A note on US excess bank reserves and the credit contraction

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Abstract

This paper reports aggregate bank excess liquidity preference curves for the pre-crisis and crisis periods. It is argued that the flat curve reflects a threshold lending rate at which point banks accumulate reserves passively. Moreover, the expansion of reserves – when the lending rate threshold is binding – does not lead to credit expansion. The latter would require policies that directly increase the demand for loans, particularly by the business sector.

JEL Classifications: E40, E41, G21

Key Words: excess bank reserves, minimum loan interest rate, credit crunch

1. Introduction

Recently there have been several contributions regarding the cause and consequences of the massive accumulation of excess bank reserves in the United States. The data from the Federal Reserve indicate a spectacular and sustained build up of excess reserves since the third quarter of 2008. Keister and McAndrews (2009) note that the total level of reserves in the banking system is "determined almost entirely by the actions of the central bank and not affected by private banks' lending decisions" (p.2). In other words, the accumulation of reserves reflects the Federal Reserve's policy actions rather than commercial banks' inaction. Moreover, Keister and McAndrews (2009) underscore the passive nature of the reserve accumulation that need not be inflationary.

On the inflation question, Keister *et al* (2008) explain that the Federal Reserve could still make monetary policy effective by paying banks interest on reserves[1]. This policy creates a floor interest rate that allows the central bank to maintain an influence over market conditions in spite of the significant excess reserves and the broken relationship between bank reserves and the money supply. Furthermore, according to the aforementioned authors, the payment of interest on bank reserves provides an opportunity for the central bank to use two instruments – bank reserves to address bank panics and the floor interest rate to deal with inflationary pressures.

Nevertheless, several analysts have noted the potential inflationary effects of excess reserves – for instance Meltzer (2009) and Feldstein (2009). In past studies, however, several observers have noted that the inflationary effects depend on whether the demand for excess reserves represents desired or undesired quantities (see Lindley *et al* 2001[2]; Mounts *et al* 2000). For instance, an expansion of desired excess reserves would lead to credit and money supply expansion, which could engender inflationary pressures. On the other hand, undesired reserves would be demanded as excess reserves and have no effect on the money supply.

Utilizing a similar idea, Agénor *et al* (2004) estimate an excess bank liquidity function for Thailand in order to determine whether the rapid contraction of bank credit,

[1] The same point was also made in Keister and McAndrews (2009).

[2] Lindley *et al* (2001) also did a brief review of the literature pertaining to the two camps of researchers espousing the views of desired (active) versus undesired (passive) excess reserves.

after the Asian financial crisis, was due to a credit crunch (supply phenomenon) or due to a contraction in private sector demand for loans. The latter would imply that the excess liquidity demand by banks is involuntary, passive or undesired[3]. Recently, Edlin and Jaffee (2009) note that the accumulation of excess reserves to "dizzying heights" reflects a credit crunch; therefore, they recommend that policies be instituted to facilitate credit expansion from excess reserves as this could be an alternative source of economic stimulus instead of the fiscal operation.

This essay sets out to explain that the credit contraction could be the result of a flat excess bank liquidity function at a threshold lending rate. In other words, excess reserves become a perfect or near perfect substitute for loans at a rate of interest above zero. Therefore, a horizontal curve is indicative of a passive accumulation of excess reserves vis-à-vis the loan rate. The paper, moreover, proffers a simple analytical framework which shows that the stimulation of bank lending may not depend in inducing commercial banks to lend more via monetary expansion, but in stimulating the private sector's demand for credit along the threshold lending rate. Once the threshold rate is binding, policies that shift outward the demand for loans also increase borrowers' surplus that is favourable for stimulating business investments – assuming the incentives are given to investors who produce real output.

Of course, the idea of a flat liquidity (or cash) demand curve is not new. It was proposed by Keynes (1936, pp. 207-208, reprinted 1994) as the liquidity trap. However, while Keynes wrote about perfect substitution between cash and bonds (at zero bond rate), this essay looks at the relationship between bank excess reserves and the lending rate. In addition, examining liquidity preference vis-à-vis the lending rate makes it possible to link conceptually excess reserves and credit.

2. Bank excess liquidity curves

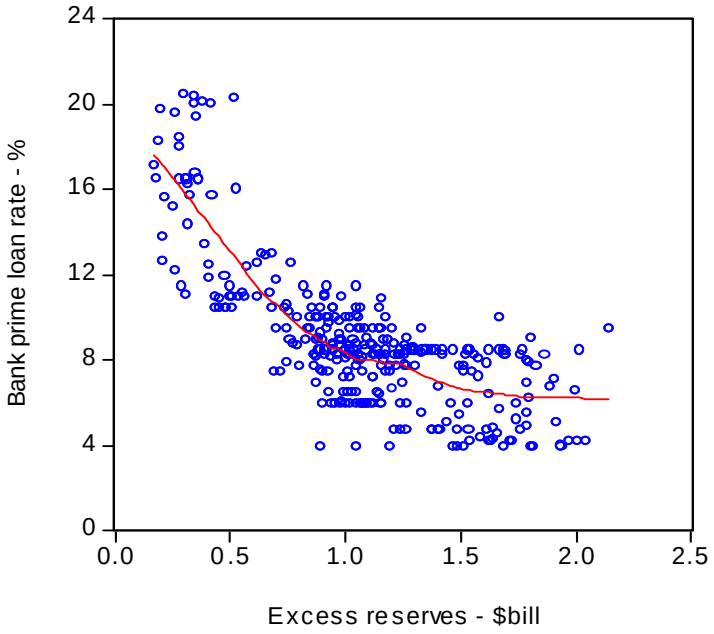
In order to extract the excess liquidity preference curves, the technique of locally weighted least squares regressions, as outlined by Cleveland (1993), is utilized. Robust weights were used to minimize the effects of outliners on the curve. A smoothing parameter of 0.3 was also used in order to fit the curves. Cleveland (1993, p. 98)

