Towards A History of the Junk Bond Market, 1910-1955

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Abstract

Monetary and financial historians exploring the World Wars and the Great Depression in the United States have relied on a limited number of interest rates series that track the returns on high quality securities. In this paper we present a monthly index of the yield on high-risk (junk) bonds covering the period 1910-1955. We show that an examination of this yield enriches our understanding of some of the key debates in US financial history. In brief, an examination of the junk bond yields (1) strengthens the view that credit standards remained relatively stable in the late 1920s, (2) strengthens the view that the cost of capital rose substantially in the early 1930s, although the timing of changes in the junk bond yield did not closely follow the banking crises, and (3) casts additional doubt on the view that financial markets entered a liquidity trap in the second half of the 1930s.

Towards A History of the Junk Bond Market, 1910-1955[1]

1. An Index of Junk Bond Yields, 1910-1955

Interest rates have played a major role in a number of controversies about U.S. macroeconomic history, including of course, the classic controversy between the monetarists and the Keynesians over the role of money in the Great Depression. Some macroeconomists, moreover -- including Ben Bernanke (1983), Frederic Mishkin (1991), and Allan Meltzer (2003) -- have attributed a good deal of importance to the risk premium, the difference between the yield on a risky corporate bond and a safe corporate or government bond of similar maturity.

The lowest quality bond for which a yield index has been calculated that covers most of the twentieth century is the Baa corporate bond, according to the ratings assigned by Moody's Investors Service. And the gap between the Baa rate and the Aaa rate has come to be routinely used as a measure of the "quality spread" in financial markets.[2] As indicated in table 1, however, Baa bonds are still relatively high on the Moody's scale: Moody's described Baa bonds during the period we are looking at as "good quality."[3] It may well be true that the Baa-Aaa spread is sufficient to tell us all we want to know: other risk spreads could be simple multiples of the Baa-Aaa spread. But to be sure that we have a full picture of the risk structure of the bond market we need information on lower rated bonds. Here we will present a new index of junk bond yields for the period 1910-1955 and with it revisit some of the controversies in which the behavior of interest rates and the quality spread played a prominent role.

Junk bonds (or high yield bonds to use a term more likely to encourage someone to buy one) are bonds that have a high potential yield to maturity because of a high risk of default. A

more formal definition makes use of the ratings assigned by Moody's, Standard and Poor's, or one of the smaller rating companies.[4] Typically these days, junk bonds are defined as those that are rated Ba or below by Moody's and BB or below by Standard and Poor's, the two major rating agencies. Here, however, we will restrict ourselves to bonds that were rated B or lower by Moody's, in order to focus on bonds that were clearly speculative. Peter F. Basile (1989) first computed the yields on a quarterly basis. Since then we have made certain corrections to Basile's data, and extended them to a monthly basis.

In constructing the index, we have generally followed the methodology developed by Frederic Macaulay (1938) in his classic study of interest rates. Although Macaulay's methods have their weaknesses from today's point of view, there are certain advantages in using Macaulay as a model. In many ways the problems that Macaulay faced as he pushed his index back into the nineteenth century -- a limited number of securities, missing prices, thin markets, and so on -- are similar to the problems one encounters in computing an index of junk bond yields. More detail on how the index was constructed is provided in the appendix, and preliminary estimates are presented in the appendix.

Most bonds, we should note at the outset, are rated Aaa or Baa. And this is especially true for large *Fortune*-500 firms. So the junk bonds investigated here represent only a fraction of the total capitalization of the bond market, although not a trivial fraction. In the years from 1912 to 1944 examined by W. Braddock Hickman (1958, 150) bonds rated Ba or below on average made up about 24 percent of the book value of outstanding rated bonds. The peak was 1944 when bonds rated Ba or below accounted for 42 percent of the book value of outstanding rated bonds. Still, why should we look at them at them? Why not focus completely on the more important high-grade bonds? One reason for looking at junk bonds is that junk bonds may be a more

sensitive indicator, perhaps a more sensitive leading indicator, of economic conditions than higher-grade bonds. A second reason is that the firms that issue junk bonds are closer on the risk continuum to a large mass of firms that are too small and too weak to issue bonds at all, and that rely on banks or the informal capital market for funds. The return on junk bonds, in other words, may be a proxy for the cost of capital for a more important group of firms. The ratings on bonds, we would argue, can be compared with the grades we give our students. Most students (nowadays) receive A's, B's, and C's. And these are the students who are likely to go out into the world and make a contribution. But the D students should not be completely ignored.

Our monthly index of junk bond rates is plotted in figure 1, along with the Aaa and Baa rates. It is obvious that the Baa rate contains much of the information in the junk bond rate. The assumption that we can get a full picture of the risk structure by looking simply at the Baa-Aaa gap is not totally in error. Indeed, one of the purposes of this paper is to test this assumption, and as we will show below, this assumption is adequate for many purposes. But the junk bond rate does not appear to be simply a constant markup of the Baa rate. There are some interesting dynamics in the junk bond rate worth exploring. Consider the following example. The Baa-government rate gap peaked during the 1920-1921 contraction at about 350 basis points. This level was not surpassed until well into 1931, and it was about equaled during the 1937-1938 contraction. The Junk-Bond-Government spread, on the other hand, reached levels that far exceeded its 1920-21 maximum early in 1930, and exceeded the 1920-21 maximum again in the 1937-39 recession.

Perhaps the most natural question to ask about a junk bond index is whether the sample of junk bonds has to be changed frequently because of defaults or lack of price data because of thin markets, making the resulting index fundamentally different from indexes of the yields on

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safer assets. We deal with this to some extent by computing an alternative index, also described in the appendix, which we call the average yield. But in truth this problem turns out to be smaller than might be imagined. Turnover in the junk bond index because of default is relatively low in our judgment, and we believe that the yields are comparable, especially across relatively short periods of time.

We will argue below that looking at the return on high-risk bonds throws additional light on several important controversies in the monetary history of the United States during the interwar period. We begin with an important debate about the behavior of capital markets in the late 1920s.

2. Was There a Decline in Lending Standards the late 1920s?

In the wake of the Great Depression it was natural to ask whether the financial crisis had been caused by the adoption of lax lending standards during the roaring twenties. A number of studies did conclude that the average quality of loans fell in the late 1920s. The main evidence was that default rates on loans made in the late twenties were higher than on loans made in the early twenties. (Moore 1956). It was hard, however, as Milton Friedman and Anna J. Schwartz suggested in their critique of the literature (Friedman and Schwartz, 1963, pp. 245-48), to separate a change in standards from bad luck. Consider two bonds. One is issued in 1925 and survives the 1930s; the other is issued in 1929 and is defaulted on in the early 1930s. It is tempting to conclude that bond issued in 1929 was riskier. But it may have been identical in every respect except date of issue to the bond issued in 1925. It may be that the entity that issued its bond in 1925 had a longer run of prosperous years in which to use the funds it raised, and strengthen itself against hard times. A child of 10, to use Friedman and Schwartz's analogy, may

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have a higher chance of surviving an epidemic than a child of 5, even though the children are otherwise similar.

There are various ways, moreover, of interpreting the notion of lax lending standards. The term might refer to a failure to make a sufficient effort to distinguish borrowers with a high probability of default from a low probability of default. Or it might mean an increased willingness to lend to a borrower known to be a high risk. If lenders became lax in the latter sense in the late 1920s we would expect a decline in the yield on risky bonds. In other words, if the average quality of loans declined because of a shift in the demand for low quality loans, their yield would have fallen.

Friedman and Schwartz (1963, p. 247, ftn. 7) appeal to this argument, when they take note of a decline in the risk premium in the late 1920s as evidence in favor of a decline in lending standards. The decline in the risk premium, however, was confined to the yield on Baa bonds, the riskiest class of bonds for which an index has been available, which fell from 7.57 in 1920-1924 to 5.81 in 1925-1929. In 1928 and the first nine months of 1929 (before the crash) the yield on Baa's averaged 5.64. In the junk bond market, however, yields were more or less steady. Yields on junk bonds fell from 10.55 to 10.35, between 1920-24 and 1925-1929. And in 1928 and the first 9 months of 1929 the yield on junk bonds was 10.47. Thus, the evidence from the junk bond market appears to contradict the idea of a major decline in lending standards in the sense of a greater willingness to invest in securities that had been classified as speculative. To be sure, inferring movements in demand from price alone is problematic. It is conceivable that there was a large increase in the willingness to buy junk bonds offset by an increased willingness to supply them. But a look at the junk bond yields does serve to qualify any conclusions drawn from the fall in Baa rates.

