-motivated preferences are postulated to depend on its own consumption or wealth relative to a reference standard that is typically defined as the economy's aggregate level of consumption or capital stock. With the noted exception of Tournemanie and Tsoukis (2008), previous research in this literature has investigated the case with either consumption-enhanced or wealth-enhanced social comparisons separately.[1] By contrast, we examine the first-best fiscal policy in a stochastic, infinite-horizon representative agent model that exhibits both (consumption and wealth) indicators of social status in the household utility. To our knowledge, this is the first work that explores such an important research topic not only for its theoretical insights, but also for its wide-ranging implications for the design and implementation of optimal tax policies.

This paper incorporates agents' status-seeking motives in consumption as well as in wealth into a standard, technology shock-driven one-sector real business cycle model with perfectly competitive firms. In order to highlight the *distinct* tax-policy effects of consumption-based versus wealth-based social comparisons, we consider a "log-log" utility specification that exhibits additive separability between relative consumption and relative wealth (physical capital). The presence of these two external effects call for government intervention in that competitive equilibrium does not yield Pareto-optimal resource allocations. On the other hand, the separable preference formulation allows us to identify model features and parameters that govern the optimal fiscal policy in a rather transparent manner.

In our model economy, the equilibrium level of consumption is higher than that at the Pareto optimum because of agents' jealous desire to keep up with the Joneses. To correct this particular market failure, the first-best tax rate on labor income turns out to be a positive constant that is equal to the strength of consumption externality. Since it is the economy's

[1] Earlier work on consumption-based social comparisons includes Abel (1990), Galí (1994), Rauscher (1997), Futagami and Shibata (1998), Fisher and Hof (2000), Ljungqvist and Ulhig (2000), Alonso-Carrera et al. (2004), Guo (2005), Liu and Turnovsky (2005), and Tsoukis (2007), among many others. In terms of wealth-based social comparisons, see Zou (1994, 1995, 1998), Bakshi and Chen (1996), Corneo and Jeanne (1997, 2001*a*, 2001*b*), Chang, Hsieh and Lai (2000), Chang and Tsai (2003), Clemens (2004), Chang, Tsai and Lai (2004), Fisher and Hof (2005), and Chen and Guo (2009), among many others.

contemporaneous aggregate consumption that enters the household utility, the representative agent's *intratemporal* trade-off between consumption and hours worked will be affected. It follows that the benevolent social planner can choose the optimal labor tax that is independent of productivity disturbances period by period.

We find that the first-best tax rate on capital income is also positive such that the Pareto-optimal level of investment can be achieved by eliminating equilibrium over-accumulation of capital caused by agents' wealth-based status-seeking motive. In addition, the optimal capital tax rate does not depend on the parameter that captures the social comparisons in consumption. Intuitively, capital taxation affects the representative household's *intertemporal* choices of consumption goods at different time periods, whereas the current level of aggregate consumption enters its utility function as a negative externality. As a result, consumption spillovers can be corrected by taxing agents' labor income without any intertemporal considerations. On the contrary, a state-contingent capital tax is needed to correct the wealth-induced preference externality.

Finally and perhaps most surprisingly, in sharp contrast to the traditional Keynesian view of automatic stabilizers that emphasizes their role in mitigating business cycle fluctuations, the first-best capital tax in our model economy moves in the *opposite* direction with disturbances to firms' production technology. Specifically, it is adopted to counter-balance movements in output and consumption such that the household's marginal utility benefit generated from its wealth-enhanced social status remains unaffected with respect to technology shocks. This striking result, which has not been found in previous studies on wealth-based social status, turns out to be qualitatively consistent with the existing empirical evidence that many countries, particularly within the developing world, have implemented *procyclical* fiscal policies (Gavin et al., 1996; Gavin and Perotti, 1997; Kaminsky et al., 2004; and Talvi and Vegh, 2005).

The remainder of this paper is organized as follows. Section 2 presents the model and the conditions that characterize a competitive equilibrium and the Pareto optimum. Section 3 derives and discusses the first-best fiscal policy. Section 4 concludes.

2 The Model

Our model economy consists of households, firms and the government. Households' preferences are defined over their own consumption, capital stock and leisure, as well as the current levels of aggregate consumption and capital in the economy. In order to examine the distinct tax-policy effects of consumption-enhanced versus wealth-enhanced social status, we consider a household utility function that exhibits additive separability between relative consumption and relative wealth (physical capital). On the production side, a homogeneous final good (GDP) is produced in a perfectly competitive environment. The government balances its budget each period and chooses the socially optimal (first-best) fiscal policy.

