



Dealing with a liquidity trap when government debt matters: Optimal time-consistent monetary and fiscal policy[☆]



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ABSTRACT

How does the need to preserve government debt sustainability affect the optimal monetary and fiscal policy response to a liquidity trap? To provide an answer, we employ a small stochastic New Keynesian model with a zero bound on nominal interest rates and characterize optimal time-consistent stabilization policies. We focus on two policy tools, the short-term nominal interest rate and debt-financed government spending. The optimal policy response to a liquidity trap critically depends on the prevailing debt burden. While the optimal amount of government spending is decreasing in the level of outstanding government debt, future monetary policy is becoming more accommodative, triggering a change in private sector expectations that helps to dampen the fall in output and inflation at the outset of the liquidity trap.

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1. Introduction

New Keynesian characterizations of optimal time-consistent monetary and fiscal policies in a liquidity trap typically omit government debt from the analysis, assuming that government purchases are financed by lump-sum taxes (e.g. [Werning, 2011](#); [Schmidt, 2013](#); [Nakata, 2013](#)).¹ At the same time, the protracted increase in government debt-to-GDP ratios in the course of the recent global financial crisis in major industrialized countries raises important questions about the appropriate stance of monetary and fiscal policy. Should policymakers adhere to fiscal stimulus in the face of a zero lower bound event if the level of government debt is already above its long-run target? How does the need to ensure debt sustainability act upon the effectiveness of monetary policy? In terms of model-based characterizations of optimal policies at the zero lower bound, is the conventional omission of government debt innocuous or do our normative prescriptions change when we account for the fact that lump-sum taxes in general do not adjust one-to-one with other fiscal variables?

[☆] The views expressed in this paper are those of the authors and do not necessarily represent those of the European Commission or the European Central Bank.

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¹ We use the term liquidity trap to describe an environment characterized by a binding zero nominal interest rate bound constraint.

We address these questions in a stylized stochastic New Keynesian model with a zero bound on nominal interest rates that accounts for government debt in the form of non-state-contingent, one-period, nominal government bonds as a means of financing government spending. Economic uncertainty arises from the presence of a demand shock. The benevolent government controls the short-term nominal interest rate and the level of government spending, and decides about the supply of government bonds. Hence, in the economy that we consider the central bank and the fiscal authority coordinate their policy measures. We focus on time-consistent policy regimes since it is the absence of a commitment device that renders the zero lower bound detrimental for stabilization policy.² Households appreciate private consumption as well as the provision of public goods and dislike labor. In the baseline model, we assign only a very limited role to tax policy. First, private consumption and household labor income are taxed at constant rates, providing revenues to the government. Second, lump-sum taxes are used to finance a constant wage subsidy to ensure that the distortions arising from monopolistic competition in the goods market and from the other taxes are eliminated in the non-stochastic steady state. However, we also present results for the case where the policymaker sets the labor tax rate optimally.³

We solve the model using a projection method and then explore how government debt affects optimal policies and stabilization outcomes when the zero bound on nominal interest rates becomes occasionally binding. The presence of government debt makes the optimal time-consistent policy in the model history dependent, that is, the future path of the policy instruments depends on today's level of government debt. We show that, first, for a given realization of the demand shock, government spending is decreasing in the level of outstanding government debt, i.e. the fiscal stance becomes more contractionary when government debt rises. Second, as long as the zero lower bound is not binding, the nominal interest rate is decreasing in the level of government debt. Real interest rates keep declining as a function of the debt level even if the zero bound on the nominal rate is binding. Third, output and inflation are both increasing in beginning-of-period debt, irrespective of whether the zero bound is binding or not.

How the model economy responds to a liquidity trap thus critically depends on the prevailing government debt level. If, for instance, the level of outstanding government debt is high relative to its steady state, then the optimal policy mix will prescribe at most a small government spending stimulus, followed by a spending reversal, and a prolonged period of expansionary monetary policy. The policymaker creates valid expectations of a subsequent boost in inflation and output above target that help to dampen the economic turmoil at the outset of the liquidity trap. If, on the other hand, the public debt level is low relative to its steady state, government spending is used forcefully to stimulate aggregate demand, when the economy falls into a liquidity trap. In this situation, however, the zero bound episode is not followed by a transitory upswing in output and inflation. In the absence of the expansionary expectation effects of the high debt scenario, the low debt scenario exhibits larger drops in output and inflation.

The ability to issue government debt allows the policymaker to influence private sector expectations without engaging in time-inconsistent policies. As emphasized by [Krugman \(1998\)](#) and [Eggertsson and Woodford \(2003\)](#), during zero lower bound episodes, expectations about future output and inflation can have considerable effects on contemporaneous stabilization outcomes. We demonstrate the powerfulness of government debt-induced history dependence by comparing optimal discretionary policies and stabilization outcomes for a liquidity trap scenario in our baseline economy with those in the conventional model setup that features zero government debt and lump-sum taxes that adjust each period to balance the government budget.

Our paper is closely related to work by [Eggertsson \(2006\)](#), who first showed that the accumulation of government debt allows a discretionary policymaker to influence expectations about the path of monetary policy after the liquidity trap. Our paper differs from this earlier work in several respects. First, the fiscal instrument considered by Eggertsson is a lump-sum tax. In his model, the policymaker lowers lump-sum taxes when the zero bound is binding in order to increase government debt. Tax collection costs make it credible that the increase in government debt will not be solely undone by future tax increases. There is no immediate trade-off for fiscal policy in a liquidity trap between stimulating the economy and stabilizing government debt. In our paper, the liquidity trap shock reduces the tax base, which may force the policymaker to tighten fiscal policy while the zero lower bound is binding. Second, in Eggertsson's model, the economy starts in a liquidity trap state and returns to the normal state with a constant probability in each subsequent period, where it will stay forever. Instead, in our model, the zero nominal interest rate bound is an occasionally binding constraint. We show that the outstanding amount of government debt prior to the zero bound event critically affects stabilization policies and outcomes in the liquidity trap. For instance, if government debt is low relative to its steady state, then the policymaker may refrain from lowering the nominal interest rate all the way to zero, which exacerbates the fall in output and inflation. Finally, we show that, unlike in [Eggertsson \(2006\)](#), the optimal discretionary policy is not necessarily associated with a transitory rise in output and inflation above the target after the liquidity trap.

The paper can also be related to studies that investigate optimal monetary and fiscal policy under commitment at the zero lower bound and account for the presence of government debt. [Eggertsson and Woodford \(2006\)](#) determine the optimal nominal interest rate and tax policy mix. [Nakata \(2011\)](#) characterizes the optimal plan for distortionary taxes, government spending and the short-term nominal interest rate.

² For a characterization of optimal monetary policy under commitment see e.g. [Eggertsson and Woodford \(2003\)](#), [Jung et al. \(2005\)](#), [Adam and Billi \(2006\)](#) and [Nakov \(2008\)](#).

³ For a characterization of optimal unconventional fiscal policy at the zero bound, i.e. the use of various tax instruments, see [Correia et al. \(2013\)](#).

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