Our conclusion from junk bond rates is consistent with Hickman's (1958, 179) evidence that the share of newly issued bonds given low ratings rose in the late 1920s. The proportion of newly issued bonds rated Ba or lower rose from 17.4% in 1920-24 to 21.2% in 1925-29. In 1928-29 the proportion was 26.6%.[5] What appear to have changed, then, were not the standards of rating agencies or investors, but rather the demand for risky loans by entrepreneurs. Such a change may have produced a decline in the average quality of loans outstanding, which might have influenced the course of the subsequent contraction. But the increase in the proportion of high risk loans does not appear to have been produced by a lowering of *standards* by lenders.

The issue of declining lending standards is closely related to the issue of whether there was a bubble in the stock market. As Peter Rappaport and Eugene White (1994) have shown, the cost of call loans rose dramatically with the stock market. This is strong evidence that while lending standards of investors in the stock market may have declined (or alternatively their estimates of future returns may have escalated), another segment of the capital market, the banks lending money to brokers, remained highly skeptical. The decline in the price of junk bonds expands on this point. Even though some investors had become very sanguine about the prospects of the stock market, such attitudes did not penetrate deeply into the junk bond market. There, investors who wished to sell bonds in order to raise cash to invest in stocks had to offer higher yields. Heterogeneous expectations are probably the norm, but perhaps differences were more pronounced in the late 1920s and early 1930s.

The behavior of junk bond rates in the late 1920s presents a sharp contrast with junk bond rates in the mid 1950s, a contrast that reinforces the view that lending standards remained relatively stable in the late 1920s. The prices of common stocks rose in both periods. But in the late 1920s the increase in stock prices was accompanied by stability in the price of junk bonds,

while in the mid 1950s junk bond prices rose. During the three years from July 1926 to July 1929, to be more specific, stock prices rose 81.39 percent, while the yield on junk bonds rose 3.91 percent. During the comparable three years from October 1952 to October 1955 stock prices rose 55.15 percent, while the yield on junk bonds fell 7.60 percent.

The difference between the periods appears to be that in the 1950s, unlike the 1920s, institutional investors – mutual funds, pension funds, and insurance companies – were willing to take on more risk and increase their holdings of junk bonds. Basile (1989, 143-146) provides evidence that all three institutional investors moved toward more risky portfolios. Of particular relevance here, Basile examined the portfolios of mutual funds reported in *Investment Companies*, a manual published by Arthur Wiesenberger, for listings of the bonds in his junk bond index. He found (Basile 1989, 146) that in 1948 large mutual funds held about $16 million (at par value) in bonds in the junk bond index, and that by 1956 that number had risen to something between $30.5 and $48 million. Additional evidence shows that other institutional investors also were buying riskier assets.

In short, if we define lax lending standards as an increased willingness to take on borrowers with obvious signs of risk, such as low bond ratings, then the evidence of the junk bond market reinforces the view that the decline in lending standards in debt markets (as opposed to equity markets) in the late 1920s was limited.

3. Did the Banking Crises Produce Higher Interest Rates in the Early 1930s?

According to Friedman and Schwartz the first banking crisis in the Great Depression began in October 1930 and ended, or at least abated, in January 1931. Interest rates, they argued

(Friedman and Schwartz 1963, 312) showed the effects of the crisis because "a widening differential began to emerge between yields on lower-grade corporate bonds and on government bonds." This differential, according to Friedman and Schwartz, was the result of a decision by the banks to sell riskier bonds while holding on to governments. The resulting decline in bond prices in turn weakened the balance sheets of the banks and contributed to subsequent banking difficulties.

Peter Temin (1976) challenged this analysis on both theoretical and empirical grounds in *Did Monetary Forces Cause the Great Depression?* Temin argued that the increase in the return on Baa bonds was solely a result of the increased risk of default or an increased price of risk due to the worsening economic conditions, and did not reflect monetary stringency, or a scramble for liquidity among the banks. Returns on government bonds and Aaa corporates, as shown in Table 2, remained stable demonstrating that the on going decline in the stock of money was not having an independent effect on the economy.

One of Temin's main arguments concerns the timing of the movement in interest rates. The increase in Baa rates, to which Friedman and Schwartz drew attention, was large by the standard of the 1920s, although not unprecedented. From January 1930 to July 1930 the Baa yield fell 15 basis points; from July 1930 to January 1930, the period containing the banking crisis, the yield rose 64 basis points. The standard deviation of six-month changes over July 1920 to July 1930 was 38 basis points. There was only one larger increase: yields rose 74 basis points from January 1920 to July 1920. The movement in Baa rates, moreover, was closely correlated with the onset of the first banking crisis: rates fell until September, the month before the onset of the crisis.

But Temin argued that the rise in the return on Baa bonds was the result of the reclassification of the bonds of firms facing financial difficulties. Suppose that worsening economic conditions produced drastic declines in the prices of certain bonds, and suppose that those bonds were reclassified. Then the yield on low rated bonds could move up and the yield on the remaining safe bonds could decline creating the illusion that banks or other holders were selling risky bonds in order to buy safe ones.

To test this theory, Temin created a yield index with a fixed group of bonds and followed their yields over the crucial years. Instead of finding a sharp upward movement correlated with the onset of the banking crisis, Temin found what he regarded as a longer-term upward trend unaffected by the banking crisis. The fixed sample shows a much greater increase in rate of return than the Baa index. The increase, however, was not concentrated during the period of the first banking crisis. The return on Temin's fixed sample, shown in the last column of Table 2, rises 84 basis points between December 1929 and June 1929; and then 74 basis points from June 1929 to December 1930, a period that contains the first banking crisis, demonstrating that the crisis had little impact on the continuing increase in average rates.[6]

Elmus Wicker's *The Banking Panics of the Great Depression* also reaches the conclusion that the first banking crisis did not produce a liquidity crunch because available interest rates, both short and long, did not rise significantly. In discussing long-term rates, Wicker (1996, p. 40) drew attention to a table similar to Table 2, and concluded that although there was an increase in Baa rates the bond market remained "calm and orderly." Overall, the thrust of Wicker's discussion seems to be that the banking difficulties in late 1930 made little impression on long-term markets.

Our index of junk bond yields (plotted along with the Baa and Aaa rates in figure 2) throws some additional light on this controversy. Evidently, the movement in the rates of the most risky securities began sometime before the first banking crisis, as Temin's inference from his fixed sample of bonds suggested, although there may have been a small fillip at the time of the first crisis. The increase in junk bond rates in 1930, moreover, was unprecedented in our sample. From December of 1929 to December of 1930 the Junk bond yield rose 570 basis points. The largest previous annual increase in our sample was 320 basis points from July 1922 to July 1923. The Baa bond rate also rose substantially from December 1929 to December 1930, by 77 basis points, although this increase had a precedent. Between July 1919 and July 1920 the Baa rate had risen 146 basis points.

The junk bond rate, moreover, appears to have moved before the Baa rate, giving an early warning of the deluge to come. In recent years the junk bond yield has been a good leading indicator as shown by Mark Gertler and Cara S. Lown (2000). And this episode may be further evidence of the sensitivity of the junk bond rate to expectations about future economic conditions. Wicker's portrait of a calm market applies to the lower risk securities. As far as the junk bond market was concerned something very bad was happening in 1930.

Although in Temin's view the banking crisis did not contribute to the decline in bond prices through a scramble for liquidity, the prior decline in bond prices, in his view did contribute to the banking crisis by reducing the value of bank assets. Unfortunately, little direct data on bank bond portfolios in the early 1930s seems to be available. Eugene White (1984) followed up on Temin's conjecture and showed that while declines in bond prices did not seem to have been a factor in producing failures of National banks, it was a factor for state chartered banks.

Additional evidence is provided by Fred L. Garlock's (1941) neglected study of country banks in Wisconsin.[7] Garlock went through reports by individual banks to the banking authorities, and for a select group of banks he talked with bank managers and was given additional information. His study provides the most detailed picture that I am aware of, of the impact of the crash on security holdings. Obviously, it covers only rural banks in Wisconsin, and so is hardly a basis for generalization. Nevertheless, the results are suggestive. Table 3 shows the response in terms of their security portfolio of the banks in his special sample. As might be imagined, all types of securities were liquidated in order to meet the rush of withdrawals. The surprising thing, however, is that the banks liquidated a larger proportion of their holdings of high grade bonds (line 3), and purchased more low grade securities. This evidence tells against the conjecture by Friedman and Schwartz that banks concentrated on selling lower rated bonds after the start of the banking crisis. It may be that during this initial phase of the Depression the banks hoped to maintain their earnings by liquidating their higher quality securities. It is also possible that higher rated bonds were easier to market quickly during the panics.