2.1 Firms

There is a continuum of identical competitive firms in the economy, with the measure normalized to one. Each firm produces output y_t using a constant returns-to-scale Cobb-Douglas production function

$$y_t = z_t k_t^{\alpha} h_t^{1-\alpha}, \quad 0 < \alpha < 1, \tag{1}$$

where k_t and h_t are capital and labor inputs, respectively, and z_t represents an aggregate technology shock.

Under the assumption that factor markets are perfectly competitive, the firm's profit maximization conditions are given by

$$r_t = \alpha \frac{y_t}{k_t}, \tag{2}$$

$$w_t = (1-\alpha) \frac{y_t}{h_t}, \tag{3}$$

where r_t is the capital rental rate and w_t is the real wage.

2.2 Households

The economy is populated by a unit measure of identical, infinitely-lived households. Each household is endowed with one unit of time together with $k_0 > 0$ units of physical capital, and maximizes a discounted stream of expected utilities over its lifetime

$$E_o \sum_{t=0}^{\infty} \beta^t \left[\log\left(\frac{c_t}{C_t^{\phi}}\right) + \theta \log\left(\frac{k_t}{K_t}\right) - A\frac{h_t^{1+\gamma}}{1+\gamma} \right], \tag{4}$$

$$0 < \beta < 1,\ 0 \leq \phi < 1,\ \theta \geqslant 0,\ A > 0,\ \gamma \geq 0,$$

where β is the discount factor, c_t is the individual household's consumption, and C_t is the contemporaneous level of aggregate consumption that is taken as given by the representative agent. When $\phi > 0$, the utility level of an individual household decreases with the aggregate consumption, hence the household preference exhibits the feature of "keeping up with the Joneses". This specification also implies jealousy (Dupor and Liu, 2003) or a negative consumption externality because each household does not take into account the external effect that its consumption reduces the utility of everyone else's. Moreover, the strength of consumption-based comparisons is bounded above by the restriction $\phi < 1$ such that strict concavity with respect to private consumption is guaranteed in a symmetric equilibrium.

In addition to consumption and leisure ($= 1 - h_t$), the representative agent derives utilities from the wealth-based social status represented by its capital ownership k_t relative to the economy-wide level of capital stock K_t. Therefore, the relative wealth $\frac{k_t}{K_t}$ is postulated to enter the household utility (4) separably from the social comparisons in consumption $\frac{c_t}{C_t^{\phi}}$, and the parameter θ measures the degree for "the spirit of capitalism" (Zou, 1994, 1995, 1998). As for consumption, the status-seeking motive in wealth generates a negative capital externality in the household's preferences. Finally, A is a preference parameter, and γ governs the intertemporal elasticity of substitution in labor supply. Notice that standard preferences correspond to the case of $\phi = \theta = 0$ whereby households derive utilities only from their own consumption and leisure.

The budget constraint faced by the representative household is given by

$$c_t + k_{t+1} - (1-\delta)k_t = (1-\tau_{ht})\, w_t h_t + (1-\tau_{kt})\, r_t k_t + \tau_{kt}\delta k_t + T_t, \tag{5}$$

where $\delta \in (0,1)$ denotes the depreciation rate of physical capital. Households derive their income from supplying labor and capital services to the firms at rates w_t and r_t, and pay taxes on labor and capital income at rates τ_{ht} and τ_{kt}, respectively. Two additional sources for the household's income are the capital depreciation allowance $\tau_{kt}\delta k_t$ that is built into the U.S. tax code, and a lump-sum transfer T_t.

2.3 Government

The government sets τ_{ht}, τ_{kt} and T_t, subject to the following constraint that balances its budget each period:

$$T_t = \tau_{ht} w_t h_t + \tau_{kt}(r_t - \delta)k_t. \tag{6}$$

Since we focus on the first-best taxation policy in this paper, government spending on goods and services does not enter our analysis. Combining (2), (3), (5) and (6) yields the aggregate resource constraint for the economy

$$c_t + k_{t+1} - (1-\delta)k_t = y_t. \tag{7}$$

2.4 Competitive Equilibrium

In a competitive equilibrium, each household maximizes (4) subject to its budget constraint (5), while taking factor prices, tax rates and the economy's aggregate consumption and capital as given. The first-order conditions for the household's optimization problem are

$$\frac{1}{c_t} = \lambda_t, \tag{8}$$

$$\frac{A h_t^{\gamma}}{\lambda_t} = (1-\tau_{ht})\, w_t, \tag{9}$$

$$\lambda_t = \beta E_t \left\{ \frac{\theta}{k_{t+1}} + \lambda_{t+1} \left[1 + (1-\tau_{kt+1})\,(r_{t+1} - \delta)\right] \right\}, \tag{10}$$

