# Monetary policy and fiscal limits with no-default

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A R T I C L E   I N F O

A B S T R A C T

This paper discusses monetary and fiscal policy interactions that stabilize government debt. Two distortions prevail in the model economy: income taxes and liquidity constraints. Possible obstructions to fiscal policy include a ceiling on the equilibrium debt-to-GDP ratio, zero or negative elasticity of tax revenues, and a political intolerance of raising tax rates. At the fiscal limit two mechanisms restore solvency: fiscal inflation, which reduces the real value of nominal debt, and open market operations, which diminish the size of government debt held by the private sector. Three regimes achieve this goal. In all regimes monetary policy is passive. In all regimes a muted tax response to government debt is consistent with equilibrium. The propensity of a fiscal authority to smooth output is found to determine what is an acceptable response (in the form of tax rate changes) to the level of government debt, while monetary policy determines the timing and magnitude of fiscal inflation. Impulse responses show that the inflation and tax hikes needed to offset a permanent shock to transfers are lowest under nominal interest rate pegs. In this regime, most of the reduction in the real value of government debt comes from open market purchases.

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## 1. Introduction

This paper discusses stabilizing fiscal-monetary regimes at the 'fiscal limit,' where the government is able to increase tax revenues only by small amounts. Fiscal limits imply that current deficits are financed mainly by increasing government debt. Assuming no outright default, this regime is sustainable only if market equilibrium brings about fiscal solvency. In this situation, the real value of nominal government debt is determined according to the celebrated fiscal theory of the price level, whose canonical foundations are set in Leeper (1991), Sims (1994), Woodford (1995), and Bassetto (2002). The contribution of this paper is to extend the conventional treatment of monetary-fiscal policy interactions, in which there is lump-sum taxation only, to an economy with distortionary taxation, capital accumulation, and liquidity constraints. As a result, the issue of nominal and real determinacy implies a new role for monetary policy in a fiscal theoretic equilibrium that is not the classical passive stance. Specifically, this paper recognizes the crucial role of open market operations in the stabilization of government debt, and specifies policy prescriptions that restore fiscal solvency. Moreover, it demonstrates that some interactions can substantially moderate the extent of fiscal inflation and fiscal consolidation required to stabilize government debt.

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Under the conditions I will discuss in this paper, fiscal limits arise endogenously from the underlying distortions and the requirement to run a balanced budget in the long run. In addition, in my analysis the interaction between monetary and fiscal policy reflects actual practice in at least two dimensions:

I: In practice, fiscal authorities have limited or no access to lump-sum taxation and therefore implement their policies primarily by distorting taxes. This can become very limiting as the economy approaches the peak of its Laffer curve.[1] Accordingly, my analysis does not rule out government borrowing subject to zero elasticity tax revenues.

II: Political intolerance to raising tax rates can markedly limit fiscal policy. Accordingly, my analysis does not rule out fiscal rules according to which tax rates exhibit weak or mute responses to the state variables.

Prominent work on fiscal stress includes Cochrane (2011), Davig et al. (2010, 2011), Davig and Leeper (2010), Sims (2011), and Bi et al. (2013). This literature typically assumes that a blunt default is inconceivable to both lender and borrower, and examines the impact of alternative fiscal and monetary policy adjustments that ensure government solvency. Fiscal solvency is restored chiefly through fiscal inflation and an expected future fiscal consolidation. Although in these models rapid bursts of inflation are a feature of the equilibrium, they are considered very low-probability events that affect inflation expectations only through the small probability that households attach to those bursts. However, as households attach more probability to policy makers' attempts to stabilize debt with passive monetary policy, upward drift in inflation expectations and inflation itself become more pronounced. In particular, Davig et al. (2011) show that without significant and meaningful fiscal policy adjustment, the task of meeting inflation targets will become increasingly difficult.

My contribution builds on this literature. Capital accumulation and distortionary taxation add a complication to aggregate dynamics, since capital and bonds are perfect substitutes in households' portfolios. However, these stores of value in fact differ from one another, as the marginal product of capital is distorted by a liquidity constraint and an income tax. As a result, any policy response – via either the nominal rate of interest or the income tax rate – potentially drives households to transfer wealth between bonds and capital, creating an arbitrage effect. In this story, if the government encounters a shock that causes fiscal stress it has access to two mechanisms to devalue its debt: fiscal inflation, which reduces the real value of nominal debt, and open market purchases, which reduce the amount of government debt held by the private sector. However, these mechanisms are not straightforward. Fiscal inflation can successfully reduce nominal debt only if the fiscal policy brings about wealth effects. Similarly, open market operations can reduce government debt if the private sector has an incentive to transfer wealth from bonds to capital. Only in that case purchases of government debt in the open market substantially can reduce fiscal inflation. The implications of this are threefold. First, the government must explicitly proclaim exactly three policy targets (e.g., an inflation target, lump-sum transfers, and a debt-to-GDP ratio). Remaining long-run levels are implied by a condition that the consolidated budget is balanced in the steady state. Second, once debt deviates from its sustainable level, under all types of policy interactions the government must let its debt grow at a faster rate than the growth in tax revenues. This result is consistent with the fiscal theory of prices. Finally, according to the fiscal theory of the price level, an active fiscal policy must interact with a passive monetary policy. In this paper, the usual characterization of this regime no longer obtains: three regimes arise in which monetary policy is passive and fiscal policy adjusts income tax rates in response to debt and output. In these regimes, a sensible fiscal rule both motivates households to transfer wealth from bonds to productive capital at the private level and, at the same time, impedes self-fulfilling herd runs from bonds to capital. Open market purchases can then reduce the amount of government debt held by households, resulting in lower future inflation. Importantly, this mechanism is effective even when the elasticities of tax revenues are negative or when tax rates respond very weakly to the state variables. An important feature of this mechanism is that the interaction between monetary and fiscal policies must induce a return on capital investment that, after taking all distortions into account, is higher than the real rate of interest. Liquidity constraints on investment that operate as capital adjustment costs enable this discrepancy to exist without implying an arbitrage.

The rest of the paper is organized as follows. Section 2 describes the economic environment, the optimal decision making of the representative household, and the evolution of government debt. Section 3 contains a detailed general equilibrium analysis. (All proofs are deferred to the Appendix.) Section 4 describes stabilizing monetary-fiscal regimes. Section 5 discusses the computation of equilibrium, shows how the economy responds to changes in the proclaimed inflation and tax rate targets under the scenario of distortionary taxation, and provides impulse responses to a permanent increase in transfers. Section 6 concludes.

## 2. The economic environment

Time is continuous. The economy is closed and populated by a continuum of identical infinitely long-lived households, with measure one. The representative household enjoys consumption, and is endowed with perfect foresight and one unit of time per "period" which it supplies inelastically. Accordingly, the representative household's lifetime utility is given by

$$U_t = \int_t^\infty e^{-\rho s} u(c_s)\, ds \tag{1}$$

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[1] Trabandt and Uhlig (2010) estimate that tax rates in 14 EU countries are slightly below the peak of their respective Laffer curves, and Denmark and Sweden are on the wrong side of the Laffer curve for capital income taxation.