As the Depression wore on, however, the Wisconsin banks began to load up on safer securities. The effect of these changes can be seen in Table 4. The percentage of government bonds in bank bond portfolios declined from 1929 to 1932, and then rose dramatically between 1932 and 1935. The banks that survived without establishing a depositor's trust -- that is without limiting access to deposits in any way -- are shown in the second column by way of contrast. As might be expected, these banks were somewhat more conservative in 1929 than all banks, holding more of their bond portfolio in higher rated securities (although not in governments) and less in lower rated and nonrated securities.

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The Vermont banks that White examined and the Wisconsin banks that Garlock examined obviously can do no more than form the basis for conjectures about how banks in urban areas and other regions of the country and how other financial intermediaries behaved. Information of the sort collected by Garlock for other financial intermediaries and for individuals would help identify where the selling pressure in the junk bond market was located. The response of particular individuals and institutions may have varied.

Hickman (1958), for example, shows that the reclassification of bonds probably produced considerable selling pressure for certain institutions, although perhaps more in later banking crises than in the first crisis. Banks in some areas were often required to purchase only investment grade bonds, which were assessed at book value by bank examiners. Bonds rated below Baa were marked to market. When bonds were reclassified some banks, therefore, (Hickman 1958, p. 140) had a strong incentive to sell them to avoid substantial reported reductions in their capital values. Mutual Savings Banks, an important part of the banking system in the Northeast, moreover, could only invest in bonds that appeared on lists issued by state banking authorities. Typically, the bonds on the list were rated at Baa or above. When bonds were reclassified, banking authorities would remove them from the list of approved bonds, and the Mutual Savings Banks were forced to sell them promptly. (Hickman 1958, p. 259). Thus, although the Wisconsin country banks found it in their interest to dump governments and purchase lower rated securities, other intermediaries and individuals may have reacted differently, adding to the upward pressure on junk bond yields.

Irving Fisher (1930, 382-83), it is interesting to note, discussed divergent movements between high-risk and low-risk securities in the *Theory of Interest*. He concluded that it was possible, in periods of great uncertainty, for the rates on risky loans to rise and the rates on

relatively safe loans to fall. Fisher cited the United States during the Civil War and Europe (but not the United States) during the First World War as times and places where great uncertainty had produced this divergence in interest rate movements. This seems to have been the case during the first banking crisis, although I do not know that Fisher had the conditions of 1930 in mind when he wrote about divergent movements in safe and risky asset. Later, as economic conditions worsened, and even strong corporations began to tremble, yields on highly rated corporates rose.

The well-known Bernanke (1983) thesis holds that the financial crisis of the early 1930s significantly increased borrowing costs for many firms and individuals. It is difficult, however, to observe this process directly because it may take the form of "credit rationing" by financial intermediaries rather than by increasing the rates charged to particular classes of borrowers. Bank lending rates, in fact, increased only to a minor degree in the Great contraction. (Smiley 1981, Bodenhorn 1995). Bodenhorn divided the United States into four regions. In the North East the average bank lending rate fell 21 basis points between 1929 and 1932. In the South the lending rate rose 2 basis points; in the Plains states, 25; and in the West, 105. The reason why we do not see much change in bank lending rates may be that banks were focusing more of their lending on low-risk customers. Bernanke (1983) relied on indirect evidence to make his point. One variable he used was the spread between the Baa rate and the rate on long-term government bonds. He also relied on timing evidence that showed that the depression worsened when bank failures mounted. In more recent work on the bank-lending-channel Bernanke and others – for example, (Bernanke, Gertler, and Gilchrist, 1996), have relied on comparisons of large and small firms, the latter presumably more sensitive to changes in the availability of credit.

As Bernanke pointed out, the Baa rate is not entirely convincing as a proxy for the Cost of Credit Intermediation, because the Baa rate applies to large companies with relatively high credit ratings. Typically, firms that relied on bank loans for a significant portion of their capital were smaller and less well established. So our index of junk bond yields provides a measure of the cost of credit to firms closer to the type that Bernanke thought would be most affected by the banking crisis. Thus, Figure 2, which shows the sharp run-up in junk bond rates during the worst years of the crisis, provides additional support for the Bernanke thesis.

Peter Temin in *Lessons from the Great Depression* (1989, p. 54) recognized that the price of lower grade industrial bonds began to decline in late 1930s. Temin, however, argued that the rise in the cost of borrowing could not have contributed much to the decline in output because the decline in output was concentrated among large firms. And large firms, evidently, continued to have access to capital. Indeed, the rate on triple A bonds, actually fell by 18 basis points between April 1930 and January 1931.[8]

Temin may well be right that the increased cost of capital was concentrated among the smaller firms. Nevertheless, the two classes firms were not completely separate. Hickman (1958, p. 183) showed that the percentage of large offerings -- which he defined as offerings over $5 million -- that were rated Ba or lower declined from 23.8 percent in 1929 (to be sure, an unusually high year) to 12.2 percent in 1930 (a more normal year) to 8.9 percent in 1931 (unusually low), suggesting that some medium firms were being discouraged from issuing bonds by high rates. The locus of the investment decline, moreover, may differ from the locus of the output decline. Consider a small railway that decides not to replace its rolling stock or locomotives because the cost of capital is high. It is the smaller firm that decreases its planned investment, but the larger firm, the manufacturer of locomotives, which decreases its output. The

extreme case is the consumer. The failure of consumers to buy new appliances because they cannot get credit from a bank or finance company may affect the sales of giant corporations.

4. Was There a Liquidity Trap in the Latter Half of the 1930s?

There has been considerable interest in recent years in whether there was a liquidity trap in the 1930s. Many economists have wondered whether low interest rates in Japan (measured by the return on government bonds) prove that monetary policy in Japan had become ineffective. (Krugman 1998). And at least until the current expansion began, there was some concern in the United States that the Federal Reserve might also "run out of ammunition." So it is natural for economic historians to ask about how close financial markets in the United States approached a liquidity trap in the late 1930s, when rates on government bonds were extremely low.

The idea of a liquidity trap, of course, derives from John Maynard Keynes who termed it "absolute liquidity preference" in the *General Theory*. 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. The reason derived from the important role played by speculators in bond markets. (A role Keynes, himself a speculator, knew well). If speculators agreed that the current rate of interest was "normal" then any attempt by the central bank to lower rates by buying government bonds would be counterbalanced by the willingness of speculators to sell bonds; and any attempt to raise rates would be counterbalanced by the willingness of speculators to buy bonds. A liquidity trap would be more likely as rates approached zero. Speculators would then be almost certain that if rates moved substantially in the future, it would be up. 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 would be powerless to affect interest rates, and therefore powerless to affect investment spending and the remainder of the economy. In Keynes's view fiscal policy, or radical controls over private investment, would have to be used to promote expansion.

In the *General Theory* Keynes qualified his discussion of the liquidity trap: "whilst this limiting case might become practically important in the future, I know of know example of it hitherto." (Keynes 1936, ***)How central this qualification was in Keynes's thinking is a matter of dispute. The *General Theory*, of course was written before Keynes could observe the late 1930s. Nevertheless, he never claimed, as far as I am aware, that financial markets in the United States entered a liquidity trap in the second half of the 1930s.

But Keynes's American followers did believe that the United States had fallen into a liquidity trap in the second half of the 1930s. Alvin Hansen (1953, 132), often described as the leading American Keynesian of the day, thought Keynes's qualification of his analysis of the 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]."[9] A substantial literature followed attempting to establish or refute the idea that there was a liquidity trap in the 1930s. Much of this literature is cited in Karl Brunner and Allan Meltzer's (1968) powerful attack on the notion of a liquidity trap in the 1930s. A central point of Brunner and Meltzer was that it is not enough to look simply at rates on government bonds. It is necessary to look at the whole range of securities.

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Figure 3 shows our junk bond yields, the Baa yields, 90-day Treasury Bill yields, and the rate of growth of M2 from January 1935 to December 1941.[10] If one were to look only at the yield on 90-day-Treasury Bills and the rate of money growth one would be tempted to agree with Hansen that the economy had entered a liquidity trap in the latter half of the 1930s. Money growth fell to negative rates in 1938, yet interest rates, represented by the yield on Treasury bills, remained low and stable. If one looks at the rate on Baa bonds, however, one does see, as Meltzer (2003, 519-20) points out, an increase in rates. And if one looks at the yield on junk bonds, one sees a dramatic rise.

To be sure, the main reason for the rise in the yields on Baa and junk bonds was the recession that ran from May 1937 to June 1938 (according to the NBER chronology). Investors were afraid that 1929-1933 had returned, and the perceived probability of defaults rose. It is possible, therefore that non-monetary forces produced the recession, which in turn produced both the rise in junk bond yields and the decline in the stock of money.[11]

Many economists, moreover, reject outright the idea that monetary policy could influence high-risk securities without first influencing yields on government bonds, to an even greater extent.[12] They rely on what Temin (1976, 96-103) calls the "pebble in the pond" theory of the transmission of monetary shocks. A pebble thrown into a pond produces a wave of large amplitude at the spot where the pebble hits the water, which diminishes and becomes irregular as it approaches the shore. In the same way, a decrease in the stock of money would have a large impact on the market for assets that are closest to money, short-term low risk bonds such as treasury bills, but would have a diminishing impact as one moved further away -- toward corporate bonds, high-risk corporates, stocks, and so on.

