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Social status, human capital formation and super-neutrality in a two-sector monetary economy☆

Hung- Ju Chen *

Department of Economics, National Taiwan University, 21 Hsu-Chow Road, Taipei 100, Taiwan

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ABSTRACT

In this paper, we study how social status affects the impact of monetary policy on the long-run growth rate in a two-sector monetary economy with human capital accumulation, and find that the super-neutrality of money, with regard to the growth rate of the economy depends on the formation of human capital. In an economy with Lucas-type human capital formation, money is super-neutral; however, for an economy in which both physical and human capital are used as inputs for human capital accumulation, the money growth rate will have a positive effect on the long-run economic growth rate. The existence, uniqueness and saddle-path stability of balanced-growth equilibrium are also examined.

1. Introduction

Economists have demonstrated considerable interest over recent years in the effects of social status on economic performance within a dynamic general equilibrium framework. The concept of social status can be traced back both to the 'spirit of capitalism' of Weber (1958) and the 'wealth effects' of Kurz (1968), with social status since then having invariably been represented within economic models as the pursuit of wealth.[1] The presence of wealth-enhanced social status motivates agents to pursue the accumulation of physical capital, which in turn affects other macroeconomic variables, such as consumption, savings and economic growth.

Early examinations of the macroeconomic effects of social status within a standard optimal growth model can be found in the studies of Zou (1994) and Wirl (1994).[2] Modern growth theory, which followed on from the seminal works of Romer (1986), Lucas (1988) and Rebelo (1991), modifies the traditional optimal growth model in such a way that the economic growth rate is endogenously determined.[3] This spurred on subsequent studies on social status which analyze the ways in which social status affects economic performance in an endogenous growth model. The impact of social status in a one-sector *AK* model was analyzed by Zou (1994) and Corneo and Jeanne (1997b), while Chang et al. (2004) and Chang et al. (2008) went on to examine the effects of social status in a two-sector model with human capital formation.

The more recent studies on social status have switched from a real economy to a monetary economy, characterized by the use of the cash-in-advance (CIA) model to examine the ways in which social status affects the super-neutrality of money,[4] since the macroeconomic effects of the money growth rate have long been an important issue in macroeconomics. Based on a descriptive aggregate model, the pioneering paper of Tobin (1965) demonstrated that a higher money

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* Tel.: +886 2 23519641x535; fax: +886 2 23582284.
E-mail address: hjc@ntu.edu.tw.

[1] The concept of relative wealth was adopted by Corneo and Jeanne (1997b) and Clemens (2004) to represent social status. Instead of using physical capital stock, Rauscher (1997) and Corneo and Jeanne (1997a) used conspicuous consumption to represent social status, while social status in both Fershtman and Weiss (1993) and Fershtman et al. (1996) was represented by a person's occupation.

[2] Social status has also been studied in many other types of models; for example, Bakshi and Chen (1996) analyzed the impact of social status on stock-market prices, while Fisher and Hof (2005) examined the effects of social status for a small open economy. Cole et al. (1992) had earlier shown that the introduction of social status may cause multiple equilibria.

[3] The transitional dynamics of Lucas (1988) were studied by Benhabib and Perli (1994) and Xie (1994).

[4] In this paper, super-neutrality of money refers to the proposition that permanent, exogenous changes to the *growth* of the money supply do not affect the long-run economic *growth* rate.

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Table 1
Related literature.

	Optimal growth model	Optimal growth model with social status	CIA model	CIA model with social status
Panel A: One-sector model				
$y = Ak^{\alpha}$	Ramsey (1928)	Zou (1994) Wirl (1994)	Stockman (1981) Abel (1985)	Gong and Zou (2001)
$y = Ak$	King and Rebelo (1990)	Zou (1994) Corneo and Jeanne (1997b)	Suen and Yip (2005)	Chang et al. (2000)
Panel B: Two-sector model				
Lucas-type human capital formation	Benhabib and Perli (1994) Xie (1994)	Chang et al. (2008)	Marquis and Reffett (1991)	This paper
Generalized human capital formation	King et al. (1988) Rebelo (1991) Bond et al. (1996) Mino (1996)	Chang et al. (2004)	Mino (1997)	This paper

growth rate can positively affect the accumulation of physical capital due to the reduction in the real interest rate, which has since become known as the Tobin effect.[5]

