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MONEY AND INTEREST RATES IN THE UNITED STATES DURING THE GREAT  
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Money and Interest Rates in the United States during the Great Depression  
Peter F. Basile, John Landon-Lane, and Hugh Rockoff  
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**ABSTRACT**

This paper reexamines the debate over whether the United States fell into a liquidity trap in the 1930s. We first review the literature on the liquidity trap focusing on Keynes's discussion of "absolute liquidity preference" and the division that soon emerged between Keynes, who believed that a liquidity trap had not been reached, and the American Keynesians who believed that the United States had fallen into a liquidity trap. We then explore several interest rates that have been neglected in previous analyses: yields on corporate debt (from Aaa to junk), bank lending rates, and mortgage rates. In general, our results strengthen the case for believing that there was no liquidity trap in the 1930s in the sense of one that covered the full spectrum of interest rates. The small segment of time in which a liquidity trap might have been present, however, makes drawing firm conclusions risky.

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## 1. Introduction

Interest in the economics of the Great Depression has been extremely high since the 2007-2008 financial crisis. One claim about the Depression that has attracted considerable attention is that the economy fell into a "liquidity trap." Monetary policy, it is said, became ineffective and deficit spending was the only policy capable of shortening the Depression. The concern is that we may now be in a similar position. The certain sign of a liquidity trap, according to this view, is near zero rates on short-term government debt. Since these rates were close to zero in the 1930s, it follows that the economy was then in a liquidity trap. This interpretation of the 1930s was pushed vigorously by Alvin Hansen and other economists in the first generation of American Keynesians. An alternative view associated with Milton Friedman, Anna Schwartz, Karl Brunner, Allan Meltzer and a number of other writers – a list that ironically includes Keynes himself – is that a true liquidity trap requires that the entire spectrum of rates, including rates on long-term government debt and short and long-term private debts, must have reached low sticking points to conclude that the economy had entered a liquidity trap. Finding that rates on short-term governments, or similar private assets, were near zero, in this view, is insufficient to establish a true liquidity trap. Here we reexamine this debate by exploring several rates that have been neglected in previous discussions: yields on corporate debt (from low risk to junk), bank lending rates, and mortgage rates. Our discussion of corporate debt, incidentally, is based on a new series of monthly junk bond yields. In general our evidence adds further support to the view that many segments of the spectrum of interest rates were flexible in the 1930s and were responsive to monetary policy. However, it must be admitted that the small segment of time in which a liquidity trap

might have been present makes drawing robust conclusions difficult. The urgency for reexamining the behavior of financial markets in the 1930s is the fear that the liquidity trap is back, or as Paul Krugman might put it “baaack.”<sup>1</sup> But the underlying issue of whether monetary policy must work through short-term government rates is important at all times.

The paper is organized as follows. Section 2 discusses the history of thought about the liquidity trap, focusing on the early divide between Keynes and the American Keynesians. Section 3 explores a view of the transmission mechanism that underlies much thinking by economic historians about the liquidity trap: the view that monetary policy effects must spread in diminishing waves from assets that are very similar to money to assets that are very different from money. The following sections then explore the behavior of various interest rate series during the 1930s. Section 4 explores the yields on government debt. Section 5 explores the yields on corporate bonds including high risk corporates. Section 6 explores commercial bank lending rates. The data explored in this section are well known to economic historians interested in long-term integration of banking markets, but have not been explored in relation to monetary policy. Section 7 explores mortgage lending rates. Section 8 summarizes the main findings.

## **2. Some History of Thought**

We will not attempt the daunting task of reviewing all of the literature on the liquidity trap in the depression. It will be worthwhile, however, to explore the basic ideas that emerged in the depression and the early postwar years. These ideas set the stage for the work that followed, and to a surprising extent drive most current policy discussions.

The idea of a liquidity trap, of course, was developed by John Maynard Keynes, who termed it "absolute liquidity preference" in the *General Theory* (1936).<sup>2</sup> Indeed, while most economic ideas seem to have long and disputed pedigrees, there is wide agreement that the idea of a liquidity trap begins with Keynes. Keynes argued that the demand for money could become perfectly elastic (or almost perfectly elastic) with respect to the rate of interest, especially at very low interest rates. In those circumstances monetary policy would be ineffective.

The reason a liquidity trap could develop was derived from the role played by speculators in bond markets; a role that Keynes, himself a speculator, knew well. If most speculators believed that the current rate of interest was "normal" then any attempt by the central bank to lower it by buying government securities would be counterbalanced by the willingness of speculators to sell these securities. Since speculators believed that any increase in price produced by government purchases would be temporary, they would sell bonds at the slightest price increase, convinced that they could buy them back later at a lower price. Similarly, any attempt to raise rates would be counterbalanced by the willingness of speculators to buy bonds. Interest rates were therefore likely to be very sticky at their normal rates.

A liquidity trap could emerge at any rate that speculators believed to be normal, but it would be more likely as rates approached zero. Speculators would then be almost certain that if rates moved substantially in any direction, it would be to go higher. If the central bank attempted to lower rates further by buying bonds, speculators would be more than willing to exchange bonds that paid little interest for cash while waiting for a fall in bond prices. The implication of the liquidity trap was that monetary policy was powerless

to affect interest rates, and therefore powerless to stimulate investment spending and the remainder of the economy. In Keynes's view, fiscal policy, or radical governmental controls over private investment, would have to be used to promote expansion.

In the *General Theory* Keynes (1965 [1936], 207) suggested that while a liquidity trap was an important theoretical possibility it had not yet arisen in the real world.

There is the possibility, for reasons discussed above, that, after the rate of interest has fallen to a certain level, liquidity-preference may become virtually absolute in the sense that almost everyone prefers cash to holding a debt which yields so low a rate of interest. In this event the monetary authority would have lost effective control over the rate of interest. But whilst this limiting case might become practically important in future, I know of no example of it hitherto. *Indeed, owing to the unwillingness of most monetary authorities to deal boldly in debts of long term, there has not been much opportunity for a test.* [Our emphasis]

The last line of this often quoted paragraph deserves some additional comment.

Evidently, Keynes envisioned a liquidity trap not simply as a low rate on short-term government debt, but rather as low and stable rates on the whole spectrum of maturities. Until all of these rates found their sticking points, more could be done with monetary policy to lower rates, and thereby encourage investment.

By “dealing boldly” Keynes had in mind, we believe, direct cash purchases of debt that expanded the monetary base and the stock of money. One could imagine other sorts of operations, say conversions of one sort of debt into another, but it seems to us that Keynes probably had in mind mainly direct purchases rather than more complicated transactions. The most famous case of debt management was the British stock conversion of 1932 in which a huge government loan dating from World War I was converted into a longer-term debt with a lower coupon. A number of observers claimed that the success of this conversion lowered the whole spectrum of rates. But, as Capie, Mills and Wood

(1986) demonstrate, the effect of this conversion was to alter the slope of the term structure rather than shift the whole function to a lower level.

The story of the liquidity trap must be an American story. The depression in Britain was a much milder affair than in the United States, both in terms of financial markets and real outcomes (Capie 1990). It would have been odd to attribute a condition that we associate with depression and nonfunctioning capital markets to an economy that experienced a mild shock and showed rapid signs of improvement. But Keynes was undoubtedly aware that short-term government rates in the United States had fallen to very low levels when he wrote this passage. There is some debate about the chronological evolution of Keynes's thinking (Patinkin 1993), but it is clear that he was thinking intensively about money, interest rates, and economic activity for several years before the publication of the *General Theory* (the preface to the *General Theory* was dated December 13, 1935). Rates on U.S. Treasuries fell below one percent in May 1931 and remained below one percent (except for one month) for the remainder of the decade. Rates on short-term governments in the U.K. also fell to very low levels. If low rates on Treasuries, rates close to the "zero bound," were sufficient to constitute a liquidity trap by Keynes's definition, he would have claimed the United States and Britain as examples in the *General Theory*. Keynes never, as far as we are aware, reversed this judgment and claimed that there had been a liquidity trap during the depression (Moggridge and Howson 1974).

Although the famous passage from the *General Theory* quoted above might be referring simply to government securities, it is clear that Keynes believed that attention had to be paid to private as well as government rates. In a passage following shortly after

the one quoted above, Keynes argued that even though risk free rates might be brought to very low levels by central bank monetary policies, risky rates, perhaps bank lending rates, which were relevant to investment decisions, might remain at unacceptably high levels.

As the pure rate of interest declines it does not follow that the allowances for the expense and risk decline *pari passu*. Thus the rate of interest which the typical borrower has to pay may decline more slowly than the pure rate of interest, and may be incapable of being brought, by the methods of the existing banking and financial organization, below a certain minimum figure. This is particularly important if the estimation of moral risk is appreciable. For where the risk is due to doubt in the mind of the lender concerning the honesty of the borrower, there is nothing in the mind of a borrower who does not intend to be dishonest to offset the resultant higher charge. It is also important in cases of short-term loans (e.g. bank loans) where the expenses are heavy; -- a bank may have to charge its customers 1½ to 2 per cent., even if the pure rate of interest to the lender is nil. (Keynes 1965 [1936], 208).

