Unconventional optimal open market purchases ☆

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A B S T R A C T

We build a model in which verifiability of private debt and a timing mismatch in debt settlements can lead to a liquidity problem in the financial market. The central bank can respond to the liquidity problem by adopting an unconventional monetary policy that purchases private debts in the open market. This policy is effective if the timing mismatch is nominal (i.e., a settlement participation risk). It is ineffective if the limited participation is driven by a real shock (i.e., preference shock).

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1. Introduction

Over the past two decades, central banks have engaged in activities that have been labeled unconventional. In contrast to conventional actions in which the central bank conducts reverse transactions with treasury securities, unconventional monetary policy applies to cases in which the central banks have either made direct loans to private creditors or purchased private securities in secondary markets. One example is that the Federal Reserve began purchasing mortgage-backed securities in 2008.[1] Another example is that since its inception, the European Central Bank has routinely purchased private credit securities, essentially making direct loans to certain sectors of the economy. Researchers have devoted considerable effort to explain whether and how unconventional monetary policies improve economic outcomes. More specifically, under what conditions are unconventional monetary policies improving long-run welfare?

To study the question, we build a three-period overlapping generations model in which both fiat money and private debt are valued in equilibrium. Fiat money is valued because it is the means of executing intergenerational transactions. Private debt is the means of executing intragenerational borrowing and lending. To be more concrete, each generation consists of

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[1] Schreft and Smith (2002) analyzed the conduct of monetary policy in a setting in which the quantity of government debt was small and shrinking. Private securities may have to be used in open market operations when no treasury debt is outstanding.

two types of agents: one type is endowed with capital (they will become lenders in our model) and the other type is capable of using the capital (these are the entrepreneurs). Entrepreneurs decide whether to sell short-term debt or long-term debt to the lenders. With the proceeds, entrepreneurs choose to employ the capital in either short-term production or long-term production. In general, the entrepreneur will match the debt duration with the production finish date. Short-term debt is settled in one period, and long-term is settled two periods after issue. Long-term debt offers a higher return because the marginal product is higher for long-term production. Debt can be redeemed either by offering the consumption good, which is produced by the production technologies and is valued by the lenders, or by offering fiat money, which can be used to purchase the consumption good.[2]

Our aim is to develop a model that captures several key observations when liquidity problems are present. Two features of the physical environment are essential to the liquidity problem in our model – the verifiability of private debt and timing mismatches in private debt settlement. Private debt contracts are not verifiable everywhere. So private debt cannot circulate as a means of payments for consumption goods and has to be redeemed at the settlement meetings. However, timing mismatches can occur between lenders and entrepreneurs. In the baseline model, this timing mismatch is modeled as a result of limited settlement market participation. Lenders face uncertainty in whether they can participate in long-term debt settlements. If they cannot, they sell long-term debt in a secondary market at a price determined by the available liquidity. Meanwhile, entrepreneurs choose the timing of their production completion, which in turn, will affect when they can redeem their debts. In our model, the timing mismatch is endogenous.

The verifiability problem and limited participation provide opportunities for trading unredeemed private debt in a secondary market, and in some cases, a liquidity problem arises.[3] In these cases, the demand for the liquidity is greater than the supply at the aggregate level. At the individual level, long-term entrepreneurs – that is, entrepreneurs who have chosen the long-term technology – are leveraged in the sense that the value of credit obligations exceed the value of liquid assets in the short run.[4] More concretely, one period after the loan is executed, the entrepreneur's available liquidity is his accumulated fiat money balances. If long-term entrepreneurs are able to accumulate sufficient money balances to redeem debts in the secondary market before their production completes, there is no leveraging and debt will be traded at par in the secondary market. Otherwise, debt will be sold at a discount price. Here, the "excess" borrowing is not a product of some information problem (for example, the principal–agent problem), nor is there a default risk in our model. The liquidity problem reflects some more basic features, namely the settlement risk that results from participation uncertainty.

If lenders are excluded from future settlement, they will seek to liquidate their debt holdings and sell their debt at a discount. Consequently, participation-constrained lenders would consume less than lenders who are not subject to the participation restriction. More importantly, the liquidity problem causes a misallocation of production. When debt sells at a discount price, there is an opportunity to make profit in the secondary market, inducing some entrepreneurs to choose the lower-return, short-term technology. This result offers insight into an explicit link between debt settlement and output. So that even with well-working secondary markets, participation risks give rise to liquidity problems, and consequently, lower output.

The central bank can address the liquidity problem using unconventional open market purchases. Here, the central bank purchases private long-term debts at par in the secondary market using money, holds the debt for one period and then settles with the entrepreneurs. To the extent that the consumption good is used to settle IOUs, the central bank exchanges the consumption good for fiat money, taking the money out of circulation. We refer to this policy as an unconventional open market purchase because the central bank is purchasing a private credit instrument in the open market as opposed to a treasury security.[5] Because of the overlapping generations structure of our model, the central bank conducts open market purchases and sells consumption goods simultaneously (but to different generations) in a period, and the aggregate money stock is constant over time. Hence, the unconventional policy redistributes liquidity to different markets. The liquidity injected in the secondary market raises the price of debt to par and eliminates profits in the secondary market. Thus, all capital is invested in the higher-return, long-term production and efficiency is achieved.

Like many other models on central bank policy, the central bank in our model is able to solve the liquidity problem because it has two advantages over individual agents.[6] First, it can costlessly produce fiat money and replace the unverifiable private debts with verifiable fiat money. Second, the bank is not subject to the settlement participation restrictions. So the

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[2] The settlement process described here is essentially the same as that put forward in Freeman (1996). We modify it so that units of the consumption good are also acceptable as a settlement device. We can say that private debt in this model economy is consistent with the real bills doctrine.

[3] Lippman and McCall (1986) provide an excellent overview of the concept of liquidity. Throughout our analysis, we adopt the notion put forward by Hirshleifer (1968), who argued that liquidity is "an asset's capability over time of being realized in the form of funds available for immediate consumption or reinvestment – proximately in the form of money" (p. 1). Outside money can be used generally to obtain consumption goods because it is verifiable while inside money is more limited because it is not verifiable.

[4] See Holmstrom and Tirole (2011) for a description of the interaction between liquidity and leveraging.

[5] Hence, the liquidity problem is solved by a modified version of Gertler and Karadi's (2011) unconventional monetary policy. The trades include some of the aspects of Freeman's (1996) collateralized discount window loans. Because the consumption good can also be used to settle IOUs, his action is a special case of our operating procedure. Mills (2006) also proposes a collateralized loan from the central bank as a means of providing liquidity.

[6] Reis (2009) provides an excellent overview of how the Federal Reserve increased both direct lending and private security purchases between 2007 and 2009. In his model, the central bank must have some special powers beyond those of private investors to improve economic outcomes. These powers amount to endowing the central bank with technological advances that other agents do not possess as Reis considers three intermediate cases: the central bank is better at evaluating investment projects, better at evaluating existing securities, and better at monitoring. Reis makes the point clearly that the central bank must be able to exercise some unique abilities to be able to possibly improve economic outcomes. The question is, are these advantages unique