This sequence makes the most sense, it seems to us, when the change in the stock of money is generated by open market purchases or sales, 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 at least possible to imagine, moreover, adjustment paths in which monetary shocks made a smaller impression on assets similar to money and a larger impression on less similar assets. We might call this the "tsunami" theory of the transmission of monetary shocks.[13] Suppose wealth holders view assets as lying on a money continuum with cash having the highest degree of "moneyness," deposits having the next highest degree, short-term government bonds the next highest, and so on. And suppose that the perceived moneyness of deposits declines as a result of the rising tide of bank failures. What would be the most direct 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 might have been more effective to sell, say, $100 of junk bonds and acquire $100 in government bonds or cash.[14] More detailed evidence, as noted above, on how wealth holders behaved in the face of the banking crises would help resolve which of several plausible stories about the adjustment process is the right one.

The possibility that monetary impulses could be transmitted through channels other than long-term government bonds was raised in earlier discussions of the liquidity trap. Milton Friedman (1971, 28), after describing Keynes's analysis, argued that the difference between monetarists and Keynesians was "was less in the nature of the process than in the range of assets

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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 asset prices affected by changes in the stock of money, creating a direct link between money and economic activity.[15]

Given the anxiety about liquidity traps, it is not surprising that a large literature has developed in recent years to explore liquidity traps. Much of that literature uses calibrated analytical models to tease out the implications of liquidity traps for monetary policy. Christopher Hanes (2002) has shown that during the supposed liquidity trap of the late 1930s that changes in bank reserves did influence long-term government bond rates, even though overnight rates were close to zero.

Here I approach the liquidity trap from a different angle by asking whether monetary policy affected the yields on high-risk securities in the second half of the 1930s. The number of observations in the liquidity-trap period, of course, is relatively small. If we define the period as running, say, from the resolution of the banking crises to U.S. entry into World War II -- from the first quarter of 1934 to the fourth quarter of 1941 -- we have only 128 monthly observations. So the ability to test for liquidity effects in the Baa or junk bond yield is limited.

Nevertheless, we attempted to throw some additional light on the issue by estimating a simple vector auto regression that includes, in the order in which they were entered, an indicator of general economic conditions, money (M2), and the yield on junk bonds.[16] To begin with we estimated a VAR with lagged values of the rate of growth of Department Store Sales to capture general economic conditions. We started with two lags and added more based on statistical significance. In the charts included here we used 12 lagged values of each variable. The equation

was estimated in first differences because testing showed that the possibility of unit roots in the underlying series could not be rejected.

The resulting impulse response chart for the response of changes in the junk bond yield to innovations in the growth of M2 is shown in figure 4. The picture is consistent with the view that monetary policy had an impact on the junk bond yield that was independent of influences running from the general level of economic activity. The effect is negative, but deteriorates, as might be expected from a liquidity effect. The wide two-standard deviation boundaries in the figure, however, warn that we cannot rule out the possibility of no liquidity effect at conventional probabilities.

Figure 5 plots the impulse-response pattern for government bonds (a 10-year maturity), the Baa bonds, and the junk bonds. All three show some response to increased or decreased liquidity, but the response is clearly much larger for the junk bonds.

Figures 4 and 5 are obviously only a starting point. We tested the robustness of the relationship in various ways. (1) We estimated the relationship in levels. Here the results were less easy to interpret, although there was a negative impact on the junk bond rate from money growth. (2) We varied the order in which the variables were entered. This did not seem to make much difference to the resulting impulse-response functions as far as the response of junk bonds to money was concerned.

(3) As indicated above, we settled on a large number of monthly lags by starting with two lags and then looking at the statistical significance of additional lags. When only a few lags were used the results did not show as clear a pattern as figures 4 and 5. But the impulse-response charts were consistent with a negative liquidity effect in the junk bond market.

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(4) We tested the relationship during the period 1910 to 1933. Finding a relationship between monetary policy and junk bond yields during the earlier period would not provide much evidence against the view that there was a liquidity trap in the latter period. But finding no relationship would cast some doubt on any finding of a relationship within the period at issue. Again, we found a negative liquidity effect running from money to the yield on junk bonds, although there was an initial positive effect and the liquidity effect did not disappear, counterintuitive results. The failure of junk bond yields to return to normal after their increase in 1929 to 1933 may explain this result.

(5) We tried indexes of industrial production rather than department store sales to measure general economic conditions. Again, the effect of money on the junk yield was strongly negative during liquidity trap era, but perversely, not during the period prior to the liquidity trap.

(6) We estimated similar VARs using quarterly data so that we could use GNP to measure general market conditions. Here we used only 2 lagged values. A typical impulse-response figure for the impact of changes in the stock of money on changes in the junk bond yield is shown in figure 6. Again, we see the expected liquidity effect.

In the end we were persuaded that the evidence is consistent with the idea that changes in money led changes in the Baa and junk bond yields, and that the effects were large enough to be taken seriously. Both the bond yields and money growth, however, reflect expectations about the future. In the case of the bonds this is obvious because holders are trying to predict the likelihood of bankruptcy. But it is also true of the money supply, as bankers for example, adjust their reserve positions to expectations of withdrawals. So it is inherently difficult, using this approach, to determine whether in fact there were liquidity effects in the junk bond market.

5. The Importance of High Risk Securities

Financial and monetary historians have been interested for a long time in the returns on risky bonds. But they have hoped that looking at the first step on the risk ladder, the difference between Aaa and the government bond rate, or the second step, the difference between the Baa rate and the Aaa rate, would provide sufficient information. In this paper we explore the adequacy of this assumption by examining a new index of the yield on junk bonds during the tumultuous years from 1910 to 1955. As it turns out, the assumption that the Baa-Aaa gap contains considerable information about the performance of risky bonds appears to be adequate for many purposes. But the junk bond rate is not simply a multiple of the Baa rate. An examination of junk bond yield, we believe, enriches our understanding of a number of key episodes in American monetary history.

(1) One debate in which interest rates and bond yields have played an important role is the debate over whether lending standards declined in the late 1920s. Our index of junk bonds strengthens the case for believing that lending standards did not decline because yields on junk bonds remained stable in the late 1920s. The late 1920s may be contrasted, in this respect, with the early 1950s when junk bond yields did decline in part because institutions that had previously been unwilling to buy them began to do so.

(2) An examination of our index of junk bond yields also strengthens the case for believing that borrowing costs rose substantially during the early 1930s. Bank lending rates as developed by Bodenhorn (1995) and Smiley (1981) do not show an increase, but this may be because of credit rationing by banks. Bernanke in his seminal (1983) article pointed to the increase in the Baa rate as evidence that costs of credit intermediation rose substantially. Our

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junk bond index, which may reflect firms that were closer on the risk continuum to those that would borrow operating capital from banks, rose to extraordinary heights during the early 1930s. And because of another sharp increase in the second half of the 1930s, it remained high on average throughout the 1930s, consistent with the idea that high borrowing costs explain the duration of the Depression.

While the movements of the junk bond rates in the early 1930s were associated with the collapse of the money supply and the financial system, one cannot identify changes in the junk bond yield with particular events such as the first banking panic of October or November1930. Indeed, the junk bond yield may have been a leading indicator of the slump, a property that it has exhibited in recent years.

More information on which institutions held junk bonds and if and when they sold them would be a useful supplement to the junk bond yield index. A somewhat neglected study by Garlock (1941) of country banks in Wisconsin showed that in the initial slump the banks in his sample actually sold a higher proportion of their high quality bonds. Only later as the depression continued did they begin moving their bond portfolio to the high quality end of the risk continuum by investing heavily in government bonds.

(3) The argument that the economy had fallen into a liquidity trap in the late 1930s appears more problematic after one looks at our index of junk bond yields. While government bond yields show virtually no response to the decline in the stock of money between 1937 and 1938, the yields on Baa bonds, and especially on Junk Bonds, did rise dramatically. Vector Auto Regressions reinforce the idea that there may have been a line of causation running from the changes in the stock of money to changes in risky yields. It is difficult to draw any persuasive

conclusions, however, because both money and bond yields respond to expectations about future economic conditions.

One conclusion we drew from our examination of the junk bond index is that policy makers should be looking at a wide range of interest rates to gage the effects of monetary policy, rather than focussing narrowly on the yields on government securities.