Keynes's belief that long-term rates could be manipulated by the government came to the fore when he advised the postwar labor government on its cheap money policy (Howson 1987). Keynes advised the labor government to maintain low rates on the whole spectrum of maturities. Essentially he advised the labor government to try the experiment which in the *General Theory* he noted had not been tried during the depression. A subsequent generation of economists would worry that an expansionary monetary policy would simply raise the rate of inflation and nominal interest rates, leaving real rates unaffected, and investment unchanged. But Keynes did not worry about these long-term effects of monetary expansion on inflation and through inflation on interest rates (Wood 1989; Howson 1989).

Although Keynes did not believe that the United States had fallen into a liquidity trap in the 1930s, Keynes's American followers believed the opposite: the United States had fallen into a liquidity trap that rendered monetary policy ineffective. Alvin Hansen (1953, 132), often described as the father of American Keynesianism, thought Keynes's



assertion that there had never been a liquidity trap "strange and inconsistent." In Hansen's view it was clear that "In fact, the United States during the thirties (especially from 1934 on) was a good example [of a liquidity trap]." American Keynesians were aware, of course, that there was a broad spectrum of rates beyond short-term government rates, but they believed that these rates had been sticky and had come down too slowly to have had a significant effect on economic activity, despite the downward pressure generated by low short-term rates (Tobin 1965, 472).

The difference between Keynes's view that no economy had ever fallen into a liquidity trap and Hansen's assertion that it was obvious that the U.S. economy had, is a manifestation of Axel Leijonhufvud's (1968) distinction between *Keynesian Economics* and the *Economics of Keynes*. Keynesian economics, in Leijonhufvud's lexicon, refers to the views of economists like Hansen and his followers who believed that liquidity traps or near liquidity traps rendered monetary policy ineffective. Keynes, according to Leijonhufvud (1968, 202-03), believed something else: that it was possible for the central bank to alter crucial long rates over the long run, but that in the short run the stickiness of rates created by opinions about the normal rates might prevent the central bank from reducing rates with *sufficient speed* to restore full employment in a timely fashion.

Although there was no sign of a liquidity trap in the early postwar years, economists returned from time to time to the question of whether there had been a liquidity trap in the 1930s. Much of this literature is cited in Brunner and Meltzer (1968). One line of argument in the postwar literature pressed by advocates of monetary policy was that it is important to look at the full spectrum of securities. Only when the full spectrum, including long-term private and public securities, have reached low sticking

points and have become insensitive to monetary policy can we conclude that the economy is in a liquidity trap; and by this standard, according to this school of thought, the U.S. economy had not fallen into a liquidity trap in the late 1930s.

It would be beyond the scope of this paper to document all of the references in the postwar literature to the importance of looking at the full spectrum of rates, but we can hit some of the highlights. Friedman and Schwartz (1963a, 231), in one of their first reports on their research, argued that it was necessary to go beyond the rate on short-term government bonds and consider “a much wider range of assets including not only government and private fixed-interest and equity securities traded on major financial markets, but also a host of other assets.” Friedman (1971, 28), after describing Keynes’s analysis of liquidity preference, claimed that the difference between monetarists and Keynesians “was less in the nature of the process than in the range of assets considered,” and that he and fellow monetarists regarded “the market rates stressed by the Keynesians as only a small part of the spectrum of rates that are relevant.” Indeed, Friedman would have gone so far as to include “durable and semi-durable consumer goods, structures, and other real property” in the list of assets whose prices were affected by changes in the stock of money, creating a direct link between money and real economic activity.<sup>3</sup>

This insight was developed in depth in the classic paper by Brunner and Meltzer (1968) on the liquidity trap to which we have already referred. This paper provided considerable theoretical and empirical evidence for rejecting the view that there was a liquidity trap in the 1930s. More recently, in response to the assertion that Japan had fallen into a liquidity trap in the 1990s, Meltzer (2003) reasserted the case against a full-

spectrum liquidity trap in the 1930s in the United States or in the 1990s in Japan in a more accessible form: the idea, Meltzer declared, was "liquidity claptrap."<sup>4</sup>

One strategy for testing for the presence of a liquidity trap is to bypass the discussion of what was happening in financial markets and look directly for possible impacts of monetary policy on GDP and similar variables. Christina Romer (1992) in a famous paper, for example, used “multipliers” derived from pre-depression experience to show that monetary policy, rather than fiscal policy or self-correction, could explain almost all of the recovery from the depths of the depression. Other important contributions in this tradition include Athanasios Orphanides (2004) and Christopher Hanes (2006). Orphanides stressed the impact of the famous decision by the Federal Reserve to double required reserve ratios in 1936 and 1937. How could there have been a liquidity trap, if monetary policy had such powerful effects? Hanes (2006) added support for the view that there was no full-spectrum liquidity trap by showing that changes in non-borrowed reserves affected long-term government bond rates during the 1930s. Here we test the no-full-spectrum liquidity trap view by examining an array of interest rates including yields on high grade and high risk (junk) corporate bonds, bank lending rates, and mortgage rates, that have been bypassed in earlier discussions. In general, our results reinforce the conclusion of Friedman and Schwartz, Brunner and Meltzer, Orphanides, Hanes and others, including Keynes, that there was no full-spectrum liquidity trap: monetary policy influenced interest rates throughout the 1930s.

### **3. A pebble in a pond or a tsunami in the sea?**

One argument, particularly influential among economic historians, that supports the view that there was a liquidity trap in the 1930s, one that is especially relevant to the

empirical examples that follow, is that monetary policy must leave a greater mark on assets that are more like money. This view relies on what Peter Temin (1976, 96-103) calls the "pebble in the pond" theory of the monetary transmission mechanism. A pebble thrown into the center of a pond produces a wave of large amplitude at the spot where the pebble hits the water, which then diminishes and becomes irregular as the wave approaches the shore. In the same way, a change in the stock of money would have a large impact on the market for assets that are closest to money, for example treasury bills, but would have a diminishing impact as one moved further away – toward long-term governments, low-risk corporate bonds, high-risk corporates, stocks, and so on.

This sequence makes the most sense when the change in the stock of money is generated by open market purchases or sales of short-term governments – when the stone is in fact thrown in the center of the pond. It is one of the unique features of the 1930s that major changes in the stock of money were brought about by changes in the reserve ratios of banks, and by changes in the currency-deposit ratios of the public. Given one of these starting points, it is less obvious that government bond rates would show the first and largest effects. It is possible to imagine, moreover, adjustment paths in which monetary shocks, even shocks that begin with open market operations in treasury bills, made a smaller impression on assets similar to money and a larger impression on assets that were less similar. We might call this the “tsunami” theory of the transmission of monetary shocks because it suggests larger effects on assets that are further from money on a liquidity continuum.<sup>5</sup>

An example can make a tsunami effect more plausible. Suppose wealth holders view assets as lying on a continuum with cash having the highest degree of liquidity

because of its short-term to maturity (zero!) and its low risk of default (zero!), deposits having the next highest degree, short-term government bonds the next highest, and so on. And suppose that the perceived liquidity of deposits declines as a result of a rising tide of bank failures. What would be the simplest way to restore the initial level of total liquidity? Rather than sell, say, \$100 of government bonds (a near money) to acquire \$100 of cash, a transaction that would have little impact on the overall liquidity position of the wealth holder, it would be more effective to sell, say, \$100 of junk bonds and acquire \$100 in government bonds or cash.

Some Keynesian economists who would agree that the economy was not in a full spectrum liquidity trap in the 1930s would argue that rates on longer-term assets could have been forced down, but only by central bank operations in those markets. The only way, to follow the Temin analogy, to produce waves near the shore is to throw pebbles near the shore. This is the burden of the last part of the initial quote from Keynes: to lower long term rates the central bank must *"deal boldly in debts of long term."* Evidently, Keynes believed that markets were segmented to a degree that prevented them from responding to a general increase in liquidity. This concern was raised recently by Bernanke and Reinhart (2004, 87) who argued that, even if the central bank succeeded in reducing the rates on long-term government bonds, a "disconnect" might develop between those rates and corporate bond rates. Paul Krugman seems to be in this camp. In a recent blog (*New York Times*, January 26, 2009, 3:17 pm) he agreed that we might not be in a full spectrum liquidity trap, but suggested that the only way that monetary policy could address non-zero rates in various markets would be through "controversial measures." By this he meant, I presume, Federal Reserve purchase programs aimed at

specific markets. In what follows we will be addressing two questions. The easier question is whether some rates remained high and variable despite the fall in Treasury bill rates to near zero levels, the more difficult question is whether these rates remained responsive to changes in the general level of liquidity.

#### **4. The Yield on Government Debt**

The basic reason for believing that there might have been a liquidity trap in the 1930s is clear in Figure 1, which shows the yield on 3-month treasury bills, the yield on 4-6 month prime commercial paper, a short-term-low-risk private asset, and the yield on 20-year federal government bonds during the interwar period. During the 1920s the two short-term rates behave in a “normal” way. Both are well above zero, and both increase during postwar monetary stringencies beginning with the severe recession from January 1920 to July 1921. This recession was exacerbated by the Federal Reserve’s decision to raise its discount rate to slow a postwar inflation. Both rates spike during the early 1930s. From then on, however, the two rates fall. By the end of 1934 the short-term private rate is below 1.00 percent and the short-term government is nearly zero, where they will remain for the remainder of the decade.