[3] Note that Keister and McAndrews (2009) argue that excess reserves are induced passively by Federal Reserve policy.

explains some factors that could determine the choice of the smoothing parameter. This article utilized a parameter such that undue wiggles in the fitted curve are avoided. Two curves are fitted. The first is for the pre-financial crisis era over the period 1980 to 2006: Dec (monthly data). Using a longer data set (pre-1980) does not alter the basic finding that the curve tends to flatten at a minimum threshold loan rate. For the crisis period, the curve is fitted using data from January 2007 to September 2009 for the purpose of maximizing observations. A chronicle of the events surrounding the 2007-2008 financial crisis might lead one to start the crisis period at around June 2007 (see Brunnermeier 2009 for a review of the events). However, this article uses January 2007 as the starting period for the purpose of extracting the aggregate bank liquidity preference curve – doing so does not change the results in any fundamental way but allows for a few more observations. It also does not change the pre-crisis curve fundamentally if we add the six observations of 2007 to that period.

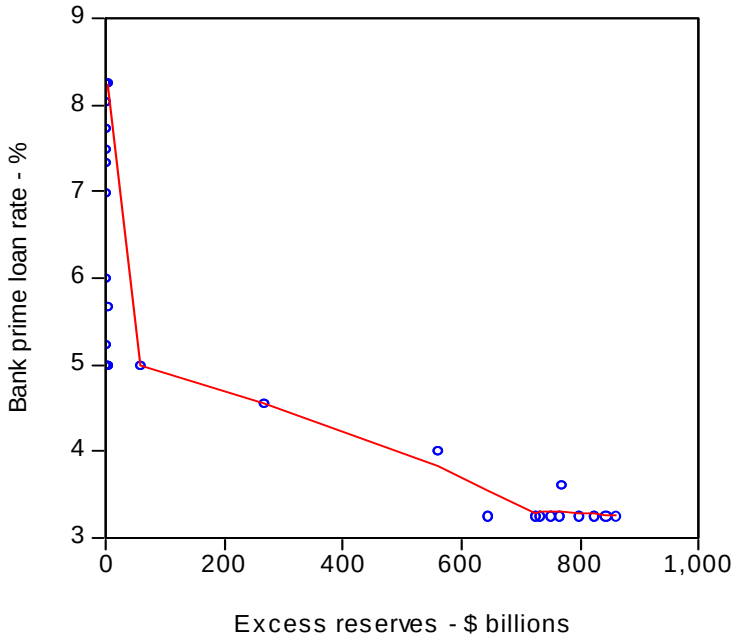
Figure 1 presents the pre-crisis aggregate liquidity preference curve. Two outliners were removed from the data when fitting this curve – those are September 2001 and August 2003. This figure suggests a threshold rate of approximately 6% as the curve becomes flat around that point. The liquidity preference curve during the crisis has a similar pattern (with fewer data points of course) but the flat segment occurs at a lower lending rate at approximately 3.25% (see Figure 2). This would suggest that the expansion of reserves possibly had a liquidity effect on the threshold rate, especially given that risk would have increased during the crisis.

Figure 1. Pre-crisis bank liquidity preference – monthly data Jan: 1980 to Dec: 2006



Data source: Federal Reserve Economic Data (http://research.stlouisfed.org/fred2/)

Figure 2. Liquidity preference during financial crisis – monthly data Jan: 2007 to Sep: 2009



Data source: Federal Reserve Economic Data (http://research.stlouisfed.org/fred2/)

3. Monetary expansion and the threshold rate

The idea proposed in this section is based on the notion that the threshold rate represents a minimum at which non-remunerated cash and interest earning loans are perfectly substitutable[4]. If we view banks as profit maximizing entities rather than rational portfolio investors – as we were urged to do by Sealey and Lindley (1977) – then the argument presented here might be palpable. At what point, therefore, is the threshold loan rate binding whereby the expansion of reserves result in the passive accumulation of such reserves rather than lending at some rate? In other words, what determines the threshold lending rate at which point the risk adjusted marginal cost of banking is just equal to the lending rate? It is postulated here that the minimum rate, at which point the liquidity preference curve is flat, is determined by the marginal cost of banking and risk. This is the rate at which point all liquidity effects from the monetary expansion are exhausted.