Our examination of the junk bond index also convinced us that it would be worthwhile extending the index forward and backward in time. By extending it forward in time we will be able to explore the effects of institutional changes (the Milken revolution) in the junk bond market. Extending the index backward in time, it must be admitted, will be a somewhat artificial exercise because it will mean extending the index into a period before formal rating systems existed. But we believe that an increased understanding of the price of high risk capital during a period of rapid economic growth and technological change would justify the effort, and we hope to accomplish these tasks in the not too distant future.

Endnotes

1. We thank the participants in a session at the Southern Economic Association Meetings in 2002, especially Frank G. Steindl (who organized the session), Elmus Wicker, and Ellis Tallman, for helpful comments on a previous draft. Larry Officer was extremely generous in sharing his knowledge of interest rate series. Deepa Bhat and Sung Won Kang provided able research assistance. None of the people we have thanked are responsible for the remaining errors.

2. The Baa-Aaa spread was used, for example, by Charles Calomiris (1993) in his survey of research on the Great Depression, and in Allan H. Meltzer's (2003) history of the Federal Reserve.

3. The Aaa and Baa rates are available on the Federal Reserve Bank of St. Louis website. <http://research.stlouisfed.org/fred2/>

4. Richard Sylla (2002) describes the history of the rating agencies. Moody's published the first ratings in 1909. This date determines the beginning of our series.

5. The agencies rated over 90 percent of the par amount of new issues.

6. Friedman and Schwartz date the onset of first banking crisis as October 1930. They are less precise about the end of the crisis, but would seem to date it after the first of the year. Temin designates November and December as the first banking crisis. To some extent the dating depends on the variables one focuses on. Friedman and Schwartz, understandably, pay close attention to the aggregate Deposit-currency and deposit-reserve ratios.

7. I am indebted to Richard Keehn for drawing my attention to this study.

8. Hunter (1982) showed that large and small firms were affected differently by the depression. Work on more recent periods also suggests that smaller firms may be adversely affected by monetary stringency, for example, Bernanke, Gertler, and Gilchrist (1996).

9. A search of the economics literature on JSTOR revealed relatively few uses of the term "liquidity trap" in the years immediately following publication of *The General Theory*. The first references are in reviews of D.H.Robertson's *Essays in Monetary Theory* (1940) by Arthur W. Marget (1941), and J.R. Hicks (1942). So Robertson, who used the term to refer to Keynes's absolute liquidity preference, may deserve credit for the term. The first reference in an article is in a critical review of Keynes's contributions by Gottfried Haberler (1946).

10. 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.

11. In this case, Friedman and Schwartz argued, the decline in the money stock was due to an independent decision by the Federal Reserve to increase legally required bank reserve ratios. A substantial literature has developed around this claim.

12. Mishkin (2001) describes several assets (stocks, housing values, and foreign exchange) through which monetary policy would influence the economy. But in each case the assumption seems to be that monetary policy would first influence "interest rates" and then asset prices and then the economy as a whole.

13. An earthquake or undersea volcanic eruption (a better analogy with the Great Depression?) behaves differently than a pebble in a pond. Sometimes the result is a tsunami, a wave that 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.

14. This is Henry Simons's model of money and the depression.

15. Friedman stressed the range of assets again in his "Comments on the Critics" (1972, 909-910)

16. Garman and Fridson (1998) show that monetary factors influence junk bond yield spreads in recent years.

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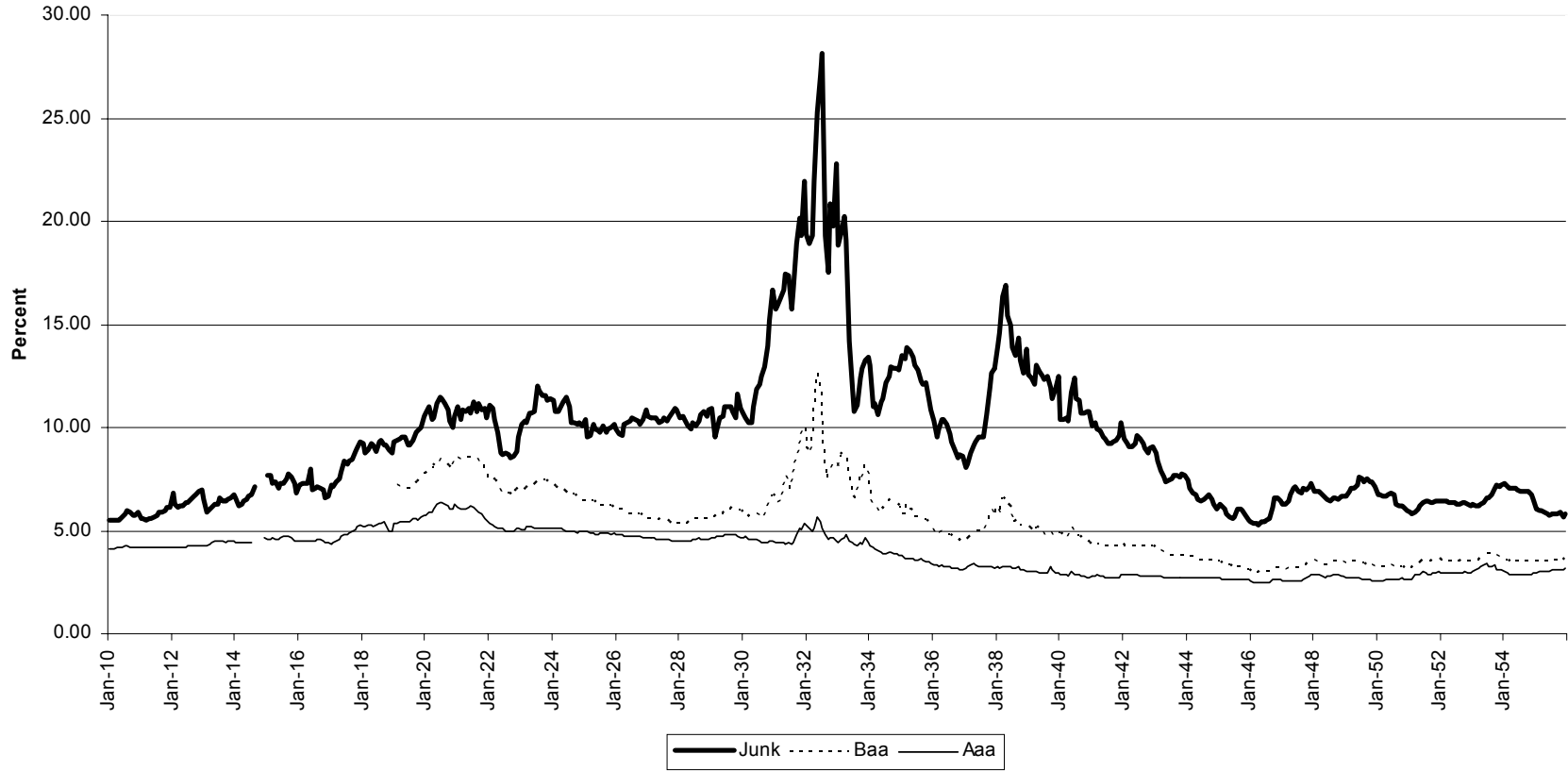**Figure 1. Yields on Corporate Bonds, Monthly,1910-55**