$$\lim_{t\to\infty} \beta^t \lambda_t k_{t+1} = 0, \tag{11}$$

where λ_t denotes the Lagrangian multiplier associated with the representative agent's budget constraint (5), and (9) equates the slope of the household's indifference curve to the after-tax wage rate. Equation (10) shows that the standard intertemporal consumption Euler equation is modified to reflect the expected marginal utility benefit from agents' status-seeking capital accumulation, captured by the term $\beta E_t \left(\frac{\theta}{k_{t+1}}\right)$, and (11) is the transversality condition.

2.5 Pareto Optimum

At the Pareto optimum, the social planner internalizes the external effects of aggregate consumption and aggregate capital by setting $c_t = C_t$ and $k_t = K_t$ in the utility function (4), subject to the production technology (1) and the economy's aggregate resource constraint (7). The first-order conditions for the social planner's optimization problem are

$$\frac{1-\phi}{c_t} = \mu_t, \tag{12}$$

$$\frac{Ah_t^{\gamma}}{\mu_t} = (1-\alpha)\,\frac{y_t}{h_t}, \tag{13}$$

$$\mu_t = \beta E_t\left[\mu_{t+1}\left(1-\delta+\alpha\frac{y_{t+1}}{k_{t+1}}\right)\right], \tag{14}$$

$$\lim_{t\to\infty}\beta^t\mu_t k_{t+1} = 0, \tag{15}$$

where μ_t denotes the Lagrangian multiplier associated with the aggregate resource constraint (7), and (13) equates the slope of the planner's indifference curve to the marginal product of labor, (14) is the consumption Euler equation, and (15) is the transversality condition.[2]

3 First-Best Fiscal Policy

There are two kinds of market imperfections in our model economy. First, when $\phi > 0$, the negative consumption externality generates a higher level of consumption in equilibrium compared to that at the Pareto optimum. Second, when $\theta > 0$ that captures the presence of wealth-based social comparisons, the Pareto-optimal level of physical capital is lower than that in a competitive equilibrium. Therefore, these environments create an incentive for government intervention to address the sources of market failures in that competitive equilibrium does not yield socially efficient (first-best) allocation of resources.

Proposition 1. The first-best fiscal policy that implements the social planner's allocations as a decentralized equilibrium is

[2] Since the production function (1), and the utility function (4) with $c_t = C_t$ and $k_t = K_t$ both are strictly concave, equations (12)-(15) are the necessary and sufficient conditions for characterizing the unique Pareto optimal allocations.

$$\tau_{ht}^{*} = \phi, \tag{16}$$

$$\tau_{kt}^{*} = \frac{\theta c_t}{(r_t - \delta) k_t}, \tag{17}$$

$$T_t^{*} = \phi (1-\alpha) y_t + \theta c_t, \tag{18}$$

for all t, where r_t is given by (2) and y_t is given by (1) .

Proof. We note that equations (8)-(11) are the necessary and sufficient conditions for a competitive equilibrium. On the other hand, as mentioned earlier, conditions (12)-(15) are necessary and sufficient for the Pareto optimum. To derive the (socially optimal) first-best fiscal policy, we need to show that when policy rules (16) and (17) are implemented, the resulting equilibrium allocations, characterized by (8)-(11), satisfy the Pareto optimality conditions as in (12)-(15).

By comparing (8) and (12), we find that the marginal utility of consumption in equilibrium is proportional to its Pareto-efficient counterpart where

$$\mu_t = (1-\phi) \lambda_t. \tag{19}$$

Substituting this condition, together with the equilibrium wage rate (3) and the proposed $\tau_{ht}^{*} = \phi$ into (9) shows that the social planner's first-order condition for hours worked (13) is satisfied. Similarly, substituting (8) and (19), together with the period-$t+1$ equilibrium capital rental rate $r_{t+1} = \alpha \frac{y_{t+1}}{k_{t+1}}$ and the proposed $\tau_{kt+1}^{*} = \frac{\theta c_{t+1}}{(r_{t+1}-\delta) k_{t+1}}$ into (10) proves that the social planner's intertemporal consumption Euler equation (14) is satisfied. Finally, the optimal lump-sum transfer T_t^{*} is obtained by substituting (3), (16) and (17) into the government budget constraint (6). ■