The CIA model with liquid constraints on consumption can be found in Clower (1967), Lucas (1980) and Stockman (1981). Stockman (1981) showed that the money growth rate does not affect the steady-state value of physical capital when consumption has liquid constraints.[6] Based upon their development of a one-sector CIA model with an *AK* production function aimed at examining the super-neutrality of money, Suen and Yip (2005) showed that indeterminacy may occur. A two-sector CIA model with Lucas-type human capital formation was also constructed by Marquis and Reffett (1991), within which only human capital was required for the accumulation of human capital. Following on from this, generalized human capital formation was subsequently introduced into a CIA model by Mino (1997), with both human and physical capital being required for human capital accumulation. Both studies demonstrated that if the cash-in-advance constraints were to apply only to consumption, then money is super-neutral. Social status was introduced into the CIA models by Gong and Zou (2001) and Chang et al. (2000) and Chang and Tsai (2003) in order to examine the macroeconomic effects of monetary policy; although Chang et al. (2000) displayed endogenous growth, Gong and Zou (2001) and Chang and Tsai (2003) did not.[7]

Thus, it is clear that the prior studies relating to the impact of social status in a monetary economy have tended to focus on the analysis of physical capital accumulation, thereby ignoring the role of human capital. In this study, we develop a two-sector CIA model with human capital formation to examine the ways in which social status affects the impact of the money growth rate on long-run economic performance. Three types of production functions and human capital formations are considered in CIA models with social status: the Lucas-type human capital formation and the production function without or with human capital externality, and the generalized human capital formation.[8] As shown in Table 1, this paper completes the study of social status in a CIA model by providing comprehensive analysis of both the short-run and long-run effects of monetary expansion under different endogenous growth monetary economies.[9]

We find that for two-sector endogenous growth models, the super-neutrality of money with respect to the growth rate of the economy is dependent on the formation of human capital.[10] When a permanent increase in the money growth rate occurs, it causes an increase in the inflation rate which reduces the real money balance and future consumption through the cash-in-advance constraint. Hence, the agent tends to use current consumption to substitute for future consumption and investment to the detriment of physical capital accumulation decreases. On the other hand, the real interest rate becomes lower due to an increase in the inflation rate and this encourages investment in physical capital (the Tobin effect). The presence of the desire for social status reinforces the second effect. In a two-sector model with Lucas-type human capital formation, the two effects cancel each other out so that an increase in the money growth rate does not affect the long-run economic growth rate.

Although money is super-neutral in an economy with Lucas-type human capital formation, within an economy with generalized human capital formation, the money growth rate will positively affect the economic growth rate. This is because with generalized human capital formation, an increase in the investment in physical capital is beneficial to both physical and human capital accumulation. Hence, the presence of social-status seeking will strengthen the motivation of physical capital accumulation and an increase in the money growth rate will raise the economic growth rate. Therefore, money is not super-neutral when the desire for social status is present.

We also show that a two-sector CIA model can be represented by a four-dimensional dynamic system. We then go on to examine the existence, uniqueness and saddle-path stability of the balanced-growth equilibrium for each of the models in this study. Our analysis provides a simplified version of the Routh theorem applied to the study of transitional dynamic property for a four-dimensional dynamic system.

The remainder of this paper is organized as follows. The basic model is developed in the next section. In Section 3, we examine the macroeconomic effects of monetary policy under Lucas-type human capital formation and generalized human capital formation. The final section presents the conclusions drawn from this study.

2. The model

We begin our analysis by considering a two-sector CIA model with human capital formation, with the economy comprising of a representative, infinitely-lived agent. Following Kurz (1968), we assume that the representative agent cares about both consumption

[5] However, the Tobin effect was subsequently challenged by Sidrauski (1967) who demonstrated that money growth does not affect the steady-state value of physical capital based on an infinite-horizon, representative agent model.

[6] If the cash-in-advance constraint applies to both consumption and investment, an increase in the money growth rate will, however, lower the steady-state value of physical capital. A study of the transitional dynamics of the Stockman (1981) model was provided by Abel (1985).

[7] See also Chen and Guo (2009, forthcoming) for studies of the impact of social status in a monetary economy with endogenous growth.

[8] A two-sector optimal growth model with generalized human capital formation was studied by King et al. (1988), King and Rebelo (1990), Bond et al. (1996) and Mino (1996).

[9] Since Table 1 is not intended to be an exhaustive literature review, many important contributions may not have been included.

[10] Chang et al. (2000) showed that for a one-sector economy with an *AK* production function, an increase in the money growth rate will raise the long-run growth rate when consumption is liquidly constrained.