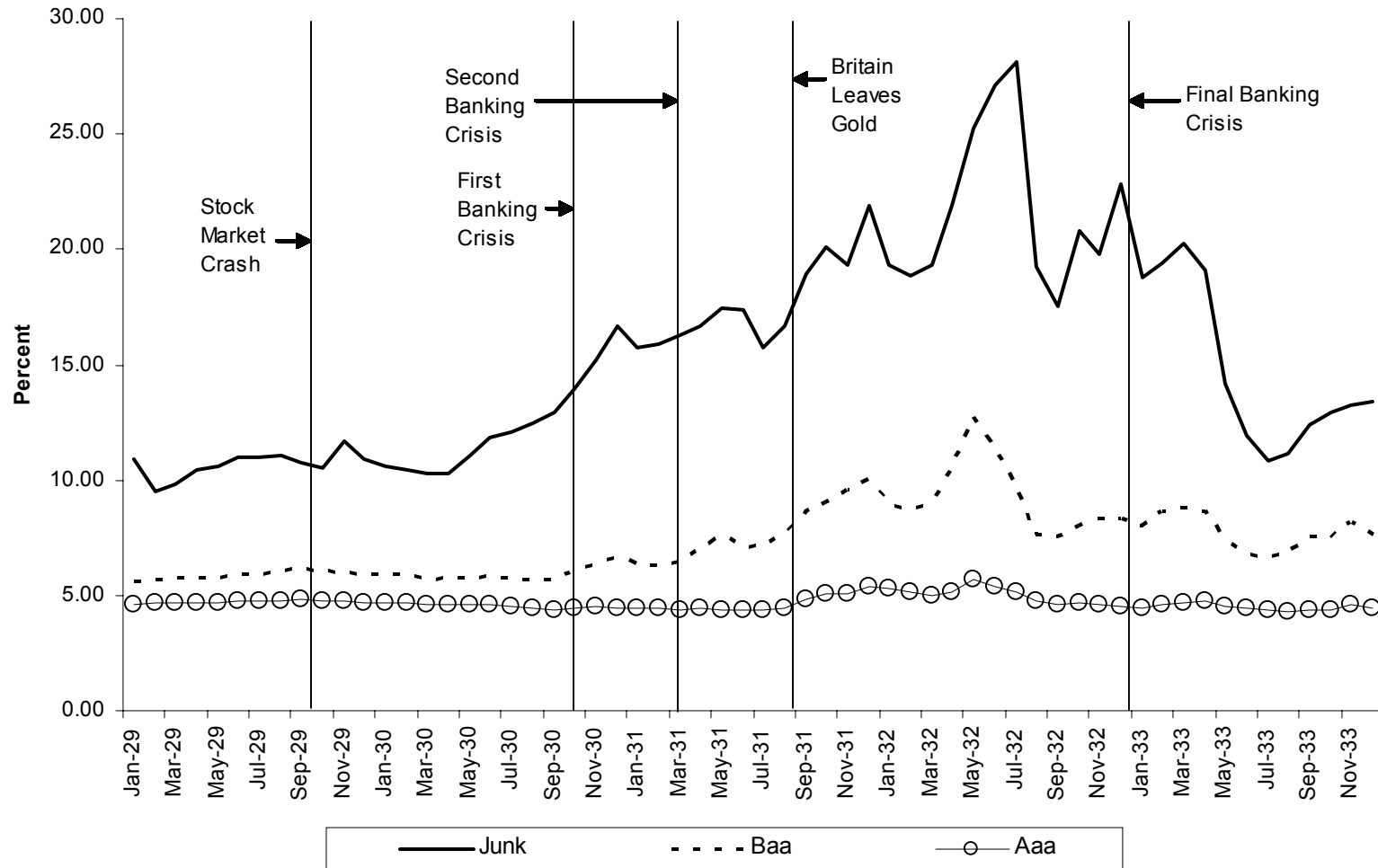**Figure 2. Bond Yields, 1929-33**

Figure 3. Money Growth and Selected Yields, 1935-1941
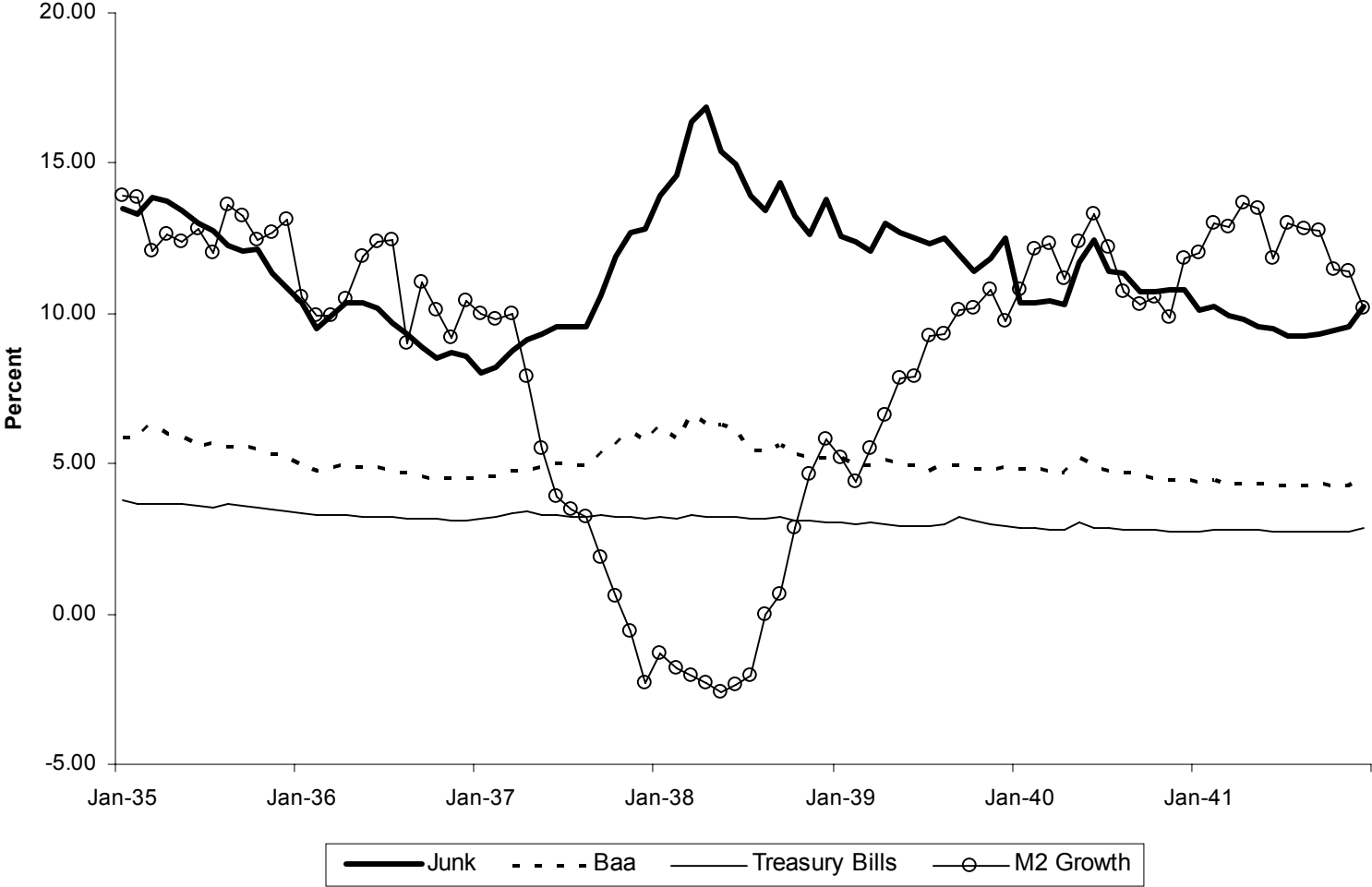
Figure 4. The Response of the Junk Bond Yield to Changes in M2 Growth, 1934-41
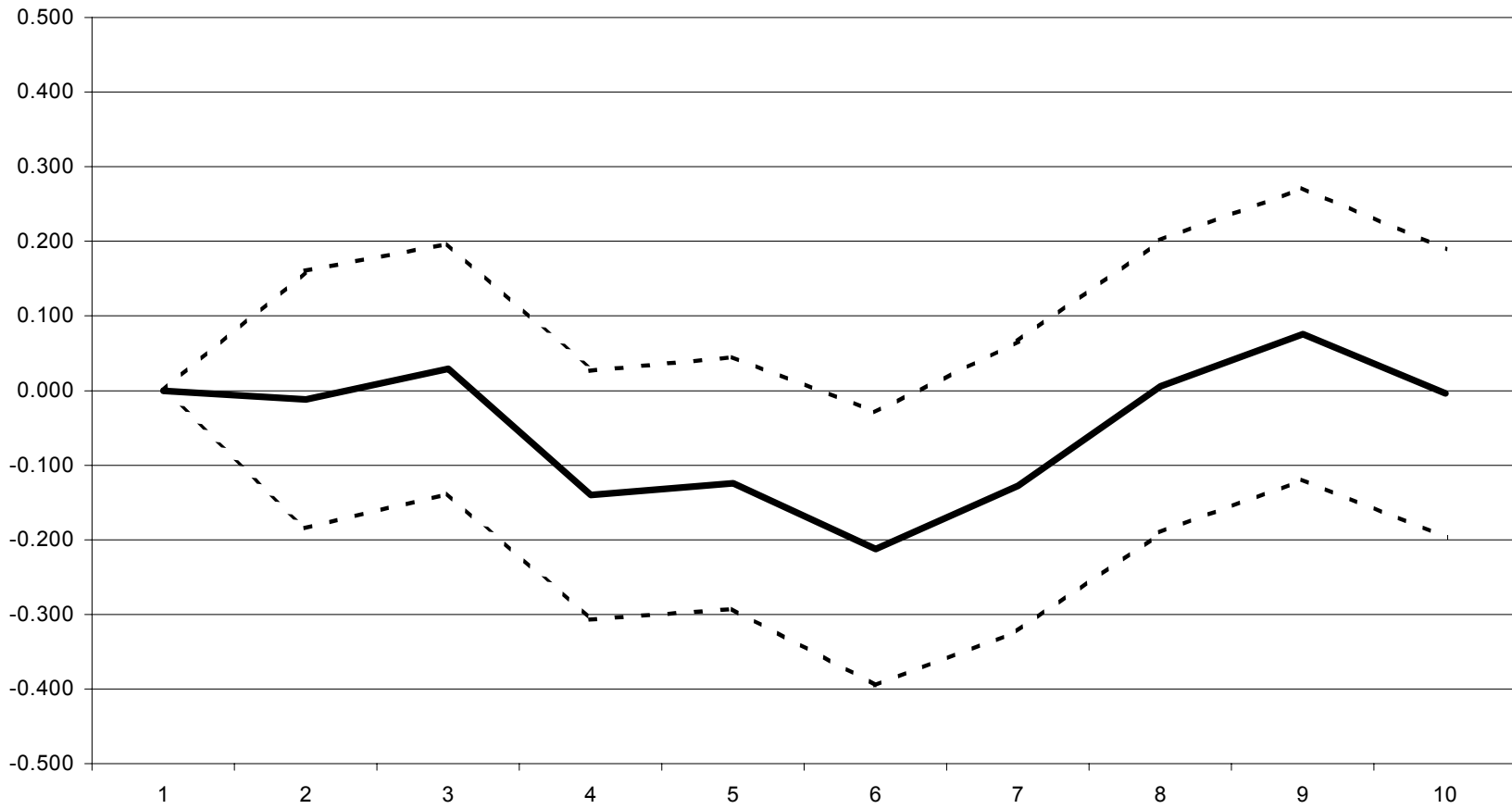
Figure 5. The Response of Selected Yields to Changes in M2 Growth, 1934-41
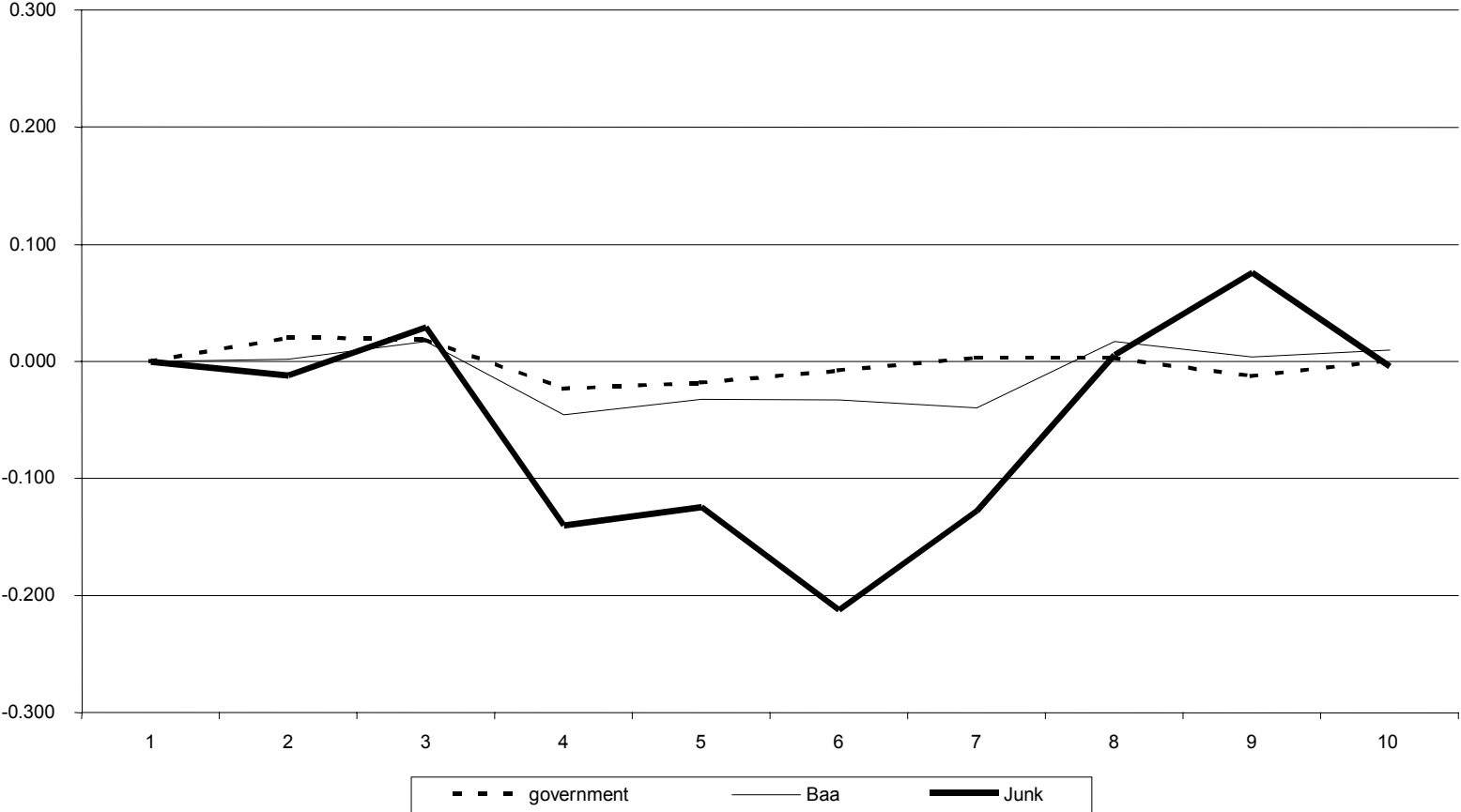
Figure 6. The Response of the Junk Bond Yield to Money, 1934-1941, Quarterly Data