The model herein presented encapsulates this notion by linking reserves and credit via the lending rate. Figure 3 shows that the threshold rate occurs at r_T, which becomes the effective supply of loans. The demand curve for excess reserves is given by R_D and it becomes flat at r_T, which represents the effective supply curve (or threshold supply curve) of loans. Moreover, r_T represents the rate at which all liquidity effects have been exhausted by the monetary expansion. It furthermore represents the supply of loanable funds by banks. In other words, the rate is determined by banks that possess the market power (oligopoly power) to determine rate and the private sector accepts the rate[5]. The banks, while determining the rate at which they lend, must consider marginal cost of production, risk and liquidity conditions.

The supply of reserves by the central bank is given by R_S. When $R_D = R_S$ the equilibrium quantity of reserves is determined as R^*. The demand for loans is denoted

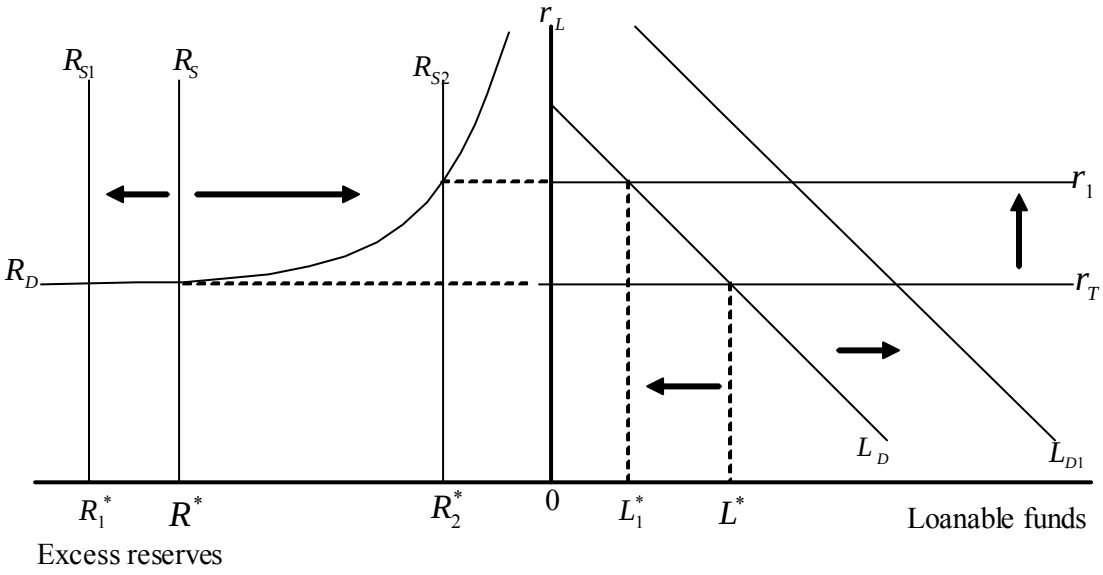
[4] Of course, starting from October 2008 interest is paid on excess reserves. However, we still see the general downward sloping and eventually flat curve when excess reserves are graphed against the lending rate.

[5] There is evidence of the existence of market power in the US banking industry – see for instance Hannan and Berger (1991).

by L_D. The downward sloping curve reflects the idea that an increase in the lending rate decreases the present value of future profit flows of businesses. The converse is occurs when the loan rate falls. It also reflects that household discounted future cash flows fall when the mortgage rate (or the rate on consumer credit) increases. A decline in the mortgage rate has the opposite effect on households. The intersection of L_D and r_T gives the equilibrium level of credit (L^*).

Figure 3 indicates that a monetary contraction from R_S to R_{S2} leads to an increase in the lending rate above threshold to r_1. Consequently, credit is contracted from L^* to L_1^*. On the other hand, a monetary expansion from R_S to R_{S1} leads to no further decrease in the lending rate as the minimum threshold rate is now binding. Credit expansion stops at L^* and excess reserves are accumulated passively. Therefore, once the threshold rate is reached credit intermediation would require that policies directly stimulate the demand for loans along this rate. The demand curve shifts out from L_D to L_{D1}. In addition, borrower surplus – bounded by the area under the loan demand curve and above r_T – increases when the demand for credit shifts outward. However, the surplus would diminish as the interest rate rises above the threshold as liquidity conditions tighten.

Figure 3. The threshold rate and loanable funds



4. Conclusion

The analysis suggests that at the binding threshold rate, liquidity injections would not engender credit expansion. The threshold rate was postulated to occur when the extracted liquidity demand curve – using the method of locally weighted least squares regressions – is horizontal thus reflecting perfect substitution between cash and interest earning loans to the private sector. At this point the reserve accumulation is passive, decreases the money multiplier, and therefore is unlikely to be inflationary. Expanding credit would require policies that directly increase the demand for loans, particularly by the private business sector. As the demand for loans increase along the threshold rate, the surplus of borrowers increases. However, the surplus diminishes as liquidity conditions tighten and interest rate rises above threshold.

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