To be sure, the short-term rates do show a small jump during the recession 1937-1938. This recession was also exacerbated by monetary policy: the famous doubling of required reserves. In general, however, the short-term rates remain low and stable during the second half of the 1930s. The yield on 20-year federal bonds also behaves somewhat differently in the second half of the 1930s than it did in the 1920s. The series levels off at

a rate below three percent. And the response to the 1937-1938 is somewhat muted compared with the response in earlier periods of monetary stringency.

For many economists, this is all the proof needed to show that the economy had entered a liquidity trap: rates on safe assets were low and steady, and above all else, short-term government rates were near the “zero bound.” The explanation, in simple liquidity preference terms, would be that the demand for money had remained stable and that increases in the stock of money (the stock increased rapidly in the second half of the thirties) had pushed the equilibrium interest rate down until the economy had reached the infinitely elastic portion of the liquidity preference curve.

There are other plausible reasons for the fall in the yield on low risk debt. One, obviously, is the severity of the banking and financial crisis. Most wealth holders were looking for the safest possible place to put their savings, especially funds that they might need to retrieve quickly, and that meant liquid short-term assets or U.S. government bonds. This was true for banks, as well as other wealth holders, because banks now had to hold large liquid reserves against the possibility of a new round of bank runs. The banks that survived the crisis, moreover, were likely to have been the more conservative banks.

Friedman and Schwartz (1963b, 496) suggested some additional reasons for low interest rates in the 1930s, and especially surprising, low rates during the expansion from 1933 to 1937. One was the general anti-business environment created by the New Deal – the creation of new regulatory agencies such as the Security and Exchange Commission, Roosevelt’s attacks on “economic royalists,” and so on – that discouraged business investment, and hence business borrowing. On the other side of the market was the

inflow of funds seeking a safe haven from political dangers in Europe. There was also an institutional change that fostered low yields on government bonds. Deposit insurance helped to stabilize the banking system and encouraged a shift back into deposits, but the prohibition of interest payments on deposits encouraged funds to flow in the other direction.<sup>6</sup> Much short-term lending, moreover, had traditionally been used to finance speculative positions in the stock market and had been secured by stocks as collateral. With the collapse of the stock market, this source of demand for loans dried up.

The full-spectrum school of thought, however, urges us to look at other interest rates such as yields on corporate debt before concluding that there was a liquidity trap. Deriving meaningful conclusions about the effects of monetary policy from the spreads between corporate bonds and government bonds or the spreads among corporate bonds of varying degrees of risk is fraught, as (Capie and Wood 2004, 80-83) point out, with difficulties. Nevertheless, as they also point out, it is worth doing the best one can with ambiguous data when the stakes are high.

## **5. The Yields on Corporate Bonds**

Figure 2 shows the yields on Aaa, Baa, and junk (high risk) corporate bonds, and the annual rate of growth of M2 monthly from January 1935 to December 1941. Money growth is, it is true, a controversial indicator of monetary policy. For one thing, it could be argued that we should be looking at movements in the real stock of money rather than the nominal stock. Keynes, although often portrayed as assuming that prices and wages were constant, thought that one potential channel through which decreases in wages and prices could stimulate the economy was by increasing the real stock of money, which in turn would lower interest rates, although he thought that the amount of stimulation



through this channel would be small (Capie and Wood 2004, 66). For our purposes, however, figure 2 does not look very different when we use a real measure of the stock of money. In any case, M2 growth, which was normally positive, declined and turned negative on an annual basis in November 1937. What happened in financial markets? The rate on Aaa bonds hardly moved. If one were to look only at the Aaa rate one would conclude that the United States was in a liquidity trap, or something very close to one. If one looks at the rate on Baa bonds, however, one does see, as Meltzer (2003, 519-20) points out, an increase in rates, although an increase of only a few basis points. But if one looks at the yield on junk bonds, one sees a dramatic rise.<sup>7</sup> The data, in short, is consistent with the continued effectiveness of monetary policy, presuming that money can have tsunami effects on assets far removed from money on the liquidity spectrum.

This evidence, although it strengthens the case against the liquidity trap, is unlikely, to return to the point made by Capie and Wood (2004, 80-83) as to the fraught nature of such data, to end debate. For one thing, a liquidity trap is an asymmetric concept. The liquidity preference curve, as we usually picture it, is a relationship between the rate of interest measured on the vertical axis and the amount of money measured on the horizontal axis that slopes downward to the right over some normal range, but flattens out in a liquidity trap. If the economy is near the point at which the curve flattens out, decreases in the stock of money will raise rates, but increases will not lower them. Another explanation for the relationships shown in Figure 2 is that it was a coincidence. The recession that ran from May 1937 to June 1938 (according to the NBER chronology) was severe. Investors were afraid that 1929-1933 had returned, and the perceived probability of defaults rose. It is conceivable that non-monetary forces produced the

recession, which in turn produced the increases in Baa and junk bond yields, and that the decline in the stock of money was produced by an independent policy shock, the famous doubling of bank reserve ratios identified by Friedman and Schwartz.

Given that the main monetary event during the period in which it is alleged that there was a liquidity trap was a decrease in the stock of money and an increase in interest rates (Figure 2), it would not be surprising that one could find a statistical correlation between interest rates and money in monthly data. Nevertheless, we can shed some additional light on the relationship between monetary policy and bond yields by estimating a simple vector autoregression (VAR) that includes a bond yield, an indicator of monetary policy, and an indicator of general economic conditions. A formal test of the effect of a shock to monetary policy on interest rates will provide some information on statistical significance, will allow us, to a degree, to hold general economic conditions constant, and will allow us to make comparisons with other periods.<sup>8</sup>

We used M2 as our indicator of monetary policy. This choice goes against the grain of recent studies that use an interest rate, say the Federal Funds Rate, as the main indicator of monetary policy. A short-term rate, however, would not make much sense for the depression because short-term rates, as we have seen, were extremely low and stable. The question is whether monetary actions that clearly did not have much influence on short-term rates might have had an impact on long-term yields, including yields on risky long-term assets. M2 has the merit that it reflects changes in monetary conditions brought about by open market purchases and sales, discount loans, and reserve ratio changes. Another merit is that it emerged as the best single indicator of monetary policy in this era in the intensive testing conducted by Friedman and Schwartz. For general economic

conditions we tried industrial production (IP), personal income, and department store sales. These series are frequently used in studies of the depression when a monthly indicator is required. The last two allow for movements in prices to affect rates. In principle, of course, one could include all three and many additional indicators of economic conditions – for example, indicators of total profits or wages – in the VAR's. The small number of observations, however, precludes going very far in this direction.

We estimated VARs for the period from January 1934 to December 1941. This is the period when a liquidity trap was most likely to have been operating. Recall Hansen's claim: that "*especially* [our emphasis] from 1934 onward the United States was a good example [of a liquidity trap]." Demonstrating that monetary policy had an impact on junk bond rates or other yields in a sample that included other periods would not resolve the issue of whether or not there was a liquidity trap during the late 1930s.

Tests for unit roots showed that the presence of a unit root could not be rejected for IP, M2, or the yield on junk bonds. We could, however, reject the null hypothesis of a unit root in the yields on Aaa and Baa bonds. There was no statistical evidence for a cointegrating relationship among IP, M2, and Junk bond yields, and no evidence of a cointegrating relationship between M2 and IP. We therefore estimated the following VAR's. (1) For Aaa bonds, a VAR in first differences of M2, first differences of IP and levels of the yield on Aaa bonds. Using information criteria we selected four lags. (2) For Baa bonds, a VAR in first differences of M2, first differences of IP, and levels of the yield on Baa bonds. Using information criteria we selected two lags. (3) For Junk bonds, a VAR in first differences of M2, first differences of IP, and first differences of the yield on Junk bonds. Using information criteria we selected five lags. The resulting impulse-

response functions for the impacts of M2 on corporate bond yields are shown in figures 3-5.

Each figure shows a “liquidity effect,” a fall in interest rates in response to an increase in money. The difference is in the size of the effects and their statistical significance. The impact on the Aaa bond rate is very small and not statistically significant at the 5% level. The impact on the Baa bond rate is somewhat larger, but also not statistically significant. The impact on the junk bond rate is still larger and does reach conventional levels of statistical significance. Figure 5 is for a VAR in which M2 is the first variable entering the VAR and the junk bond rate is the last variable, but the impulse-response functions from other orderings are similar. The results, in other words, provide additional support for the claim advanced above that monetary stimulation remained effective, but showed up in tsunamis that left little impact on assets close to money on the liquidity spectrum but rose in magnitude as they reached the distant shores of the liquidity spectrum.

We tested the robustness of the relationships shown in Figures 3-5, particularly the effect shown in Figure 5, in several ways.

(1) In theory increases in money could also affect nominal interest rates through income and inflation effects. Increases in money that raised income levels would raise rates by increasing the demand for credit. Increases in money that increased prices could also influence rates. Increases in income or prices stemming from non-monetary forces, could also influence rates. Both Keynes and Fisher, to take two of the most astute and prominent contemporary observers, described a number of channels through which price changes might have influenced nominal rates during the depression (Capie and Wood

2004, 66-67). Prices in the United States rose during the initial recovery and then fell in the 1936-1937 recession, so it is possible that expectations of price changes may have influenced rates. We addressed this issue by trying nominal measures, department store sales and personal income, in the VARs. Department stores sales were a larger share of retail sales at that time than they are now and personal income was a larger share of GDP, so these variables were more representative of general economic conditions than they would be today. We also used these variables in combination. The impulse-response charts for the response of the junk bond rate to a monetary innovation, however, look similar no matter the variable or combination of variables used to represent general economic conditions.