Recall that agents' status measured by the social comparisons in consumption and wealth both generate negative externalities in the representative household's preferences. It follows that like a Pigouvian tax, taxing status-seeking activities will raise economic welfare in our model economy. Specifically, equation (16) shows that, as in Ljungqvist and Uhlig (2000), the first-best tax rate on labor income is a positive constant that is independent of the technology shock $\left(\frac{\partial \tau_{ht}^*}{\partial z_t} = 0\right)$.[3] The intuition for this finding is straightforward. The first-order condition for labor supply governs the intratemporal choices of consumption and leisure, along with the contemporaneous nature of consumption spillovers imply that the benevolent social planner can choose the optimal labor tax period by period. As a result, eliminating negative consumption externalities calls for taxing labor income at the rate ϕ each period ($\tau_{ht}^* = \phi$), which in turn induces agents to face the correct trade-off between their decisions in consumption versus leisure (or labor hours).

On the other hand, since the net rate of return from investment $r_t - \delta$ is positive so that households have an incentive to invest, the optimal tax on capital income under the first-best policy, given by (17), is positive ($\tau_{kt}^* > 0$). That is, τ_{kt}^* is set to achieve the Pareto-optimal level of investment by removing agents' status-seeking motive which generates capital over-accumulation in equilibrium. Notice that in the absence of wealth-based comparisons ($\theta = 0$), the optimal capital tax rate becomes zero ($\tau_{kt}^* = 0$) as there are no intertemporal interrelations among macroeconomic aggregates that the social planner needs to address. Moreover, the first-best capital tax rate does not depend on the consumption externality that is governed by the parameter ϕ. Intuitively, capital taxation affects the intertemporal trade-off between consumption goods at different dates, whereas the current level of aggregate consumption enters the household utility. Therefore, consumption spillovers can be corrected by the optimal labor tax, as in (16), without any intertemporal considerations. By contrast, state-contingent taxation on capital income is needed to correct the wealth-induced preference externality.

Proposition 2. The first-best (positive) tax rate on capital income moves in the opposite direction with disturbances to firms' production technology, $\frac{\partial \tau_{kt}^*}{\partial z_t} < 0$.

Proof. We first rewrite the first-best capital tax rate by substituting (2) into (17) to obtain

$$\tau_{kt}^* = \frac{\theta}{\alpha\left(\frac{y_t}{c_t}\right) - \delta\left(\frac{k_t}{c_t}\right)}, \tag{20}$$

and note that $\frac{\partial k_t}{\partial z_t} = 0$ because the value of k_t is pre-determined in period $t-1$. It follows that the relationship between the optimal tax on capital income and the technology shock is given by

[3] Ljungqvist and Uhlig (2000) obtains the same result on τ_{ht}^* under a slightly different preference specification in a stochastic representative-agent model without capital accumulation. In particular, the household utility depends on the difference between an individual's own consumption and a fraction of the economy's current level of aggregate consumption. By contrast, we adopt the "ratio" formulation, as in (4), in this paper.

$$\frac{\partial \tau_{kt}^*}{\partial z_t} = \frac{-\theta\left[\alpha \underbrace{\frac{\partial\left(\frac{y_t}{c_t}\right)}{\partial z_t}}_{\text{positive}} + \frac{\delta k_t}{c_t^2}\underbrace{\left(\frac{\partial c_t}{\partial z_t}\right)}_{\text{positive}}\right]}{\left[\alpha\left(\frac{y_t}{c_t}\right) - \delta\left(\frac{k_t}{c_t}\right)\right]^2} < 0. \tag{21}$$

A positive productivity disturbance shifts out the labor demand curve, which causes the real wage and hours worked $\left(\frac{\partial h_t}{\partial z_t} > 0\right)$ both to rise. This in turn raises the total output, whose increase is then divided between higher levels of consumption $\left(\frac{\partial c_t}{\partial z_t} > 0\right)$ and investment through the aggregate resource constraint for the economy (7). As a result, the output-to-consumption ratio will rise, $\frac{\partial\left(\frac{y_t}{c_t}\right)}{\partial z_t} > 0$.[4] ■

In sharp contrast to traditional Keynesian demand-management policies that are designed to mitigate business cycle fluctuations, the first-best capital tax τ_{kt}^* in our model economy does not operate like an automatic stabilizer. Instead, it is adopted to counter-balance movements in output and consumption caused by shocks to the firm's production function in combination with households' status-seeking economic activities. To understand this (perhaps quite) surprising result, we rearrange the analytical expression of τ_{kt}^*, as in (17), and find that for a given period t,

$$\frac{\tau_{kt}^*\left(\alpha\frac{y_t}{k_t} - \delta\right)}{c_t} = \frac{\theta}{k_t}, \tag{22}$$

where $\alpha\frac{y_t}{k_t}$ is the capital rental rate given by (2), and $\frac{\theta}{k_t}$ is the marginal utility benefit derived from agents' status-motivated capital accumulation. Since k_t is a pre-determined variable, $\frac{\theta}{k_t}$ remains unaffected with respect to any change in the period-t technology shock, *i.e.* $\frac{\partial\left(\frac{\theta}{k_t}\right)}{\partial z_t} = 0$.

