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Jointly optimal monetary and fiscal policy rules under liquidity constraints

Huixin Bi [a], Michael Kumhof [b,*]

[a] International Economic Analysis Department, Bank of Canada, 234 Wellington Street, Ottawa, Canada
[b] International Monetary Fund, United States

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ABSTRACT

We study the welfare properties of an economy where both monetary and fiscal policies follow simple rules, and where a subset of agents is liquidity constrained. The welfare benefits of optimizing the fiscal rule are far larger than those of optimizing the monetary rule. The optimized fiscal rule implements strong automatic stabilizers that primarily stabilize the income of liquidity-constrained agents, rather than output. Transfers targeted to liquidity-constrained agents are the preferred fiscal instrument. The optimized monetary rule exhibits super-inertia and a weak inflation response. Optimized simple rules perform as well as the optimal policy under the timeless perspective.

1. Introduction

In the wake of the recent financial crisis we have seen a lively debate concerning the merits of activist fiscal policy. Given the perceived urgency of preventing a deep recession, the initial attention was mostly focused on the pros and cons of fiscal stimulus measures, but some attention is now shifting to the need for longer run sustainability. Remarkably though, the economics profession entered this period of turmoil with few analytical tools to think about the systematic use of fiscal policy in response to the business cycle. Specifically, and unlike the monetary policy literature since Taylor (1993), there was little work on rules-based fiscal policy. This is where our paper attempts to make a contribution, by proposing and evaluating a novel and simple policy rule whereby the fiscal surplus to GDP ratio responds to a tax revenue gap. The paper studies the welfare consequences of jointly optimizing this fiscal rule and a conventional monetary rule, in an economy where a subset of households is liquidity constrained. We show that, despite its simplicity, our rule is able to match the welfare performance of the optimal policy from the timeless perspective.

Taylor (2000) discusses a fiscal rule in which the budget surplus responds to the output gap. He advises against it, and argues that the role of fiscal policy should be limited to "letting automatic stabilizers work" .[1] But this raises the very

* Corresponding author. Address: Deputy Division Chief, Modeling Unit, Research Department, International Monetary Fund, 700 19th Street NW, Suite 9-548E, United States. Tel.: +1 202 623 6769; fax: +1 202 623 8291.

E-mail addresses: hbi@bankofcanada.ca (H. Bi), mkumhof@imf.org (M. Kumhof).

[1] This view is supported by the more recent work of Schmitt-Grohé and Uribe (2007) and Kollman (2008). Both papers assume that all households are unconstrained and infinitely-lived, and their fiscal rules use a debt gap but no real activity gap.

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important question of how strong automatic stabilizers should be to maximize policy objectives. This question can be mapped into the problem of finding the optimal countercyclicality of a fiscal rule, which is at the heart of this paper.

Taylor (2000) makes two exceptions to his assessment, fixed exchange rate regimes and a situation where nominal interest rates approach their zero lower bound. There is however a third exception that has so far been largely neglected by the literature,[2] the presence of a significant share of liquidity-constrained households, meaning households who can neither borrow nor save, as in Gali et al. (2007).[3] There are several important reasons for considering such an environment. First, pure monetary business cycle models with nominal rigidities have been criticized for not adequately replicating the empirically observed short-run effects of fiscal policy, and non-Ricardian features such as liquidity-constrained households can help overcome some of these difficulties.[4] Second, the assumption of liquidity constraints is supported by recent empirical evidence that we will discuss when calibrating our model.