(2) We also tried introducing government bond rates and Aaa and Baa corporate bond rates in the VARs to see if we could still detect an effect running from money to junk bond rates when returns on governments or lower-risk corporates were allowed to affect junk bond rates. Again, the impulse-response charts showing the effect of money on junk bonds look much like Figures 3-5.

(3) We also estimated the VARs over other segments of the interwar period. The period January 1919 to December 1929, the “normal” period preceding the depression, is especially useful for comparison purposes. Finding a relationship between monetary policy and junk bond yields during the 1920s would not provide much evidence against the view that there was a liquidity trap in the second half of the 1930s. But finding no relationship would raise questions about the meaning of a relationship within the liquidity-trap period. Industrial production and department store sales are available for the 1920s. Unfortunately, monthly personal income does not begin until January 1929.

Although the precise shape of the impulse-response function varies depending on the way the equation is estimated, we found similar effects in the 1920s and the second half of the 1930s.

(4) We estimated similar VARs using quarterly data so that we could use nominal GNP to measure general market conditions. Again, we found effects similar to those shown in Figures 3-5.

In the end we were persuaded that the evidence is consistent with the idea that changes in money produced changes in corporate yields in the late 1930s, and that the effects, especially in the junk bond market, were large enough to be taken seriously. Given the caveats noted above – the small number of observations and the asymmetrical character of a liquidity trap (decreases in money might produce increases in rates as one moved out of the liquidity trap range) – it must be conceded that room for doubt remains.

In addition to rates on assets sold on competitive national markets it is also important to look at rates set by lending institutions. These loans were an important share of total lending. In the *General Theory*, as we noted, Keynes pointed to downwardly rigid bank lending rates as a potential obstacle to reaching full employment. We will begin by examining commercial bank lending rates.

## **6. Commercial Bank Lending Rates**

The data on bank lending rates has been used mainly in studies of regional integration and has been neglected in studies of the liquidity trap. This is unfortunate because bank lending is one of the most important potential channels for monetary policy. We can take a closer look at bank lending rates based on the work of Gene Smiley (1981), who computed biannual bank lending rates by region from 1926 through 1937,

and Howard Bodenhorn (1996). These rates, it must be admitted, are somewhat synthetic: they are derived from national bank earning and balance sheet data. However, Smiley and Bodenhorn did a careful job of purging the data, as much as possible, of extraneous influences. The results must come close to actual lending rates.

There is, however, another potential difficulty. Riskier borrowers were being denied loans after the depression took hold. A tighter set of lending standards was implicitly an increase in rates, but one that was not reflected in measured loan rates. Milton Friedman, writing shortly after the outbreak of the Korean War, put it this way. "The nominal rate charged by banks or other lenders may not change but the "quality" of loans they will make may rise; there may be what has, somewhat unfortunately, been called "capital rationing." Thus I shall regard the lesser availability of loans at the former rate of interest as equivalent to a rise in "the" rate of interest" (Friedman 1951, 189). Ben Bernanke in his famous paper on nonmonetary effects of the Great Depression put it this way: "commercial loan rates reflect loans that are actually made, not the shadow cost of bank funds to a representative potential borrower" (Bernanke 1983, 264). Nevertheless, a comparison of measured loan rates across regions can provide some hints about how bank lending rates changed over the course of the depression.

Figure 6 shows bank lending rates in New York and Illinois, the states that contain the nation's primary financial centers, New York and Chicago. Both rates fell dramatically over the course of the depression. By 1937 they had reached a low level. Indeed, the rates in New York City and Chicago (available in Smiley's data set) were consistent with Keynes's claim, quoted above, that "in cases of short-term loans (e.g. bank loans) where the expenses are heavy; -- a bank may have to charge its customers 1½

to 2 per cent., even if the pure rate of interest to the lender is nil" (Keynes 1965 [1936], 208). The most likely explanation for this decline is that banks in the financial centers were able to shed their higher risk borrowers and maintain a core of very low risk borrowers. In some cases banks in the financial centers may have been able to replace smaller firms on their customer lists with larger firms that in the twenties would have chosen to borrow on long-term capital markets. Both rates in Figure 6 increase between 1937 and 1938, perhaps reflecting, with some delay, the monetary contraction that influenced the bond market.

What about other parts of the country? Figure 7 shows bank lending rates in seven other states. These states were the most populous states (as of 1930) in the remaining census divisions. California, for example, represents the Pacific division; and Texas, the West South Central division. The pattern is somewhat mixed, but bank lending rates in five of these seven states also show the increases following the mid-depression monetary contraction. This suggests that further injections of bank reserves might have brought rates down further and faster than was the case.<sup>9</sup>

The national banks, which are the source of the bank lending rates explored in Figures 7-9, were forced by law to concentrate mainly on short-term commercial loans, although they did some real estate loans. The best available data for mortgage lending is the NBER's sample of mortgage loans which comes from insurance companies and other intermediaries heavily involved in real estate markets.

## **7. Mortgage Rates**



The NBER collected data on a large sample of mortgage loans. The most relevant variables, for our purposes, are the contract loan rate and the percentage of the purchase price that the borrower supplied from other sources, the down payment. We can refer to the latter as the buyer's equity, although in fact the purchaser may have borrowed some or all of the down payment. Other things equal, the down payment, measured as a percentage of the price, is a reasonable ex-ante measure of the quality of loans. In the published data, at least, there does not seem to be anything else that would serve as well. Requiring a large down payment protects the lender because the price of the property can fall further before the value of the property falls below the value of the loan. On the other hand, requiring a large down payment is equivalent, from the point of view of the borrower, to a higher contract rate with the same down payment.<sup>10</sup>

Figures 8-10 show how mortgage rates and down payments changed during the depression. Figure 8 shows the contract rate on nonfarm mortgages made by commercial banks (measured on the left vertical axis) and the "percentage down" or equity (measured on the right vertical axis). Figure 9 shows the same variables for savings and loan associations, and Figure 10 shows the same variables for life insurance companies. As might be expected if there was arbitrage across markets, the three figures show similar patterns. The contract loan rate and down payment were stable during the 1920s for all three lenders. The loan rate and percentage required down payment rose during the financial crisis – a pattern that is clearest for the loans made by the life insurance companies.<sup>11</sup> Rates and down payments then fell during the remainder of the 1930s. There does not seem to have been a strong reaction to the mid-depression monetary contraction in either contract rates or required down payments. Of all the series these

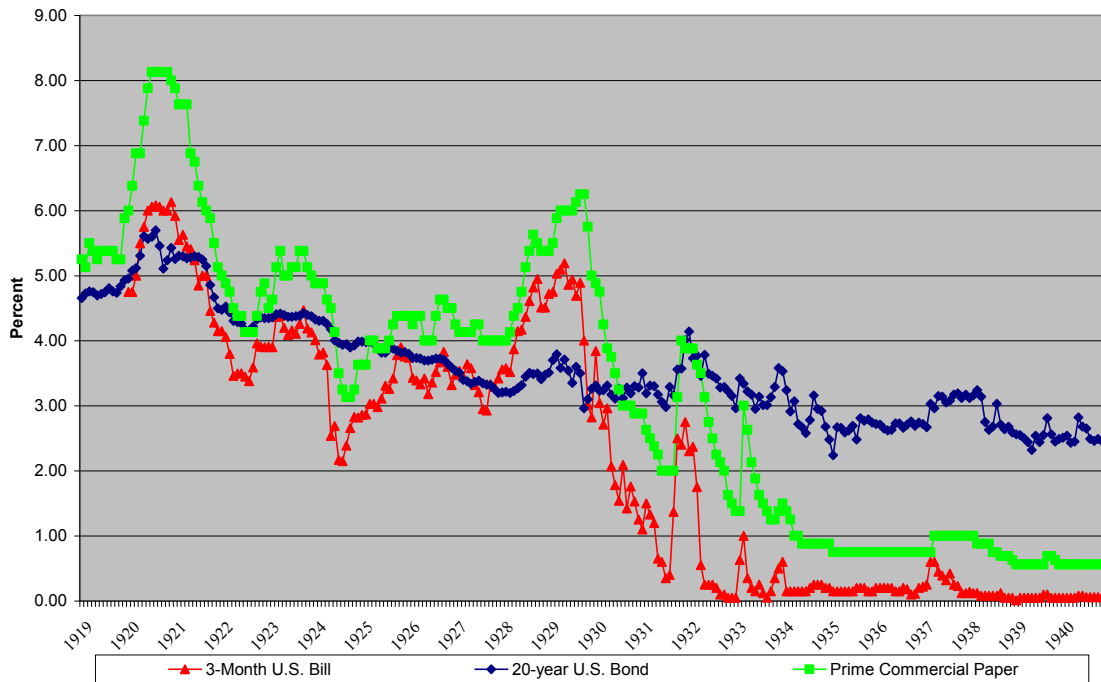
seem the least responsive to short-term changes in monetary policy. This was not a phenomenon unique to the late 1930s; it also appears to have been true in the 1920s. Whether the fall in rates and required down payments during the second half of the 1930s was due more to the general fall in rates, and the increase in liquidity, or to the launching of New Deal mortgage programs would be difficult to determine. In either case, there was some room for mortgage rates and required down payments to decline and stimulate housing demand, although the process was drawn out over the length of the depression.