On the other hand, $\frac{\tau_{kt}^*\left(\alpha\frac{y_t}{k_t} - \delta\right)}{c_t}$ represents the government's capital tax revenue, valued using the household's marginal utility of consumption, given by $\frac{1}{c_t}$. A positive innovation to the labor productivity raises the economy's tax base because of higher hours worked and output. Moreover, higher labor hours increase the household's projected income stream, thereby raising its ability to consume. Given the economy's aggregate resource constraint (7), the expansion of output will be stronger than the associated rise in consumption, *i.e.* $\frac{\partial y_t}{\partial z_t} >$

[4] Combining (12) and (13) leads to $\frac{y_t}{c_t} = \frac{A h_t^{1+\gamma}}{(1-\alpha)(1-\phi)}$. Since $A > 0$, $\gamma \geq 0$, $0 < \alpha < 1$ and $\phi \geq 0$, the preceding expression implies that $sgn[\frac{\partial\left(\frac{y_t}{c_t}\right)}{\partial z_t}] = sgn[\frac{\partial h_t}{\partial z_t}]$.

$\frac{\partial c_t}{\partial z_t} > 0$. This, together with $\frac{\partial k_t}{\partial z_t} = 0$, implies that τ^*_{kt} has to fall in order to maintain the equality of (22). As a result, the first-best fiscal policy consists of a procyclical capital tax rate that moves negatively with the macroeconomic conditions, $\frac{\partial \tau^*_{kt}}{\partial z_t} < 0$.

The above result of fiscal pro-cyclicality, which has not been found in the existing literature on wealth-based social status, turns out to be qualitatively consistent with substantial econometric evidence. For example, Gavin et al. (1996) and Gavin and Perotti (1997) show that fiscal policies are often procyclical in Latin American countries: higher government consumption and lower taxes during expansions, whereas the opposite holds true during recessions. Talvi and Vegh (2005) report that the phenomenon of fiscal pro-cyclicality is not limited to Latin America. Based on a sample of 56 countries over the $1970-1994$ period, these authors find strong and robust empirical support for procyclical fiscal policies in non-G7 industrial and many developing countries. Kaminsky et al. (2004) also show that numerous (from a large sample of 104) countries exhibit fiscal pro-cyclicality between 1960 and 2003. Overall, our analysis provides a theoretical explanation for the procyclical fiscal policies that are observed in the actual data, particularly within developing countries.

4 Conclusion

We have shown that when consumption-enhanced as well as wealth-enhanced social status enter separably into the representative household's utility function, there is a clear division of the (socially optimal) first-best fiscal policy with regard to correcting the economy's two market failures. Specifically, a time-invariant and positive tax rate on labor income is needed to eliminate negative externalities that arise from the contemporaneous level of aggregate consumption. In addition, to overturn agents' status-seeking capital over-accumulation in equilibrium, a state-contingent and positive tax rate on capital income is called for. Finally and perhaps quite surprisingly, in contrast to a conventional automatic stabilizer, the optimal capital tax moves in the opposite direction to technology shocks for a rather unorthodox reason – it is used to counter-balance fluctuations in output and consumption such that the wealth-status-motivated marginal utility benefit remains unaffected by disturbances to firms' production technology. This striking result turns to be qualitatively consistent with the discernible empirical evidence that many countries have adopted procyclical fiscal policies.

This paper can be extended in several directions. For example, we can consider a more generalized preference formulation that exhibits non-separability in relative consumption and relative wealth. This extension will allow us to examine the robustness of our results by analyzing the interrelations between intratemporal and intertemporal distortions from consumption-based versus wealth-based social comparisons. Moreover, it would be worthwhile to incorporate other kinds of market imperfections that have been studied in the optimal taxation literature, such as incomplete markets (Aiyagari, 1995), untaxed factors of production (Correia, 1996), lack of commitment (Benhabib and Rustichini, 1997), and imperfectly competitive firms (Guo, 2005), among many others. We plan to pursue these research projects in the near future.

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