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Speculative runs on interest rate pegs

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ABSTRACT

We analyze a new class of equilibria that emerges when a central bank conducts monetary policy by setting an interest rate (as an arbitrary function of its available information) and letting the private sector set the quantity traded. These equilibria involve a run on the central bank's interest target, whereby money grows fast, private agents borrow as much as possible against the central bank, and the shadow interest rate is different from the policy target. We argue that these equilibria represent a particular danger when banks hold large excess reserves, such as is the case following periods of quantitative easing. Our analysis suggests that successfully managing the exit strategy requires additional tools beyond setting interest-rate targets and paying interest on reserves; in particular, freezing excess reserves or fiscal-policy intervention may be needed to fend off adverse expectations.

1. Introduction

Until the last few years, most central banks (CBs) around the world conducted monetary policy by setting targets for short-term interest rates. Maneuvering interest rates as a way to achieve low and stable inflation is now regarded as a success story, and it is widely expected that it will return to be the dominant tool of monetary policy as soon as the economy and inflation recover enough to warrant moving away from the zero lower bound on nominal interest rates.

The aftermath of quantitative easing implies subtle differences for interest-rate management that have however potentially dramatic implications for the control of the price level. Taking the Federal Reserve System as an example, before 2008, day-to-day implementation of a given interest-rate target was entrusted to open-market operations undertaken by the trading desk of the Federal Reserve Bank of New York; the trading desk retained full control of the *quantity* of monetary base available for transactions.[1] In the aftermath of quantitative easing, the monetary base is much larger than what is demanded purely for transaction reasons, and, during the period of exit, control of interest rates is expected to be achieved by setting a *price*, the interest paid on bank reserves. Interest on reserves acts as a floor on the interest rate in the interbank

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[1] For further discussion of the tools used by the Federal Reserve for managing interest rates, see Goodfriend (1991).

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market, as described in Goodfriend (2002). By setting an appropriate interest on reserves, it is expected that banks will not attempt to lend out their excess funds on deposit at the CB, and that interbank rates will remain close to this floor. In this case, the excess monetary base that is not needed to carry out everyday transactions would remain effectively parked at the CB. But what would happen instead if banks and the public lost confidence in the central bank's ability to keep inflation in control and started trying to use those reserves at once? In this paper, we consider this possibility and we argue that purely setting interest on reserves is an insufficient tool to achieve price stability; we show that this policy is subject to "runs." A CB that persisted using only interest on reserves as its policy tool in the face of a run would face hyperinflation. Other, more likely exit scenarios in such adverse circumstances involve freezing excess reserves or fiscal-policy intervention; these scenarios thus deserve further attention.

We conduct our analysis in a simple environment that features flexible prices and a standard cash-in-advance constraint, where the intuition for our results is simple and transparent; however, our results would extend to models with frictions. In this setup, we introduce a CB that sets the one-period interest rate; this interest rate need not be fixed, but rather may depend in arbitrary ways on all the information that the CB has at the moment it makes its decision. The private sector is free to choose quantities traded with the CB, *up to a limit*. In the case of interest on reserves, this limit is zero: banks cannot hold negative reserves. More generally, the CB could (and does) allow borrowing, but this is limited, typically by collateral requirements. We show that setting a policy rate in this way leads to multiple equilibria. Some of the equilibria are familiar and common to the environments where limits to money growth are not considered.[2] However, new equilibria emerge, where money growth and inflation are higher. These equilibria involve a run on the CB's interest target: the private sector borrows as much as possible from the central bank, money in circulation grows fast, and the shadow interest rate in the private market is different from the policy rate.

In our environment, the severity of a run is affected by the size of the trades that the private sector can undertake against the CB. In the case of quantitative easing and interest on reserves, this is determined by the size of the CB's balance sheet. More generally, if government bonds are an important source of collateral to borrow from the CB, fiscal policy plays a prominent role in defining the characteristics of equilibria that feature runs.[3] This is a new channel by which excessive deficits affect price stability, and it is independent of the familiar unpleasant monetarist arithmetic of Sargent and Wallace (1981) and of the fiscal theory of the price level (Leeper, 1991; Sims, 1994; Woodford, 1994). In fact, we deliberately rule out these alternative channels of monetary-fiscal interaction by postulating fiscal rules that ensure long-term budget balance independently of the path of inflation.

In an extension of our model, we consider what happens if the central bank sets interest rates in a (possibly narrow) sliver of the market, rather than standing ready to buy and sell a large swathe of securities at a set price. When no run occurs, we show that the equilibrium remains the same independently of the size of the market in which the central bank operates. But if a run occurs, the consequences are more limited the more circumscribed this market. This provides a rationale for why central banks may find it attractive to set targets only for very short-term interest rates (a relatively small portion of the entire bond market), but refrain from doing the same for a broad spectrum of the yield curve.

This extension also allows us to consider the difference between targeting interest rates on Treasury paper and obligations of the CB itself (excess reserves). In the absence of a run, Eggertsson and Woodford (2003) and Goodfriend (2014) explain why quantitative easing is neutral if it is conducted by purchasing short-term Treasury securities that pay the same interest rate as the newly created excess reserves (and serve the same liquidity needs at the margin). In the event of a run, however, short-term Treasury securities and excess reserves need not be equivalent, and the size of the CB balance sheet is important. It is easy for the CB to stop buying Treasury securities in the face of large unexpected supply by the banking sector, thereby retaining control over the monetary base in circulation. Conversely, preventing banks from attempting to use their excess reserves involves changes in reserve requirements, a tool that central banks in developed economies have not used recently and that might be difficult to deploy, for political and legal reasons, on the scale needed to reabsorb the current levels of excess reserves in Japan, the United States, or the United Kingdom.[4] That is, the CB converting *excess* reserves to *required* reserves precisely because commercial banks wish to withdraw them could be interpreted as the CB defaulting on its promises.

In the simple setup that we describe, in the event of a run, households force the central bank to its bound in a single period. In practice, the unfolding of a run would be slowed by a number of frictions that may prevent all households from running at once with all of their nominal wealth; these frictions may take the form of limited participation in bond markets (see, for instance, Grossman and Weiss, 1983; Alvarez and Atkeson, 1997; Alvarez et al., 2009), noisy information about other households' behavior, or the presence of long-term bonds whose price is not pegged by the central bank.

Our model sheds light on two historical episodes. In the more extreme case, the policy of the Reichsbank during the German hyperinflation fits well within our model. As mentioned by Sargent (1983), the German Reichsbank discounted

[2] Examples of these equilibria are those identified by Benhabib et al. (2001a,b) and those discussed in Cochrane (2011). In those equilibria, the Fisher equation linking interest rates and expected inflation remains valid, while the speculative runs that we identify involve high inflation and severe monetary distortions coexisting with low (official) nominal interest rates.

[3] Arguably, the size of a CB's balance sheet is a measure of "in-house" fiscal policy run by the monetary authorities, since it involves managing the magnitude of the CB's interest-bearing liabilities.

[4] As an example, in the United States, there are limits imposed by law on the Federal Reserve's ability to alter reserve requirements (Feinman, 1993); an Act of Congress would thus be needed to freeze reserves on the scale that would be required to absorb the current level of excess reserves.