## 8. Conclusions

The debate over whether there was a liquidity trap in the United States in the 1930s has continued, with varying intensity, since the concept of a liquidity trap was first developed by John Maynard Keynes in the *General Theory*. The early American Keynesians believed that the United States had fallen into a liquidity trap in 1930s because, first of all, yields on short-term government bonds were near zero for most of the decade, and because longer-term rates seemed to adjust slowly. An alternative school of thought (which includes Keynes!) holds that even though short-term government rates were near zero, the economy had not fallen into a liquidity trap because the full spectrum of rates had not reached low sticking points. This paper provides some additional support for this view by considering a range of interest rates that have been neglected in discussions of the liquidity trap, including rates on corporate debt ranging from Aaa to high yield (junk) corporate bonds, bank lending rates, and mortgage rates. The main finding is that as we move away from short-term government bonds on the “liquidity

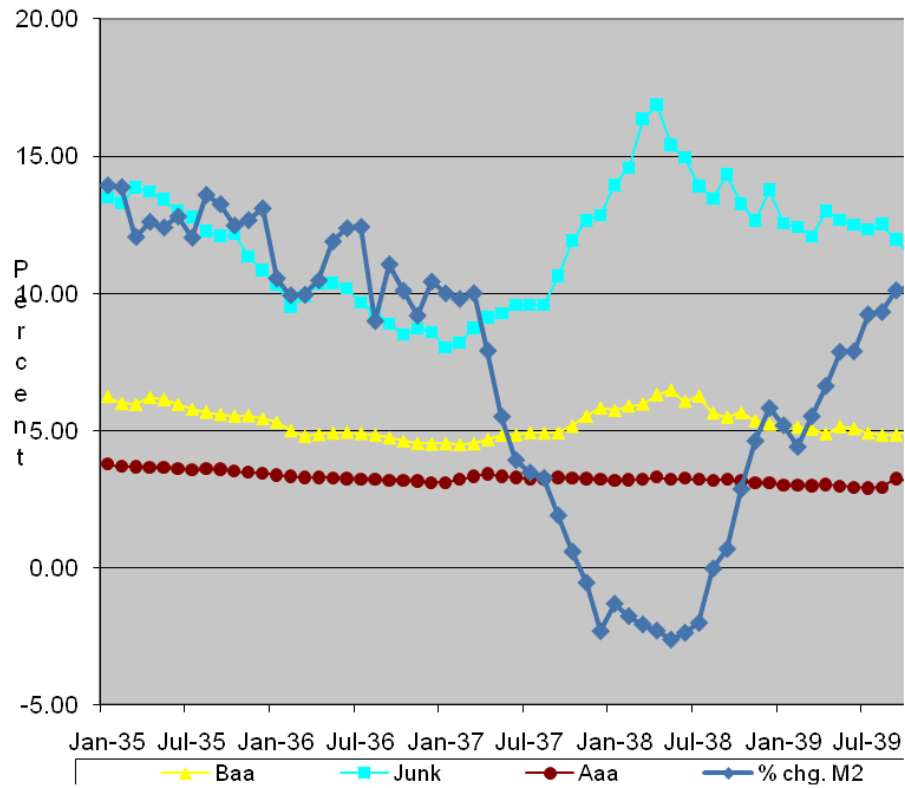
spectrum” we encounter rates that appear to have been sensitive to changes in monetary policy, although the mortgage rates were an exception.

These findings, even if accepted, are unlikely to end the debate over whether there was a liquidity trap in the 1930s. The period of time in which a liquidity trap was alleged to have been in effect – the 1930s as a whole, or perhaps simply the second half of the 1930s – does not provide a sufficient number of observations from which to draw robust conclusions. More importantly, the question of the transmission mechanism remains open. If we want to lower rates can we rely on general increases in the stock of money that create tsunamis throughout the whole spectrum of rates, or does lowering rates in a depression require specific measures tied to specific markets?



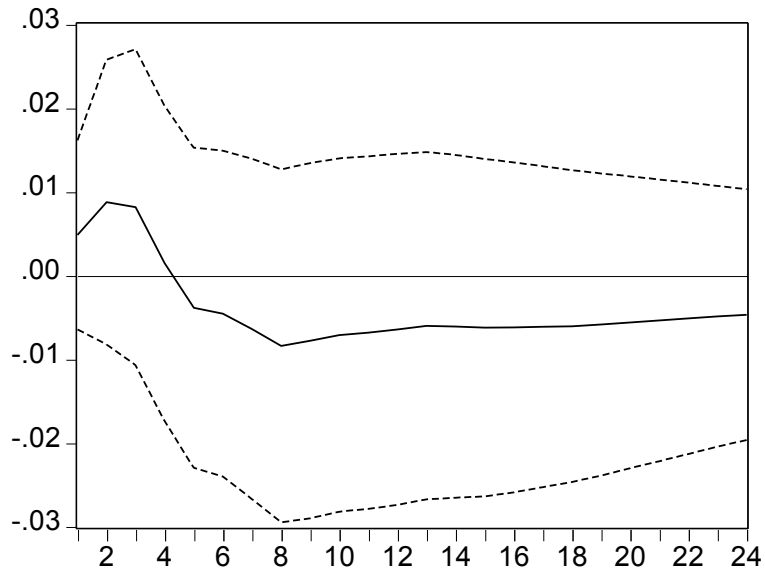
**Figure 1. Yields on 3-month U.S. Treasury Bills, 20-Year U.S. Government Bonds, and 4-6 month commercial paper, monthly, 1919-1940.**

**Sources. U.S. Governments: *Historical Statistics* (2006, series Cb56, Cb57, Cb60, and Cb61). Cb60 and Cb61 are from Cecchetti (1988, table A1). Cecchetti's series begin in January 1929. We extended Cb60 backward using Cb56 but adding the average difference between Cb60 and Cb56 for the first 5 months of 1929 to Cb56. We extended Cb61 backward in the same way using Cb57. Prime Commercial Paper: *Banking and Monetary Statistics: 1914–1941*, (1943 Table 120).**



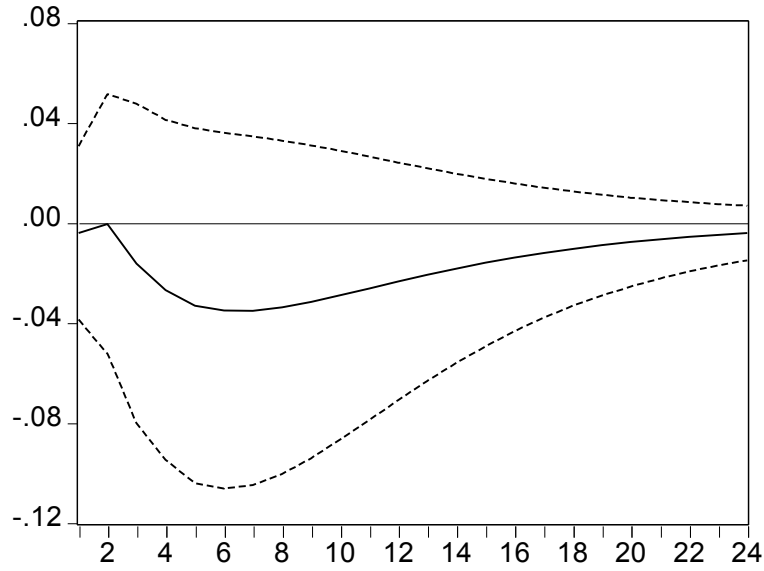
**Figure 2. Rate of change in the stock of money and selected corporate bond yields, monthly January 1935 – December 1939.**

**Sources.** Money is M2 from Friedman and Schwartz (1970, 29-35). The rate of growth of money plotted in the chart is the difference between the natural logarithm of M2 in a particular month and the natural logarithm of M2 twelve months earlier multiplied by 100. The Aaa and Baa bond yields are from *Historical Statistics* (2006, series Cb58 and Cb59). Junk Bond yields were prepared by the authors from individual bond yields reported in the *Wall Street Journal*. A quarterly series was reported in Basile (1989), but we prepared a monthly index for this paper. Junk Bonds were defined as bonds rated B or lower by Moody’s. These bonds were described by Moody’s as “speculative.”



