



# Social status and long-run effects of monetary policy in a two-sector monetary economy of endogenous growth

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## ABSTRACT

We develop a two-sector monetary economy with human capital accumulation and a cash constraint applied to both consumption and investment to examine the ways in which social status affects the impact of monetary policy on the long-run economic growth rate. Our findings suggest that the formation of human capital is an important determinant to the super-neutrality of money in the growth-rate sense. Within an economy with Lucas-type human capital formation, money is super-neutral; however, within an economy where human capital accumulation formation is more generalized, and in which both physical and human capital are used as inputs, the growth rate in money will have a negative effect on the long-run growth rate of the economy. The existence, uniqueness and saddle-path stability of balanced-growth equilibrium are also examined.

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## 1. Introduction

Within a standard economic model, the utility of individuals is affected by wealth via the resultant implied consumption; however, in reality, wealth not only provides higher standards of living, but it also directly affects such utility through its influence on the position of individuals within society. Indeed, it is quite common to find people continuing to work long hours, despite having already amassed considerable wealth. Put simply, the honor (or prestige) associated with the position of individuals within society (their 'social status') motivates them to accumulate even greater wealth.

In addition to wealth, social status can also be affected by many other things, such as occupation, educational level and conspicuous consumption.<sup>1</sup> Clearly, however, it is extremely difficult to carry out any empirical assessment of social status based on such broad measures. Thus, within the extant literature, the tendency has been to take the pursuit of wealth as being representative of social status; nevertheless, the use of wealth as a measure of social status gives rise to various problems. As noted by

Roll (1977), it is virtually impossible to estimate 'aggregate wealth', essentially because a significant proportion of such wealth is not traded. Stock holdings have therefore been used to measure wealth in many of the prior studies.<sup>2</sup> Following this line of research (using capital holdings to measure social status), Bakshi and Chen (1996) found that the acquisition of wealth by investors was essentially based upon their perceived enhanced status and resultant implied consumption.

The concept of capital acquisition in macroeconomics can be traced back to the 'spirit of capitalism' of Weber (1958) and the 'wealth effects' of Kurz (1968), while Zou (1994) and Wirl (1994) represent some of the early studies on the macroeconomic effects of social status, largely epitomized by capital holdings in a standard optimal growth model. These later studies demonstrated that the presence of wealth-enhanced social status motivates agents to engage in the accumulation of physical capital, which in turn has knock-on effects on consumption, savings and economic growth.

Recently, researchers have begun to show considerable interest in the effects of social status on the 'super-neutrality' of money, in the growth-rate sense within a cash-in-advance (CIA) economy.<sup>3</sup>

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<sup>1</sup> Refer to Fershtman and Weiss (1993), Fershtman et al. (1996), Rauscher (1997), Corneo and Jeanne (1997a,b) and Clemens (2004) for various representations of social status.

<sup>2</sup> See, amongst others, Epstein and Zin (1991) and Cochrane and Hansen (1992).

<sup>3</sup> In this study, the 'super-neutrality of money' refers to the proposition that permanent, exogenous changes to growth in the money supply do not affect the long-run economic growth rate.

**Table 1**  
Related literature of the super-neutrality of money.

	$c_t \leq m_t$	$c_t + i_t \leq m_t$
Panel A: $y = Ak^\alpha$		
No social status	Abel (1985): $dk^*/d\mu = 0$	Stockman (1981): $dk^*/d\mu < 0$
With social status	Gong and Zou (2001) and Chang et al. (2000): $dk^*/d\mu > 0$	Gong and Zou (2001) and Chang and Tsai (2003): $dk^*/d\mu < 0$
Panel B: $y = Ak$		
No social status	Chang et al. (2000): $dg^*/d\mu = 0$	Suen and Yip (2005): $dg^*/d\mu < 0$
With social status	Chang et al. (2000): $dg^*/d\mu > 0$	Chen and Guo (2009): $dg^*/d\mu < 0$
Panel C: Lucas-type human capital formation		
No social status	Marquis and Reffett (1991): $dg^*/d\mu = 0$	Marquis and Reffett (1991): $dg^*/d\mu = 0$
With social status	Chen (forthcoming): $dg^*/d\mu = 0$	This paper: $dg^*/d\mu = 0$
Panel D: generalized human capital formation		
No social status	Chen (forthcoming): $dg^*/d\mu = 0$	Mino (1997): $dg^*/d\mu < 0$
With social status	Chen (forthcoming): $dg^*/d\mu > 0$	This paper: $dg^*/d\mu < 0$

Note: A CRRA utility function was adopted by Mino (1997) and Suen and Yip (2005). Results of Mino (1997) and Suen and Yip (2005) shown in Table 1 correspond to the case where the elasticity of inter-temporal substitution is less than or equal to 1. In both studies, multiple equilibria may occur when the elasticity of inter-temporal substitution is larger than 1.

