Preventing a Repeat of the Money Market Meltdown of the Early 1930s

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This paper analyzes the meltdown of the commercial paper market during the Great Depression, and relates those findings to the recent financial crisis. Theoretical models of financial frictions and information problems imply that lenders will make fewer non-collateralized loans or investments and relatively more extensions of collateralized finance in times of high risk premiums. This study investigates the relevance of such theories to the Great Depression by analyzing whether the increased use of a collateralized form of business lending (bankers acceptances) relative to that of non-collateralized commercial paper can be econometrically attributable to measures of corporate credit/financial risk premiums. Because commercial paper and bankers acceptances are short-lived, they are more timely measures of the availability of short-term credit than are bank or business failures and the level or growth rate of the stock of bank loans, whose maturities were often longer and were renegotiable. In this way, the study adds to the literature on financial market frictions during the Great Depression, which aside from analyzing securities prices, typically investigates the behavior of credit-related variables that lag current conditions, such as bank failures, bankruptcies, the stock of money, or outstanding bank loans.

In particular, the real level of bankers acceptances and their use relative to non-collateralized commercial paper were strongly and positively related to spreads between corporate and treasury bond yields. Also significant were short-run events, such as the October 1929 stock market crash and the 1933 bank holiday episode that sparked flights to quality in the bond market and a flight to collateral (BAs) in the money market and perhaps away from the loan market. Furthermore, these shifts in the composition of external finance were large, supporting the view that financial frictions and reduced credit availability may have played an important role in depressing the U.S. economy during the 1930s.

The paper also relates these findings to the current financial crisis by examining how the relative use of commercial paper reacted to yield spreads during the current crisis, taking into account Federal Reserve actions to improve liquidity conditions in the money markets. Results suggest that these efforts may have, at least so far, helped prevent the commercial paper market from melting down to the extent seen during the early 1930s.

JEL Classification Codes: E44, E50, N12

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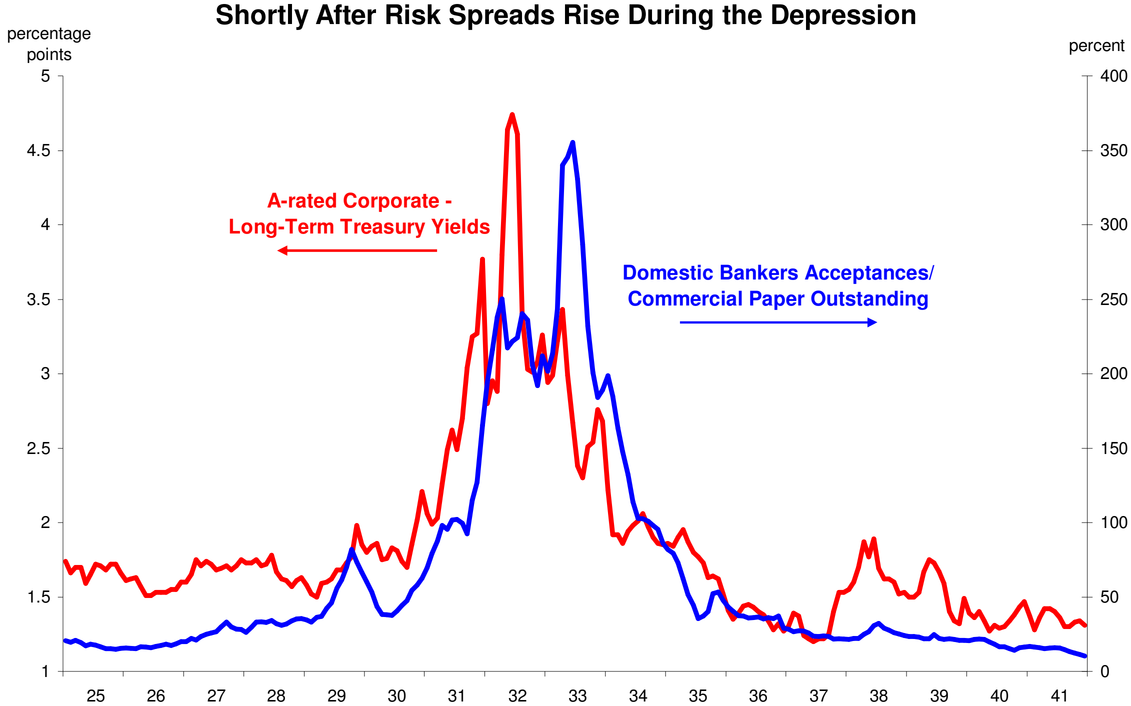
This paper analyzes the meltdown of the commercial paper market during the Great Depression and relates those findings to the recent financial crisis, particularly with respect to Federal Reserve and Treasury efforts to improve liquidity conditions in the money markets. Theoretical models of financial frictions imply that credit extensions will shift from risky to safer borrowers if economic factors increase default risk or increase the cost of loanable funds via increasing liquidity risk premiums (e.g., Bernanke and Blinder, 1988; Bernanke and Gertler,1989; Bernanke, Gertler, and Gilchrist, 1996; Jaffee and Russell, 1976; Keeton, 1979; Lang and Nakamura, 1995; and Stiglitz and Weiss, 1981). Based on these implications, post-World War II data on the composition of business credit has been used to assess the relevance of such theories, dating back to at least Jaffee and Modigliani (1969), who assess the composition of bank business lending, and extending to recent studies, such as Kashyap, Wilcox, and Stein (1993), who analyze the relative use of commercial paper and bank loans. This literature, especially the flight-to-quality model of Lang and Nakamura (1995) and the financial accelerator approach of Bernanke, Gertler, and Gilchrist (1996), implies that lenders will make fewer non-secured loans and extend relatively more collateralized finance in times of high default risk.