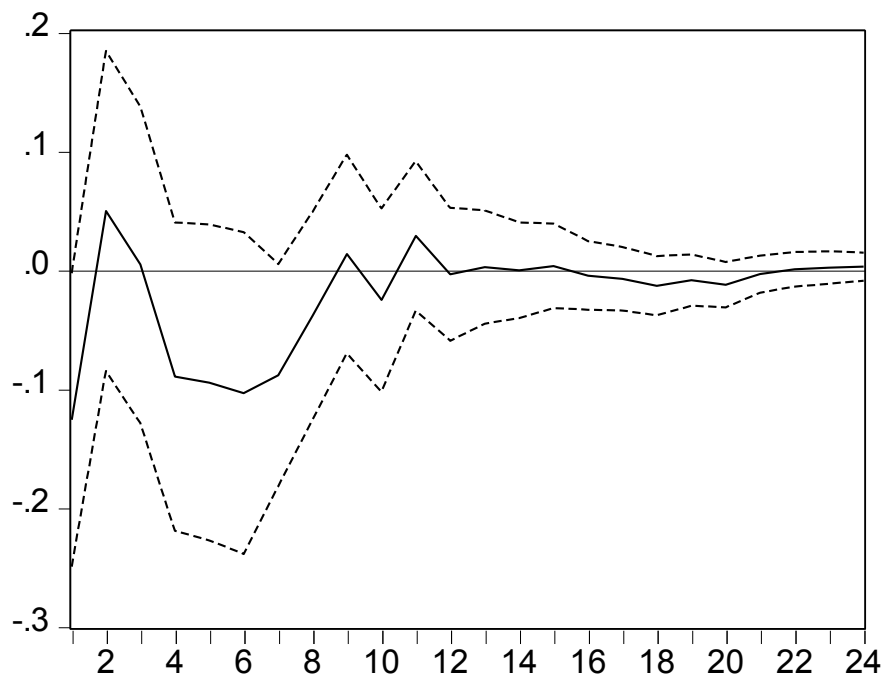
**Figure 3. The response of the Aaa bond yield to a one standard deviation innovation in M2, a Cholesky decomposition.**

**Sources. See Figure 2.**



**Figure 4. The response of the Baa yield to a one standard deviation in M2, Cholesky decomposition.**

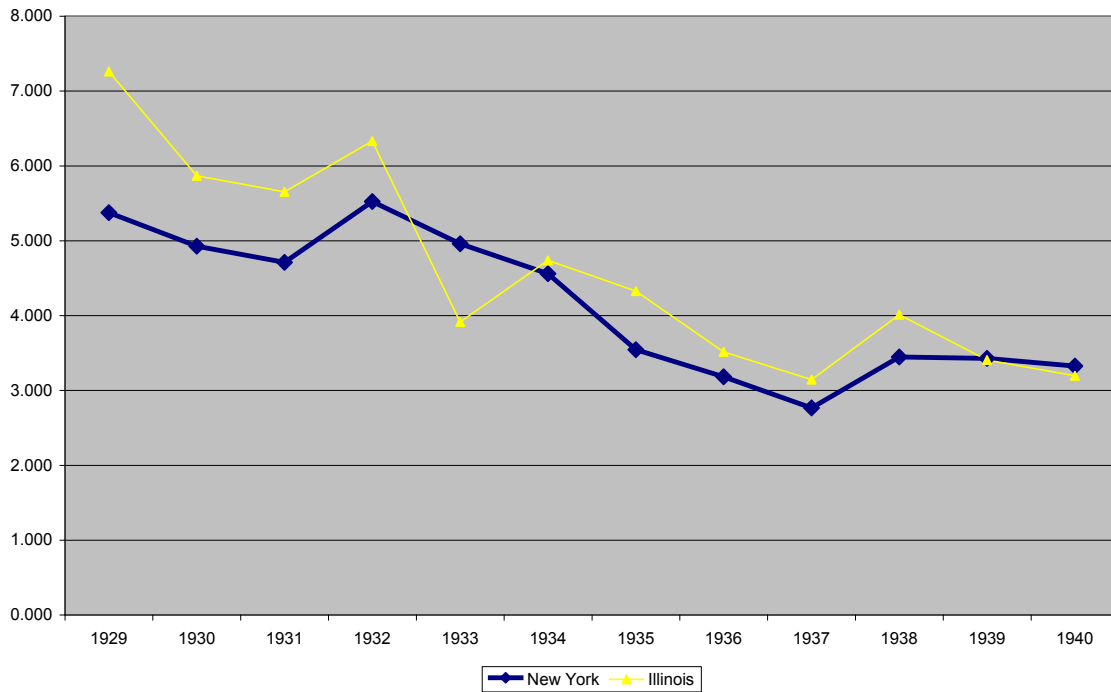
**Sources. See Figure 2.**



**Figure 5. The response of the junk bond yield to a one standard deviation innovation in M2, Cholesky decomposition.**

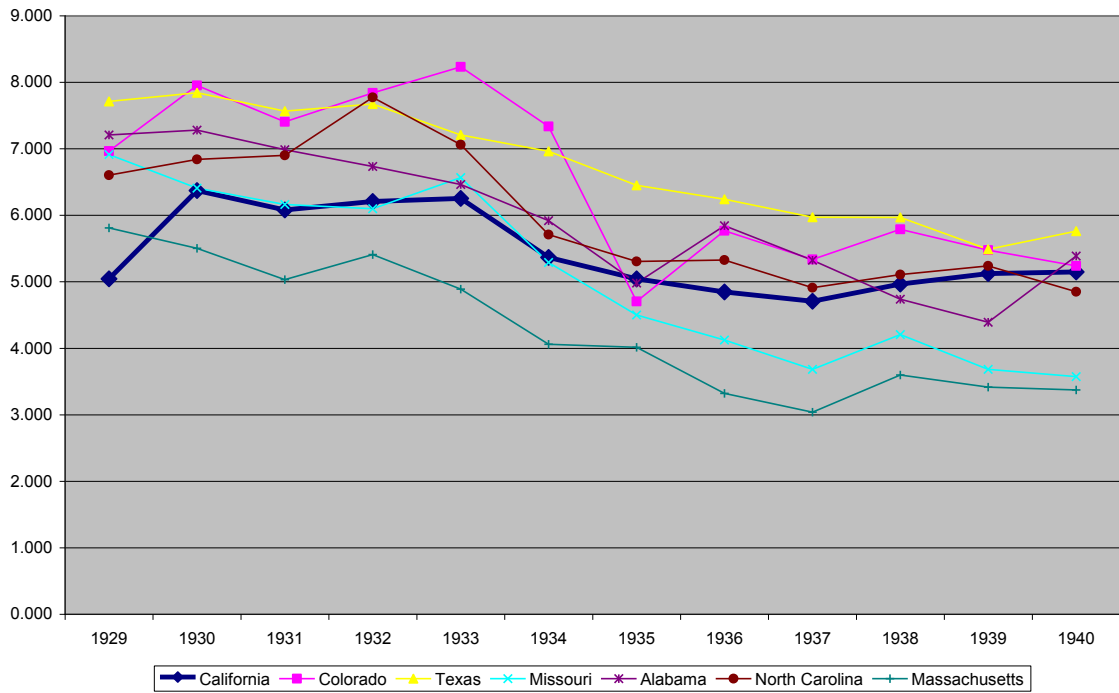
**Sources. See Figure 2.**





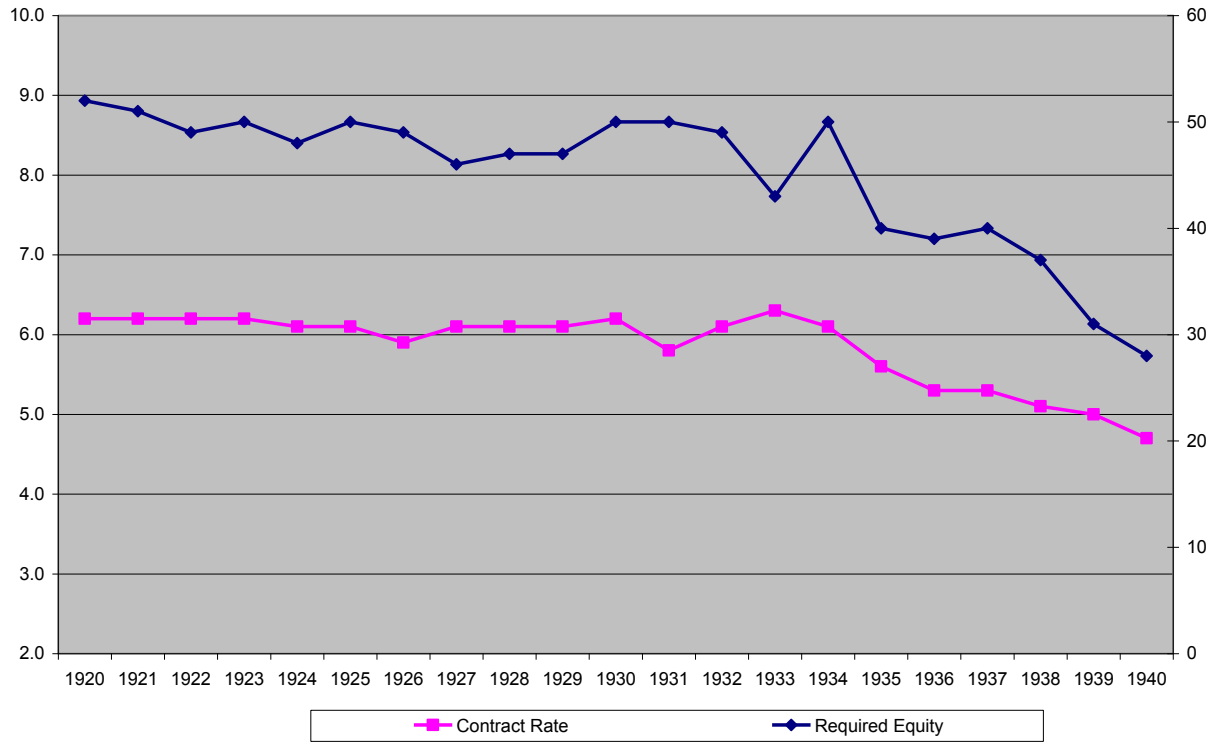
**Figure 6. Bank lending rates in New York and Illinois, 1929-1940.**

