

The Optimal Inflation Tax*

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We determine the second best rule for the inflation tax in monetary general equilibrium models where money is dominated in rate of return. The results in the literature are ambiguous and inconsistent across different monetary environments. We derive and compare the optimal inflation tax solutions across the different environments and find that Friedman's policy recommendation of a zero nominal interest rate is the right one. *Journal of Economic Literature* Classification Numbers: E31, E41, E58, E62. © 1999 Academic Press

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1. INTRODUCTION

This paper addresses the issue of the optimal inflation tax in monetary general equilibrium models where money is dominated in rate of return. Friedman (1969) addresses this issue in a first best environment, where lump-sum taxes are available. He proposes a monetary policy rule that generates a nominal interest rate equal to zero, corresponding to a zero inflation tax and to a negative rate of inflation. The intuition is simple: since the marginal cost of supplying money is negligible, the marginal benefit should equal the marginal cost, and so the nominal interest rate should be set equal to zero.

We are interested in the more relevant second best results, i.e., when the government must finance government expenditures without having access to lump-sum taxation. Here, the literature is inconsistent, particularly across different monetary environments. The key inconsistency, which will be our main focus here, is that while in models that explicitly specify transaction technologies the Friedman rule is a general result, in models

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with money in the utility function the results are ambiguous. As pointed out by Woodford (1990), "either the Phelps or the anti-Phelps result is possible, depending upon details of specification." In any case, the conventional wisdom is still the intuition in Phelps (1973), that in a second best environment liquidity is a good that should be taxed, just as any other good. We clarify the issues involved and find that the Friedman rule is the optimal policy. The reason for the generality of this result is the fact that money is a free good. We show that since the cost of producing the good is zero, the optimal unit tax is also zero, under general conditions, translating into a robust optimal rule of a zero nominal interest rate. This result is important in that it translates into a very clean policy recommendation, independent of the parameterization of the economy.

The class of general equilibrium models that incorporate the feature of dominance in rate of return, and in which we perform the welfare analysis, are designed in a somehow ad hoc fashion.¹ Where this is more clearly so is in models where the preferences depend on the real quantity of money, as proposed by Sidrauski (1967) and Brock (1975). The fact that the use of money for transactions is not explicit in these models led Clower (1967) to propose a cash-in-advance restriction. Lucas (1980) and Lucas and Stokey (1983) used this approach in a general equilibrium framework. A more complete transactions technology, where it is assumed that time is substitutable for the use of money, was addressed by McCallum (1983), Kimbrough (1986), and McCallum and Goodfriend (1987).

Two major second best taxation sets of rules in the public finance literature have been used to justify the optimal inflation tax results: the Diamond and Mirrlees (1971) optimal taxation rules of intermediate goods and Ramsey's (1927) taxation rules of final goods, further developed by Atkinson and Stiglitz (1972). The Diamond and Mirrlees (1971) optimal taxation rules, derived for the case of constant returns to scale production functions, are the basis for the results in the literature of monetary models with transactions technologies.² In Correia and Teles (1996) we show that the Friedman rule is the optimal solution in these monetary models for all homogeneous transactions costs functions. We also show that the interpretation of this result is not a direct extension of the theorem of Diamond and Mirrlees but is related to the free good characteristic of money and to the special structure of production and taxation implied in this class of models.

¹ In contrast, models where the purpose is to generate an equilibrium positive price for fiat money are more fundamentally specified. The seminal papers are Samuelson (1958), Grandmont and Younes (1973), Bewley (1980), Townsend (1980), and Kiyotaki and Wright (1989). In these models, the perfect substitutability between money and bonds implies a zero nominal interest rate, and the policy issue is the determination of the real interest rate.

² See Kimbrough (1986), Guidotti and Végh (1993), and Chari *et al.* (1996).

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