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# Optimal monetary policy in an economy with incomplete markets and idiosyncratic risk<sup>☆</sup>

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## Abstract

This study investigates an incomplete markets economy in which the saving behavior of a continuum of infinitely lived agents is influenced by precautionary saving motives and borrowing constraints. Agents can use two types of assets (interest bearing IOUS and money) to smooth consumption. Money is valued because of a timing friction in the bond market. In particular, the bond market closes before agents observe their idiosyncratic productivity shock. I find that the Friedman rule is not optimal for this economy. The results indicate that the optimal allocation has a rate of inflation of 10%, and a positive amount of private credit held by the government. A positive inflation rate transfers resources from agents with big endowments to those holding bonds which improves risk sharing, and therefore, welfare. However, for higher rates of inflation, agents economize on money holdings, offsetting the insurance effects, and causing a reduction in welfare. Furthermore, higher rates of inflation discourage agents from borrowing, and the endogenous lower bound on bond holdings is

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higher than the exogenous borrowing limit. High rates of inflation, therefore, exacerbate frictions in the bond market.

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## 1. Introduction

One of the most celebrated propositions in modern monetary economics is Friedman's (1969) doctrine regarding the "optimum quantity of money". Friedman argued that an optimal monetary policy involves a steady contraction of the money supply at a sufficient rate (e.g. at the discount rate in the deterministic stationary case) so that the nominal interest rate is zero. The main idea behind the Friedman rule is that a positive nominal interest rate would encourage people to economize on their cash holdings and thus decrease welfare. In most monetary models, following a monetary policy which attains the zero nominal interest rate is optimal (e.g. Lucas and Stokey, 1983; Kimbrough, 1986a,b; see also Woodford, 1990 for an excellent survey).<sup>1</sup> Chari et al. (1996) show that the Friedman rule is optimal in three standard monetary models with distorting taxes (cash-in-advance, money-in-the utility function, and shopping-time models) where a priori reasoning would suggest that a moderate inflation tax might be desirable (see Phelps, 1973).<sup>2</sup> However, the Friedman prescription differs markedly from what we observe in practice; nominal interest rates on default-free government debt are typically positive.

One class of models in which the optimality of the Friedman rule does not necessarily hold involves models of incomplete insurance markets and borrowing constraints. In these environments, agents hold fiat money (or any other asset) to self-insure against stochastic endowments and/or preferences. The consumption smoothing role of money was first developed in the work of Bewley (1980, 1983) who analyzes the optimality of the Friedman rule in incomplete market environments. He shows that there may not exist any monetary equilibria in which real balances remain bounded away from zero if the money supply is contracted at the discount rate called for by the Friedman rule. That is, a contraction of the money supply may prevent the existence of a monetary equilibrium in which real money balances provide "liquidity" to agents—exactly the opposite of Friedman's objective. This possibility arises from the positive probability that an agent receives a long stream of bad shocks to his endowments. Agents would like to hold an infinite amount of real balances against such a possibility if the return on real balances is sufficiently high

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<sup>1</sup>See also Williamson (1996), and Paal and Smith (2000) for environments in which positive nominal interest rates are desirable.

<sup>2</sup>Several studies compute the welfare implications of growth rates of money supply other than that proposed by Friedman (see Cooley and Hansen, 1989; Correia and Teles, 1996; Dotsey and Ireland, 1996; Aiyagari et al., 1998).

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