**Source: From the data underlying Bodenhorn (1996), courtesy of the author.**



**Figure 7. Bank lending rates in selected states, 1929-1940.**

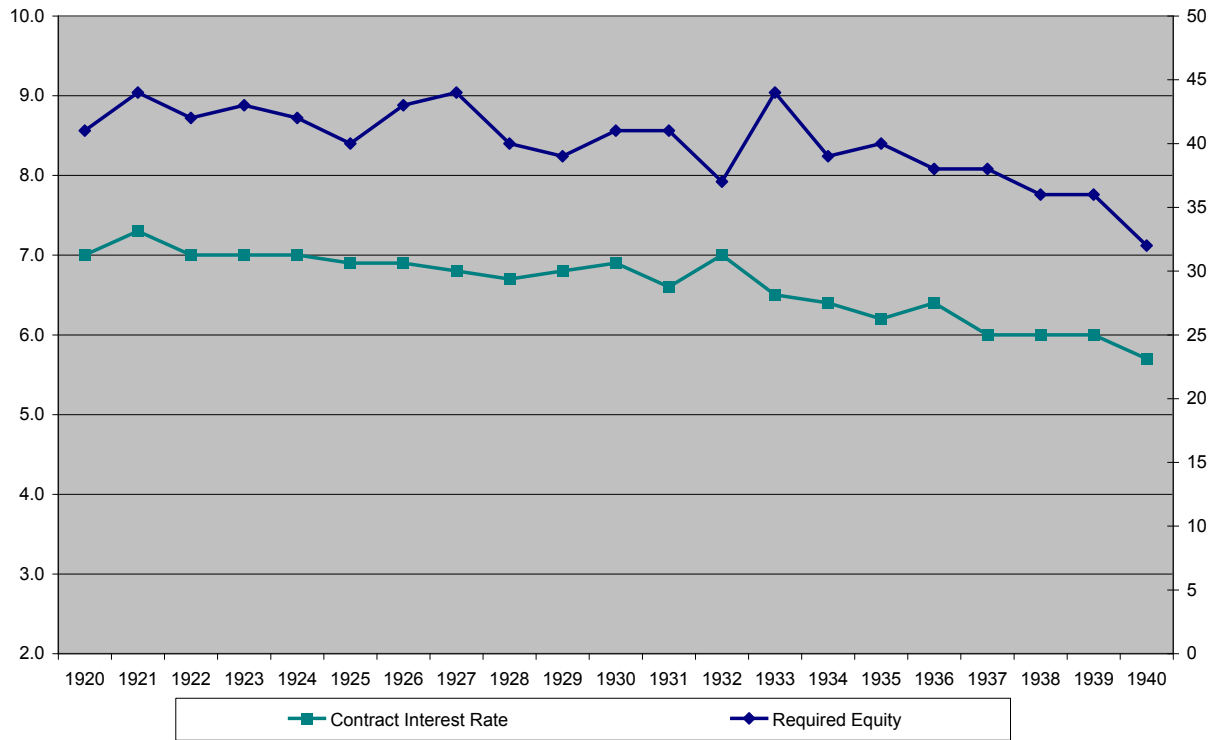
**Source: From the data underlying Bodenhorn (1996), courtesy of the author.**



**Figure 8. Nonfarm mortgages created by commercial banks, annual 1920-1940.**

**The contract rate is measured as a percentage along the left vertical axis, and the required down payment is measured as a percentage along the right vertical axis.**

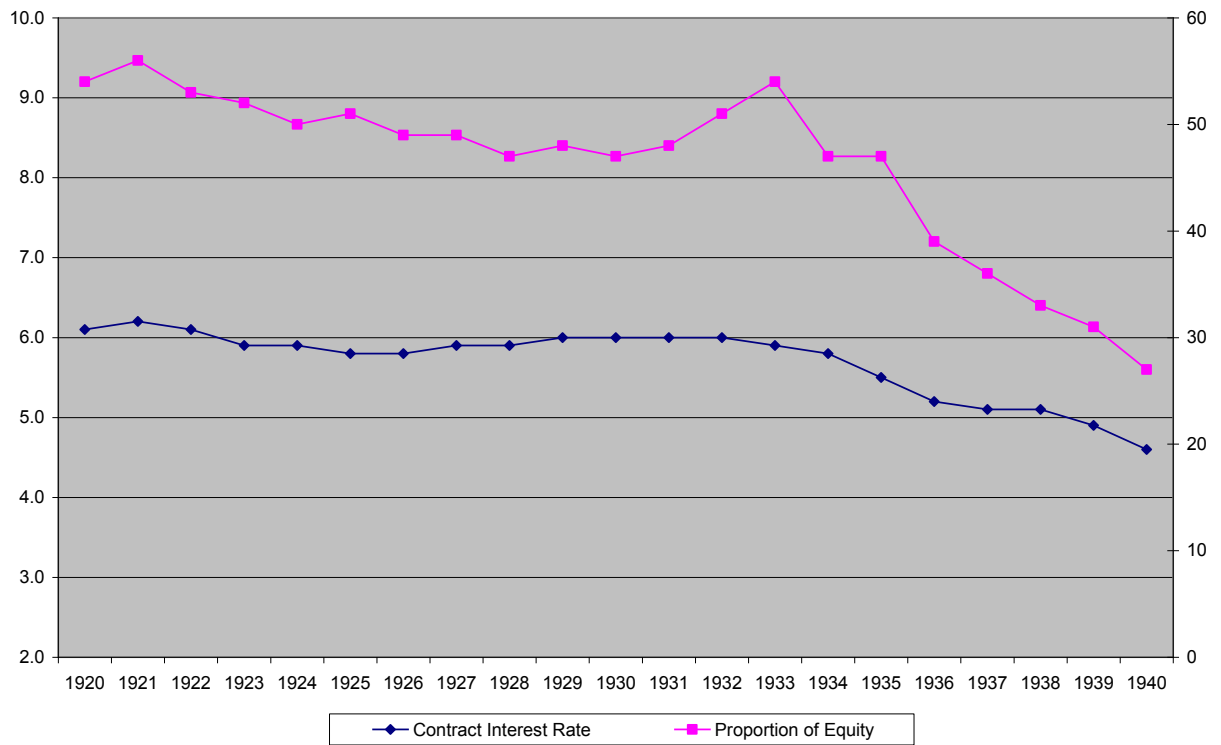
**Source: *Historical Statistics* (2006, series Dc1196 and Dc1202).**



**Figure 9. Nonfarm mortgages by savings and loan association, 1920-1940.**

**The contract rate is measured as a percentage along the left vertical axis, and the required down payment is measured as a percentage along the right vertical axis.**

**Source: *Historical Statistics* (2006, series Dc1194 and Dc1293).**



**Figure 10. Nonfarm mortgages by life insurance companies, 1920-1940.**  
**The contract rate is measured as a percent along the left vertical axis, and the required down payment is measured as a percent along the right vertical axis.**

**Source: *Historical Statistics* (2006, series Dc1195 and Dc1201).**

## References

- Bodenhorn, Howard. "A More Perfect Union: Regional Interest Rates in the Twentieth Century United States." In *Anglo-American Financial Systems: Institutions and Markets in the Twentieth Century*, eds. Michael Bordo and Richard Sylla, 415-53. Edited by. Burr Ridge, Illinois: Irwin, 1996.
- Banking and Monetary Statistics: 1914–1941*, U.S. Federal Reserve System, Board of Governors, September, 1943.
- Basile, Peter F. "The Cyclical Variation of Junk Bond Risk Premiums in a Historical Perspective, 1910-1955," Masters Thesis, Rutgers University, 1989.
- Bernanke, Ben S. "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression." *The American Economic Review*. 73 (1983): 257-276.
- Bernanke, Ben S. and Vincent R. Reinhart. "Conducting Monetary Policy at Very Low Short-Term Interest Rates." *The American Economic Review, Papers and Proceedings* Vol. 94, No. 2, (May, 2004): 85-90.
- Brunner, Karl and Allan H. Meltzer. "Liquidity Traps for Money, Bank Credit, and Interest Rates." *The Journal of Political Economy*. 76 (Jan. - Feb., 1968): 1-37.
- Calomiris, Charles W. "Financial Factors in the Great Depression." *The Journal of Economic Perspectives*. 7, (Spring, 1993): 61-85.
- Capie, Forrest H. "Monetary Stringency, Stock Market Crash, and the Great Depression." *European Economic Review* 34 (May 1990): 608-15.
- Capie, Forrest H., and Geoffrey Wood. "Price Change, Financial Stability, and the British Economy, 1870-1939." In *Deflation: Current and historical perspectives*, eds. Richard C. K. Burdekin and Pierre L. Siklos, 61-90. Studies in Macroeconomic History, 2004.
- Capie, Forrest H., Terry C. Mills, and Geoffrey E. Wood, "Debt Management and Interest Rates: The British Stock Conversion of 1932." *Applied Economics*, (October 1986) 18: 1111-26.
- Cecchetti, Stephen G. "The Case of the Negative Nominal Interest Rates: New Estimates of the Term Structure of Interest Rates during the Great Depression." *The Journal of Political Economy*, Vol. 96, No. 6 (Dec., 1988), pp. 1111-1141.

