



A model of optimal legal restrictions and open market operations

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Abstract

This paper considers an asset model that generates a monetary equilibrium in which capital, government bonds, and fiat money are held as perfect substitutes. Due to a congestion effect, output per producer is a decreasing function of the aggregate capital stock, and this effect makes a legal restriction on capital accumulation welfare enhancing. The restriction considered is that the money to capital ratio must be at some level greater than that level existing in a monetary equilibrium. In this context an open market purchase of bonds will decrease the nominal interest rate, and inflation, but may increase or decrease the real interest rate. I also show that the optimal policy response to an exogenous increase in total factor productivity is for the monetary authority to undertake an open market purchase. The two changes together result in a decrease in inflation and the nominal interest rate, and an increase in the real interest rate.

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1. Introduction

In the 1970s a general dissatisfaction with Keynesian analysis led macroeconomists to investigate more thoroughly the micro-foundations of macroeconomics. Beginning with the joint and individual work of Sargent and Wallace this investigation spilled over into monetary theory as economists began to study monetary policy in environments where individuals select optimal portfolios over individually issued assets and government assets (see, for example, Sargent and Wallace (1981, 1982) and Wallace (1983)). A long-standing problem for monetary theory, identified years ago by Hicks (1935), has been to explain why individuals hold fiat money, a non-interest bearing asset, as opposed to seemingly more lucrative alternatives. By way of solving this problem, a large literature has followed the suggestion of Wallace (1983) and has modeled the demand for money, when money is dominated in rate of return, as arising due to legal restrictions on individual portfolios. I pursue this strategy here, but in contrast to the standard literature, assume the legal restriction (or reserve requirement) may be an optimal policy that enhances individual welfare.

The restriction here is that the money-capital ratio must be larger than that which would exist in a pure monetary equilibrium in which all assets earn a common real return. Explicit or implicit in any argument that financial markets ought to be regulated is the notion that individual optimizing behavior generates negative external effects. To model such effects, I assume there is congestion in the production of goods whereby an individual's output is decreasing in the aggregate capital stock. The optimal policy considered is a legal restriction that maximizes the steady state consumption of agents. Focusing on optimal policy is of interest for several reasons. First, I am able to show that the effects of monetary policy depend upon the nature of the legal restriction. Thus in this model, in general, an open market purchase of bonds may decrease or increase the real interest rate; however, if the reserve requirement initially is at its optimal level, the purchase will decrease the real interest rate. This suggests that previous work which fails to investigate *optimal* legal restrictions may be of limited relevance.

A second reason for considering an optimal policy is to determine the optimal policy response to exogenous shocks. Parallel to and complementing the legal restrictions literature, there is a large literature analyzing monetary policy in the form of open market operations, and a significant fraction of this work seeks general conditions under which a model will exhibit the “unpleasant monetarist arithmetic” posited by Sargent and Wallace (1981). (For recent examples see Bhattacharya et al. (1998) or Bhattacharya and Kudoh (2002).) The model in this paper exhibits “unpleasant monetarist arithmetic.” This is to say that an increase in the bond to money ratio, a “tight” monetary policy, will increase inflation. (In addition it will also increase the nominal interest rate, but as noted above, may increase *or* decrease the real interest rate (results similar to those derived by Espinosa-Vega and Russell (1998a)).) The model here, however, does not seek general conditions under which this “arithmetic” occurs, but rather is concerned with determining optimal legal restrictions and the optimal policy response to economic shocks. With respect to exogenous shocks I am able to generate optimal policy responses that have several “real world” characteristics.

How, for example, should the monetary authority respond to an exogenous upward shift in the marginal product of capital schedule, an increase in total factor productivity? Before answering this question, one should note that it is of interest for several reasons.

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