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Optimal debt management in a liquidity trap☆

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ABSTRACT

We study optimal debt management in the face of shocks that can drive the economy into a liquidity trap and call for an increase in public spending in order to mitigate the resulting recession. Our approach follows the literature of macroeconomic models of debt management, which we extend to the case where the zero lower bound on the short-term interest rate may bind. We wish to identify the conditions under which removing long-maturity government debt from the secondary market can be an optimal policy outcome. We show that the optimal debt-management strategy is to issue short-term debt if the government faces a sizable exogenous increase in public spending and if its initial liability is not very large. In this case, our results run against the standard prescription of the debt-management literature. In contrast, if the initial debt level is high, then issuing long term government bonds is optimal. Finally, we find a role for revisions in the debt management strategy during LT episodes, whereby the government actively manages the maturity structure, in some cases removing long bonds from the secondary market.

1. Introduction

A prominent characteristic of the latest recession in the US was the sharp decline in short-term nominal interest rates, which reached their zero lower bound (ZLB), a situation referred to as the liquidity trap (LT). At the same time, large rises in spending levels led to rapid increases in government debt liabilities, bringing to surface concerns over the solvency of the government's budget. The maturity structure of debt held by the public also went through a dramatic shift; the buybacks of long term bonds from the secondary market conducted by the Federal Reserve contributed to a sharp shortening of the maturity of debt in the hands of the private sector.

In this paper, we study optimal debt management in a LT. We follow the trail of a literature that analyzes government portfolios in macroeconomic models in which the optimal choice of the maturity structure of public debt enables the government to smooth taxes through time (e.g., Angeletos, 2002 and Buera and Nicolini (2004), hereafter ABN, Faraglia et al., 2010 among others). The optimal portfolios that emerge from these models feature two key properties: first, issuing only long term debt is optimal, since this allows the government to take full advantage of the negative covariance between long

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bond prices and deficits, and 'complete the markets'; second, government portfolios are constant over time, meaning that governments do not have to actively manage the maturity of debt.

The above mentioned papers abstract from shocks that can drive the economy into a LT, focusing mainly on disturbances in the level of spending. We wish to determine whether this plays a role in producing optimal policies which are so far from observed practices during the recent downturn.

Our model features monopolistic competition and sticky prices, and assumes that monetary and fiscal policies are coordinated; a benevolent planner with full commitment controls inflation and distortionary taxes. We model LTs assuming shocks to preferences which raise the discount factor and induce agents to postpone consumption (e.g., Eggertsson and Woodford, 2003, 2006 and Christiano et al., 2011). Realistically, we consider cases where these shocks are accompanied by simultaneous increases in spending levels.

Using our model we ask: What types of debt should the government issue in LTs, and also is there a role for active debt management during these episodes? Our findings are as follows: First, issuing only long term bonds is not (always) the optimal policy. Depending on the magnitude of the spending shocks and the initial debt level of the government, it may be that short term financing is optimal; when the initial liability is low and the increase in public spending that occurs when the economy enters the LT is substantial, the government prefers to issue short bonds. Second, the bond positions that emerge from our model are not constant through time. We find a role for revisions in the debt management strategy during LT episodes, whereby the government actively manages the maturity structure, in some cases removing long bonds from the secondary market.

To understand the first finding, that long bonds are not always optimal, note that when preference shocks hit, long bond prices increase so that a government that issues long debt experiences an increase in its liability. Whether or not is optimal to incur this loss in the value of debt depends on the response of current and future primary surpluses to preference and spending shocks. There are two effects in the model. First, spending shocks put the intertemporal budget of the government into deficit. Second, preference shocks lower future interest rates and so tend to increase the present value of the future surpluses to which the government must commit in order to repay a high initial debt level. If the first effect prevails, when spending shocks are substantial and initial debt levels are not, then the covariance between long bond prices and government deficits becomes positive and short term financing is optimal. If the second effect is the dominant one, the covariance is negative, and this restores the optimality of long term debt.

Our second finding, that optimal portfolios may be rebalanced during LT episodes, is due to the fact that in the presence of the ZLB constraint, the Ramsey equilibrium outcome is 'history dependent' even though we assume complete financial markets. This property is well known; in the presence of constraints involving forward expectations of future endogenous variables (in our case consumption and inflation) the history of shocks that hit the economy matters for allocations. Since in our model this involves changes in taxes, consumption and inflation through time, it impacts asset prices and government deficits, making it optimal to rebalance portfolios.

Section 2 of our paper describes the model economy and the Ramsey policy equilibrium. In Section 3, we consider a version of our model – with quasi-linear preferences – that delivers analytical results for the optimal portfolio. Since in this case real interest rates are not impacted by consumption growth (and therefore taxes), the government can only rely on committing to a higher level of future inflation to satisfy the ZLB constraint. As we show, in this model, the impact of the history of shocks on the optimal allocation is limited. This property is summarized by the fact that the Lagrange multiplier on the ZLB constraint remains constant through time. This turns out to be a special case of our model which implies that the optimal portfolio remains constant throughout the LT. Portfolio rebalancing during LTs obtains only under curved utility, when policy can influence future consumption levels through taxation. Section 4 relies on numerical simulations to solve the model under more general preferences, and Section 5 concludes.

This paper is closely related to two further strands of the literature. First, there is a long stream of papers which characterize optimal fiscal and monetary policies under the ZLB and in a variety of policy environments, featuring either full commitment or discretion. Prominent examples are Adam and Billi (2006); Eggertsson (2006); Eggertsson and Woodford (2003, 2006); Schmidt (2013); Werning (2011); Jung et al. (2005); Nakata (2013) and Bouakez et al. (2017). The findings of these papers are obviously relevant to our analysis; for example the Ramsey policy outcome in our model ought to be similar to Eggertsson and Woodford (2006). Since our focus is on debt management, we spend little time discussing the properties of taxes and inflation, since these are known from the previous literature. The only case where we insist on these properties is in Section 3, where we present analytical results under quasi-linear utility. To our knowledge, the expressions and results contained in Section 3 are new and complement previous findings in the literature.

Second, a recent literature studies the impact of long term asset purchases by the Federal Reserve (Quantitative Easing) during the recent downturn (see e.g., Chen et al., 2012; De Graeve and Theodoridis, 2016 among others). In these models government bond markets are segmented, due to transaction costs and investors with 'preferred habitats'- trading only in an subset of the assets available.[1] These models are therefore suitable to analyze if long bond purchases had an impact on long term interest rates and thus on consumption and investment during the recession. We abstract from these features; our analysis builds on the presumption that markets are complete. But with our frictionless benchmark we offer an alter-

[1] See also Vayanos and Vila (2009), Guibaud et al. (2013) and Greenwood et al. (2015) for alternative microfoundations of bond market clienteles and preferred habitat.

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