The relaxation of the liquidity constraint, by way of the government substituting its ability to borrow for that of constrained households, partially offsets the effects of a market imperfection and is therefore critical for aggregate welfare. The real activity gap in the fiscal rule should therefore move closely with the tightness of the liquidity constraint, which ends up arguing strongly against choosing the output gap, and in favor of choosing an appropriate tax revenue gap. When this gap is present, the inclusion of an additional debt gap turns out to be redundant. Stabilization of the interest-inclusive surplus to GDP ratio at a long-run target value does stabilize the debt to GDP ratio, but with a near unit root on debt.[5]

We show that tax revenue gap rules can be used to represent a continuum of rules from balanced budget rules to highly countercyclical rules. We find that the welfare gains available by moving from the former to the latter are very large compared to what is typically found in the monetary policy literature, and also compared to the welfare gains from optimizing monetary policy in our own model. Furthermore, these welfare increases have only modest costs in terms of additional fiscal instrument volatility. This argues in favor of implementing powerful automatic stabilizers such as unemployment insurance, as long as the associated incentive problems can be addressed. The best fiscal instrument is transfers targeted to liquidity-constrained households.

The optimal monetary policy rule exhibits super-inertia and a very small coefficient on inflation. The reason is that a gradual, non-aggressive interest rate response stabilizes the real wage, which improves welfare both by stabilizing the income of liquidity-constrained households, and by reducing the labor supply volatility of unconstrained households. This part of our results is similar to Stehn (2009), who uses a linear-quadratic model without capital.

From the point of view of a policymaker the optimality of a policy rule encompasses not only the maximization of household welfare, but also the avoidance of excessive instrument volatility. An analysis of fiscal and monetary instrument volatility will therefore accompany our welfare analysis. For welfare analysis, we perform a full second-order approximation of the model, and we numerically optimize the coefficients of the policy rules by way of grid searches. To complete the analysis we present a comparison of optimal simple rules with the optimal policy from the timeless perspective.

The remainder of the paper is organized as follows. Section 2 describes the model. Section 3 discusses calibration of a baseline model. Section 4 presents impulse responses and welfare results for the baseline model. Section 5 compares optimal simple rules and the optimal policy from the timeless perspective. Section 6 concludes. The model's first-order optimality conditions and some technical details are contained in a separate Technical Appendix.

2. The model

We consider a closed economy that is populated by two types of households, both of which consume output and supply labor. Infinitely lived households, identified by the superscript *INF*, have full access to financial markets, while liquidity-constrained households, identified by *LIQ*, are limited to consuming their after-tax wage income, augmented by government net transfers, in every period. The share of *LIQ* households in the population equals ψ. Technology grows at the constant rate $g = A_t/A_{t-1}$, where A_t is the level of labor augmenting technology. The model's real variables, say x_t, therefore have to be rescaled by A_t, where we will use the notation $\check{x}_t = x_t/A_t$. The steady state of $\check{x}_t$ is denoted by $\bar{x}$.

2.1. Infinitely lived (INF) households

The utility of a representative *INF* household at time t depends on consumption c_t^{INF}, labor supply ℓ_t^{INF} and government consumption spending c_t^g. Lifetime expected utility has the form

$$U_0^{INF} = E_0 \sum_{t=0}^{\infty} \beta^t \left(\left(1 - \frac{\upsilon}{g}\right) \epsilon_t^c \ln\left(c_t^{INF} - \upsilon \bar{c}_{t-1}^{INF}\right) - \frac{\kappa}{1+\frac{1}{\gamma}} \left(\ell_t^{INF}\right)^{1+\frac{1}{\gamma}} + \chi^{INF} \ln\left(c_t^g\right) \right), \tag{1}$$

[2] For recent exceptions see Kumhof and Laxton (2009) and Stehn (2009).

[3] Alternative terminologies used in the literature include rule-of-thumb or hand-to-mouth consumers, and limited asset markets participation.

[4] See Fatas and Mihov (2001), Blanchard and Perotti (2002), Ganelli and Lane (2002) and Gali et al. (2007). An alternative way of modeling non-Ricardian household behavior uses overlapping generations models following Blanchard (1985) and Weil (1989). See Chadha and Nolan (2007) for an analysis of fiscal policy rules in the overlapping generations framework.

[5] This has been found to be optimal in the theoretical literature. For a prominent example see Aiyagari et al. (2002).