Table 1. Bond Ratings			
Moody	**Poor**	**Standard**	**Meaning**
Aaa	A**	A1+	Highest Quality
Aa	A*	A1	High Quality
A	A	A	Sound
Baa	B**	B1+	Good Quality
Ba	B*	B1	Fair
B	B	B	Speculative
Caa	C**	C1+	Very Speculative
Ca	C*	C1	Weak
C	C	C	Gambles
D	D	D	Default

Notes: Junk bonds are often defined as those rated Ba or below. Our index is confined to bonds rated B or below. Defaulted bonds are excluded. The verbal descriptions are those used by Moody's during the period 1910-1955. Standard and Poor were merged in 1941. A smaller firm, Fitch, also rated bonds.

Source: Hickman (1958,142)

Table 2: Long-term Bond Yields, 1929-31						
Date			Aaa	Baa	Junk (B and below)	Peter Temin's Fixed Sample
1928	December	3.45	4.61	5.60	10.85	6.01
1929	June	3.69	4.77	5.94	11.00	6.73
	December	3.36	4.67	5.95	10.94	7.68
1930	June	3.25	4.57	5.78	11.85	8.52
	December	3.22	4.42	5.71	16.64	9.26
1931	June	3.13	4.36	7.36	17.34	11.35

Note: The last two observations occurred after the onset of the first banking panic in October 1930.

Sources: Long-term Government Bonds: www.nber.org (series m13033a). Aaa, Baa, and Peter Temin's Fixed Sample (Temin 1976, 107). Junk Bonds: Appendix.

Table 3. The Response of Country Banks to the Great Contraction (Garlock's Select Sample of Rural Wisconsin Banks)

	High Grade	Medium Grade	Low Grade	Total
Securities held in 1929	38	37	25	100
Securities sold 1929-32	25	17	10	52
Proportion sold (percent)	*66%*	*46%*	*40%*	*52%*
Securities remaining in portfolio	13	20	15	48
Change in ratings of securities held 1929-32	0	-11	+11	0
Securities held from 1929 to 1932 at 1932 ratings	13	9	26	48
Securities acquired	6	5	14	25
Proportion of initial holdings replaced (percent)	*16%*	*14%*	*56%*	*25%*
Securities Held in 1932	19	14	40	73

Note: All securities are valued at book value (acquisition price) and measured as a percentage of total security holdings in 1929. The definitions of the grades are as follows. High grade: U.S. Government Securities, Federal Land Bank Bonds, Aaa and Aa Corporates, and State and Municipal Bonds not in Default. Medium grade: A and Baa Corporates. Low grade: All others including defaulted and not rated.

Source: (Garlock 1941, 49-50). The figures were read from a difficult chart. So there is a small margin of error, perhaps one percent, around the figures.