- Clement, Douglas, and Allan Meltzer. "Interview with Allan H. Meltzer." *The Region*, The Federal Reserve Bank of Minneapolis, September 2003. Available at [http://www.minneapolisfed.org/publications\\_papers/pub\\_display.cfm?id=3356](http://www.minneapolisfed.org/publications_papers/pub_display.cfm?id=3356), accessed August 6, 2009.
- Friedman, Milton. "Comments on Monetary Policy." *Rev.Econ.Stat.*, 1951, 33, 3, 186-191.
- Friedman, Milton. "A Theoretical Framework for Monetary Analysis." NBER Occasional Paper 112. New York: National Bureau of Economic Research, 1971.
- Friedman, Milton. "Comments on the Critics." *The Journal of Political Economy* 80, (1972): 906-950.
- Friedman, Milton and Anna J. Schwartz. "Money and Business Cycles." *The Review of Economics and Statistics*, Vol. 45, No. 1, Part 2, Supplement. (Feb., 1963a), pp. 32-64.
- Friedman, Milton and Anna J. Schwartz. *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press, for the NBER, 1963b.
- Friedman, Milton and Anna J. Schwartz. *Monetary Statistics of the United States: Estimates, Sources, Methods*. New York: Columbia University Press, for the NBER, 1970.
- Garman, M. Christopher and Martin S. Fridson. "Monetary Influences on the High Yield Spread versus Treasuries." In *High-Yield Bonds: Market Structure, Portfolio Management, and Credit Risk Modeling*, eds. Theodore M. Barnhill, Jr., William F. Maxwell and Mark RR. Shenkman. New York: McGraw-Hill, 1998, pp. 251-68.
- Haberler, Gottfried. "The Place of the General Theory of Employment, Interest, and Money in the History of Economic Thought (in Keynes' Contributions to Economics: Four Views)." *The Review of Economic Statistics*. 28 (1946): 187-194.
- Hanes, Christopher. 2006. "The Liquidity Trap and U.S. Interest Rates in the 1930s." *Journal of Money, Credit and Banking* 38, (1) (Feb.): 163-94.
- Hansen, Alvin H. *A Guide to Keynes*. New York: McGraw-Hill Book Company, Inc., 1953.
- Hicks, John R. "The Monetary Theory of D. H. Robertson." *Economica*, New Series 9 (Feb.1942): 53-57.

- Historical Statistics of the United States: Earliest Times to the Present*. Eds. Susan B. Carter, Scott Sigmund Gartner, Michael R. Haines, Alan L. Olmstead, Richard Sutch, and Gavin Wright. Millennial ed. New York: Cambridge University Press, 2006.
- Howson, Susan. "The Origins of Cheaper Money, 1945-7." *The Economic History Review*, New Series, Vol. 40, No. 3 (Aug., 1987): 433-452.
- Howson, Susan. "Cheap Money versus Cheaper Money: A Reply to Professor Wood" *The Economic History Review*, New Series, Vol. 42, No. 3 (Aug., 1989), pp. 401-405.
- Keynes, John Maynard. *The General Theory of Employment, Interest, and Money*. New York: Harcourt, Brace & World, Inc. 1965 [1936].
- Krugman, Paul R. "It's Baaack: Japan's Slump and the Return of the Liquidity Trap." *Brookings Papers on Economic Activity* (1998): 137-87.
- Leijonhufvud, Axel. *On Keynesian Economics and the Economics of Keynes; a Study in Monetary Theory*. New York, Oxford University Press, 1968.
- Marget, Arthur W. "Review of *Essays in Monetary Theory* by D. H. Robertson." *The Review of Economic Statistics* 23 (1941): 147-151.
- Meltzer, Allan H. "Liquidity Claptrap." *The International Economy*. (November/December 1999): 18-23.
- Meltzer, Allan H. *A History of the Federal Reserve*. Vol. 1. Chicago: University of Chicago Press, 2003.
- Moggridge, D. E. and Susan Howson "Keynes on Monetary Policy, 1910-1946." *Oxford Economic Papers*, New Series, Vol. 26, No. 2 (Jul., 1974): 226-247.
- Orphanides, Athanasios, "Monetary policy in deflation: the liquidity trap in history and practice", *The North American Journal of Economics and Finance*, 2004, 15(1): 101-124.
- Patinkin, Don. "On the Chronology of the General Theory." *The Economic Journal*, Vol. 103, No. 418 (May, 1993): 647-663.
- Robertson, Dennis H. *Essays in Monetary Theory*. London: P.S. King and Son, Ltd., 1940.
- Romer, Christina D. "What Ended the Great Depression?" *Journal of Economic History* 52 (December 1992).



Saulnier, Raymond Joseph. *Urban Mortgage Lending by Life Insurance Companies*. National Bureau of Economic Research, 1950.

Smiley, Gene. "Regional Variation in Bank Loan Rates in the Interwar Years." *The Journal of Economic History*, Vol. 41, No. 4. (Dec.1981): 889-901.

Temin, Peter. *Did Monetary Forces Cause the Great Depression?* New York: W.W. Norton, 1976.

Tobin, James. "The Monetary Interpretation of History." *The American Economic Review*, Vol. 55, No. 3 (Jun., 1965): 464-485.

Wicker, Elmus. *The Banking Panics of the Great Depression*. Cambridge, New York: Cambridge University Press, 1996.

Wood, Geoffrey E. "A Comment on 'The Origins of Cheaper Money.'" *The Economic History Review*, New Series, Vol. 42, No. 3 (Aug., 1989): 396-400.

## Endnotes

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1. The title of an influential paper by Krugman (1998), which argued that Japan during its "lost decade" was another example of a liquidity trap, was "It's Baaack: Japan's Slump and the Return of the Liquidity Trap." Writing recently in the *New York Times* (June 14, 2009), Krugman argued that our current situation represents "the third time in history that a major economy has found itself in a liquidity trap, a situation in which interest-rate cuts, the conventional way to perk up the economy, have reached their limit. When this happens, unconventional measures are the only way to fight recession." The unconventional policies that Krugman has in mind may include Federal Reserve purchases of long-term government and possibly private securities, which would make his position close to Keynes' described below.
2. The earliest use of the term "liquidity trap" that we are aware of is Dennis Robertson (1940). The first references in a search of the economics literature on JSTOR are in reviews of Robertson by Arthur W. Marget (1941), and J.R. Hicks (1942), indicating the appeal of the term. The first reference in an article is in a critical review of Keynes's contributions by Gottfried Haberler (1946).
3. Friedman stressed the range of assets again in his "Comments on the Critics" (1972, 909-910).
4. Recently, Alan Meltzer, perhaps engaging in some hyperbole in order to drive home his point, suggested that all rates would have to be zero for a true liquidity trap. "... during the period of transition, long-term rates move relative to short-term rates, stock prices move relative to bond yields. And there isn't that tight relationship that would be required so that you could get a liquidity trap. *You'd have to get all those yields to zero; we never have seen that*" (Clement and Meltzer 2009).
5. A tsunami, as most of us now know, behaves differently from the wave created by a pebble in a pond. It is usually caused by an earthquake or undersea volcanic eruption (surely a better analogy for the financial crises of the 1930s than a pebble in a pond). The wave produced is barely noticeable on the surface when it is passing through deep water. As it enters the shallow water near the shore, however, the wave becomes compacted and grows in height, and can come ashore doing enormous damage.
6. An attempt to shift from deposits into bonds won't alter the total amount of deposits – the buyer's bank account will decrease by x dollars while the seller's account will increase by x dollars – but will alter the price of bonds.
7. Junk bonds were corporate bonds rated below B or lower by Moody's.
8. Garman and Fridson (1998) show that monetary factors influenced junk bond yield spreads in recent years.

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9. During the depression the Federal Reserve published monthly series which they described as bank customer loan rates. These rates are available at the NBER website ([www.nber.org](http://www.nber.org)) in their section of historical macro-data. These series do not react to the mid-depression monetary contraction. We don't have a good explanation for why these series failed to respond as did the others. Perhaps banks had shed many of their short-term customers and retained long-term customers who held very strong ideas about normal rates based on their long relationships with the banks.

10. Here is a numerical example which illustrates the relationship between loan rates and required down payments. Suppose that a borrower puts down \$50 and borrows \$100 in order to buy a house valued at \$150. If the opportunity cost of the equity is 10% per year and the mortgage rate is 6% per year then the annual cost of the property is \$11.00 per year [ $\$11.00 = .10 * 50 + .06 * 100$ ]. Suppose that the mortgage rate is raised to 7%, then the total cost would rise to \$12 per year [ $\$12 = .10 * 50 + .07 * 100$ ]. Alternatively, the cost of the loan could be kept at 6%, but the borrower could be asked to make a down payment of \$75. Then the cost of buying the home would still have risen to \$12.00 per year [ $.10 * 75 + .06 * 75$ ], the same as if the mortgage rate had risen.

11. Saulnier (1950), who presents the same series, describes it as limited to dwellings for 1-4 families.