The impact of the growth rate of money on economic performance has long been an important issue in macroeconomics; indeed, the pioneering work of Tobin (1965), which was based upon a descriptive aggregate model, demonstrated that a higher money growth rate can positively affect the accumulation of physical capital due to portfolio substitution from real balances to capital, which has come to be known as the Tobin effect.<sup>4</sup> Stockman (1981) subsequently developed a cash-in-advance (CIA) model with the primary aim of demonstrating that when there are liquidity constraints on consumption and investment, an increase in the money growth rate will lower the steady state value of physical capital.<sup>5</sup>

The effects of social status in CIA models were examined by Gong and Zou (2001), Chang et al. (2000), Chang and Tsai (2003) and Chen and Guo (2009), of which Chang et al. (2000) and Chen and Guo (2009) displayed endogenous growth while Gong and Zou (2001) and Chang and Tsai (2003) did not. Based upon the assumption that there are liquidity constraints on consumption, Gong and Zou (2001) and Chang et al. (2000) and Chang and Tsai (2003) demonstrated that if the desire for social status prevailed, the money growth rate would positively affect the level, or growth rate, of output. However, Chen and Guo (2009) subsequently argued that even with the presence of social-status seeking, if the cash-in-advance constraint applied to both consumption and investment, an increase in the growth rate of money would lead to a reduction in the economic growth rate.<sup>6</sup> The related literature regarding the super-neutrality of money is given in Table 1.<sup>7</sup>

Within the prior studies on the impact of social status within a monetary economy, the focus has invariably been placed on the accumulation of physical capital, thereby ignoring the role of human capital. In the present study, we examine the ways in which social status affects the impact of the growth rate of money on long-run economic performance in a two-sector CIA

model characterized by human capital accumulation.<sup>8</sup> Two types of human capital formation are considered in the present study, the first of which is based upon our assumption that human capital is the only input for human capital accumulation; we refer to this as 'Lucas-type human capital formation' (Lucas, 1988).

We then go on to follow King et al. (1988) and Bond et al. (1996) by assuming that the accumulation of human capital requires inputs of both physical and human capital, a process which we refer to as 'generalized human capital formation'.<sup>9</sup> As shown in Table 1, this paper completes the study of social status in a CIA model by providing a full analysis of long-run effects of monetary expansion under different human capital formations.

Social status is represented in this study by the accumulation of physical capital, a representation of social status which is consistent with that used in the prior empirical studies, which provide broad support for the significant direct effect on utility attributable to the pursuit of capital holdings (Bakshi and Chen, 1996). Within a monetary economy, wealth intuitively comprises both capital and cash holdings; however, it is possible to achieve an approximate and effective measurement of wealth based upon capital holdings, essentially because, relative to wealth, the proportion of money holdings is much smaller than the proportion of capital holdings. The use of this simple representation of social status not only simplifies our analysis, but also results in findings that are comparable to those reported in Chen and Guo (2009).

We find that the super-neutrality of money with respect to the economy's growth rate depends on the human capital formation. We show that a two-sector CIA model with human capital accumulation can be represented by a four-dimensional dynamic system and verify the existence and uniqueness of the equilibrium. A permanent increase in the growth rate of money leads to a rise in the inflation rate, with such increase in the inflation rate ultimately lowering the real interest rate and leading to portfolio substitution from real balances to capital (Tobin, 1965). However, while a prevailing desire for social status further reinforces this effect, the

<sup>4</sup> However, the Tobin effect was subsequently challenged by Sidrauski (1967) who demonstrated that money growth did not affect the steady state value of physical capital, based upon an infinite-horizon, representative-agent model.

<sup>5</sup> See Suen and Yip (2005) for a comprehensive discussion of the super-neutrality of money in an endogenous-growth CIA model.

<sup>6</sup> Furthermore, Chen and Guo (forthcoming) showed that the sign of the correlation between money and output growth is dependent upon the inter-temporal elasticity of substitution in consumption, as well as the liquidity-constrained ratio of consumption to investment.

<sup>7</sup> Table 1 is not intended to be an exhaustive literature review and many important contributions may not be included.

<sup>8</sup> Studies of the effects of social status within a two-sector CIA model characterized by human capital formation were also undertaken by Chen (forthcoming, 2010); however, the model settings in these studies differed markedly from those used in the present study. Chen (forthcoming) assumed that the cash-in-advance constraint was applied only to consumption. In Chen (2010), social status comprised of both physical capital and human capital. However, with this more sophisticated representation of social status, the model becomes quite complex, and it therefore becomes infeasible for any analytical examination of the stability properties of the equilibrium.

<sup>9</sup> See also King and Rebelo (1990) and Mino (1997).

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