Table 4

Distribution of Bonds Held by Wisconsin Country Banks, by Quality of Bond, 1929-1935

	All Banks	Banks that Survived without establishing a Depositor's Trust	All Banks	All Banks
Number of banks	57	17	46	31
Year	1929	1929	1932	1935
All U.S. Government Bonds	23%	22%	17%	40%
Grade 1 (Aaa)	7	9	4	2
Grade 2 (Aa)	5	8	6	6
Grade 3 and 4 (A-Baa)	30	34	21	29
Grade 5 and 6 (Ba-B)	15	10	21	13
Grades 7 and other low-rated Bonds (Caa-C)	1	2	10	3
Nonrated, defaulted, and other	19	15	22	8
Total	100	100	100	100

Note: The state banking authority established the grades on the basis of ratings provided by several services. The ratings in parentheses are my guess as to the corresponding Moody's rating based on Garlock's description.

Source: Garlock (1941, 49)

Appendix: Computing the Junk Bond Yields

The table below shows our estimates of the junk bond yields for the period 1910-1955. The numbers are preliminary, and may change as the result of further checking. The procedures used were those used by Macaulay (1938). Although Macaulay's study was done some time ago, many of the problems he faced in computing nineteenth century yields, as we noted above, also must be faced when computing an index of junk bonds. The basic idea is to choose a group of bonds with similar characteristics and follow their yields over time. Basile chose bonds with the following characteristics. (1) The bonds were rated B or lower by Moody's. (2) The bonds had to maintain their rating for 3 or more years. This avoids the possible volatility imparted by bonds that were rapidly moving up or down the rating scale. It does sometimes happen that the rating of a given junk bond is lowered quickly when bond is on the road to default. (3) The bonds had call provisions similar to modern today's junk bonds. The yields computed, however, were simple yields to maturity. No adjustments were made for call provisions.

Prior to 1928 the price of the bond was the asking price from the General Quotation section of the *Commercial and Financial Chronicle*. From 1928 on, actual sales prices were used. Prior to 1919 only railroad bonds were used because the series usually used to show changes in interest rates on corporate bonds are Macaulay's series for railroad bonds. Macaulay's railroad bonds were not separated by risk class. For that reason Basile went back to Macaulay's data and created a new index of Aaa rated railroad bonds for the period 1910 to 1918, so that he would have a corporate Aaa series as similar in as many respects as possible, except risk, to his junk bond index. Macaulay's system for chaining yields together when the bonds in the index were changed because the term to maturity grew too short, because the bond went into default, or for some other reason. New bonds were added in January, and the average yield for each

subsequent observation during the year was multiplied by the ratio of the average yield on the old sample of bonds in January to the yield on the new sample in January. This procedure raises certain questions for an index of junk bonds, since the sample of junk bonds is smaller than the samples for other classes of bonds, and yields differences between bonds being removed from the sample and added to the sample might be substantial. For that reason Basile computed what he called the "average yield," which is simply the average for all bonds available at a particular date. In general, however, the average yield was quite close in level and movement to the chained (Macaulay-style) index.

Appendix Table 1. Junk Bond Yields, Monthly, 1910-1955

Year	January	February	March	April	May	June	July	August	September	October	November	December
1910	5.50	5.54	5.51	5.52	5.52	5.63	5.78	5.97	5.88	5.72	5.76	5.87
1911	5.59	5.59	5.53	5.60	5.60	5.69	5.70	5.87	5.91	5.96	6.14	6.15
1912	6.79	6.25	6.10	6.23	6.23	6.39	6.39	6.51	6.69	6.72	6.91	6.95
1913	6.53	5.87	6.06	6.13	6.26	6.27	6.59	6.45	6.41	6.52	6.56	6.71
1914	6.55	6.19	6.29	6.42	6.54	6.65	6.77	7.17	NA	NA	NA	NA
1915	7.70	7.70	7.28	7.33	7.07	7.26	7.30	7.52	7.73	7.56	7.28	6.79
1916	7.22	7.30	7.26	7.26	7.99	7.01	7.06	7.11	7.07	6.99	6.62	6.66
1917	7.19	7.14	7.34	7.50	7.86	8.35	8.24	8.37	8.45	8.83	9.01	9.32
1918	9.26	8.76	8.93	9.26	9.15	8.87	9.29	9.42	9.14	9.15	8.92	8.79
1919	9.34	9.36	9.44	9.52	9.57	9.16	9.18	9.35	9.76	9.87	9.97	10.57
1920	10.66	11.05	10.35	10.46	11.19	11.44	11.38	11.17	10.88	10.33	10.01	10.52
1921	10.98	10.38	10.84	10.79	10.91	10.72	11.28	10.78	11.15	10.89	10.95	10.50
1922	11.05	10.93	10.36	9.78	8.76	8.65	8.80	8.68	8.53	8.58	8.86	9.55
1923	10.12	10.28	10.25	10.71	10.71	10.79	12.00	11.75	11.52	11.57	11.33	11.41
1924	11.35	10.78	10.75	11.11	11.22	11.49	11.02	10.21	10.20	10.19	10.25	10.08
1925	10.39	9.56	9.57	10.14	9.96	9.84	9.79	10.04	9.75	9.92	9.98	10.14
1926	9.91	9.72	9.64	10.15	10.20	10.31	10.44	10.41	10.28	10.19	10.38	10.89
1927	10.54	10.47	10.45	10.47	10.23	10.28	10.47	10.33	10.50	10.70	10.93	10.85
1928	10.44	10.56	10.38	10.08	9.94	10.27	10.11	10.33	10.59	10.80	10.56	10.85
1929	10.94	9.51	9.81	10.43	10.58	11.00	10.98	11.05	10.74	10.50	11.66	10.94
1930	10.61	10.47	10.27	10.27	11.04	11.85	12.07	12.45	12.96	13.94	15.17	16.64
1931	15.73	15.87	16.26	16.69	17.46	17.34	15.71	16.70	18.94	20.13	19.29	21.92
1932	19.35	18.89	19.29	21.91	25.25	27.09	28.15	19.27	17.50	20.82	19.80	22.81
1933	18.81	19.44	20.24	19.10	14.17	11.93	10.81	11.12	12.38	12.90	13.28	13.37
1934	13.04	11.03	11.14	10.65	11.22	11.40	12.19	12.49	12.96	12.84	12.86	12.76
1935	13.50	13.30	13.86	13.72	13.42	13.00	12.78	12.27	12.09	12.17	11.35	10.84
1936	10.33	9.51	9.91	10.35	10.38	10.18	9.66	9.30	8.89	8.49	8.71	8.57
1937	8.03	8.20	8.74	9.13	9.28	9.57	9.57	9.57	10.62	11.92	12.66	12.84
1938	13.95	14.57	16.36	16.88	15.40	14.95	13.91	13.46	14.33	13.26	12.65	13.77
1939	12.55	12.41	12.07	12.99	12.68	12.49	12.34	12.52	11.96	11.37	11.83	12.49
1940	10.35	10.39	10.43	10.31	11.69	12.42	11.43	11.31	10.71	10.70	10.77	10.79
1941	10.08	10.24	9.95	9.82	9.54	9.49	9.25	9.23	9.31	9.41	9.57	10.23
1942	9.48	9.20	9.05	9.08	9.22	9.63	9.47	9.25	8.99	8.80	8.97	9.07
1943	8.73	8.39	7.91	7.60	7.37	7.43	7.50	7.65	7.64	7.58	7.75	7.68
1944	7.48	7.09	6.85	6.77	6.55	6.44	6.52	6.62	6.71	6.48	6.32	6.04
1945	6.30	6.22	6.05	5.84	5.70	5.60	5.67	6.06	6.08	5.96	5.71	5.53
1946	5.42	5.31	5.32	5.31	5.44	5.42	5.48	5.54	6.12	6.59	6.57	6.42
1947	6.27	6.27	6.45	6.71	7.06	7.15	6.88	6.84	7.05	6.97	7.12	7.27
1948	6.88	6.92	6.89	6.76	6.55	6.47	6.46	6.56	6.56	6.51	6.64	6.66
1949	6.64	6.89	7.05	7.09	7.18	7.57	7.49	7.39	7.48	7.36	7.37	7.12
1950	6.72	6.71	6.70	6.69	6.74	6.85	6.73	6.31	6.17	6.17	6.11	5.96
1951	5.85	5.79	5.91	6.05	6.18	6.36	6.45	6.40	6.34	6.37	6.46	6.45
1952	6.42	6.47	6.45	6.39	6.39	6.33	6.28	6.26	6.32	6.37	6.29	6.17
1953	6.27	6.19	6.20	6.29	6.38	6.62	6.63	6.76	7.06	7.18	7.17	7.21
1954	7.30	7.11	7.08	7.06	7.02	6.96	6.89	6.87	6.90	6.88	6.71	6.48
1955	6.03	5.98	5.95	5.88	5.83	5.75	5.78	5.83	5.83	5.86	5.70	5.83

Source: See text. These are preliminary estimates. The market was closed from August to December 1914 because of the start of World War I.