Studies of the current crisis may be hampered by what some may misperceive as a lack of historical precedent, but the current study provides an analysis of the relative use of commercial paper during the Great Depression to shed light on how the money markets have been affected by the current crisis. It also provides evidence that Fed/Treasury efforts may have (so far) prevented the commercial paper market from imploding on the scale that it did in 1932. In general, empirical studies of the impact of financial frictions and monetary factors during the 1930s have focused on examining the links between bank failures/loans and economic activity (Bernanke, 1983; and Calomiris and Mason, 2003), the source and impact of the fall in the money supply (Boughton and Wicker, 1979; Friedman and Schwartz, 1963; and Hamilton, 1992), the role of nonmonetary factors (Temin, 1976 and 1989), the conduct of monetary policy

(Field, 1984; and Wheelock, 1990), the role of unanticipated deflation (Hamilton, 1987), or links between default risk spreads and economic growth (Bernanke, 1983). Although the credit and financial frictions' literature, particularly the financial accelerator work of Bernanke and Gertler (1989) and Bernanke, Gertler, and Gilchrist (1996), is partly motivated by the Great Depression, there are no published studies that empirically analyze the composition of business credit *extensions* during the era, partly reflecting a lack of data on timely measures of external finance.

The current paper fills part of this gap by investigating whether the increased use of a collateralized form of business lending (bankers acceptances, BAs) relative to that of non-collateralized commercial paper during the Great Depression (Figure 1) can be econometrically attributable to indicators of corporate credit risk and the risk of bank runs. For robustness, these financial factors are assessed in models of the levels and first differences of real bankers acceptances. In addition to the default and liquidity risk premiums in corporate-Treasury yield

Figure 1: Domestic Bankers Acceptances Rise Relative to Commercial Paper Shortly After Risk Spreads Rise During the Depression



spreads, the risk of bank runs may also have encouraged the use of BAs. The main reason is that in a crisis, banks had the option of borrowing against or selling BAs to the Federal Reserve, which committed itself to rediscounting BAs and commercial paper held by banks and whose ability to rediscount bank assets was limited to these types of paper until the Banking Act of 1935. As a result, BAs were more liquid than other bank assets. But the Fed's conduct of open market operations in BAs and discounting BAs lowered the liquidity risk of investing in BAs.. By implication, the relative use of BAs as a source of external finance should be increasing in (1) measures of corporate-Treasury risk spreads, which blend default risk and liquidity risk, and (2) possibly measures of the risk of bank runs, such as the currency-to-deposit ratio. Nevertheless, there are reasons why higher bank run risk may not induce greater use of BAs.This paper is related to Bernanke's (1983) empirical findings that two proxies for the destruction of financial intermediation during the Depression, deposits of suspended banks and liabilities of failing businesses, were significant in explaining changes in industrial production in the presence of money growth. Bernanke also referenced a finding that a proxy for default risk, the spread between yields on Baa and Aaa-rated corporate bonds, was also statistically significant in accounting for industrial production, but was also highly collinear with other indicators of financial distress. Although Bernanke discussed how deflation destroyed collateral and thereby plausibly reduced the availability of credit, the literature has not directly assessed whether the composition of business finance during the Great Depression was affected by rising risk premiums and bank run risk in ways consistent with theories of financial frictions.

The current study tests whether an empirical implication of the credit/financial frictions' channel is consistent with Bernanke's finding that financial frictions were macro-economically important. This study also uses more timely data on business finance than has been often used in studying the Great Depression. Because commercial paper and bankers acceptances are short-lived, they are more timely indicators of the availability of external finance than are bank or business failures and the level or growth of the stock of bank loans, which lag the economy and which have been analyzed in much of the literature on the Great Depression. A particular problem with analyzing outstanding bank loans is that bankers may have given troubled borrowers more time to repay loans or delayed writing off loans. As a result, growth in the stock of bank loans may not give a consistent nor timely indication of the availability of new credit.

Consistent with a financial frictions channel, bankers acceptances—real or relative to commercial paper—are increasing in the spreads between investment-grade corporate and Treasury bond yields. Such spreads are used to gauge risk premiums, without breaking them down into expected default losses and changes in the price of default and liquidity risk. [Temin (1976) argues that wider corporate quality spreads reflected heightened risk of business failures rather than tight liquidity conditions.] Because the money market and corporate spread variables exhibit drift and nonstationarity during the Great Depression era, cointegration techniques are used. Given the short maturities of bankers acceptances and commercial paper, results imply that risk premiums persistently affected the composition and availability of external finance.

To relate these findings to the current crisis, this study also analyzes the current crisis. Owing to the deepening of financial and credit markets, and the Fed's shift toward conducting open market operations in Treasury and agency debt, bankers acceptances have become a trivial source of domestic finance. Instead, the paper-bank loan mix (Kashyap, Wilcox, and Stein, 1997) is modeled to see how the same Baa-Treasury spread used in the Great Depression sample is related to the composition of short-term business finance in the current crisis. Results suggest that actions taken since October to improve liquidity in the money markets may have helped prevent the commercial paper market from imploding by as much as it did in the early 1930s.

This study is organized as follows. Section 2 provides detail about bankers acceptances and hypotheses about their use during the Great Depression. Section 3 presents the data and section 4, the empirical results for this era. Section 5 examines whether new Federal Reserve liquidity programs may have prevented the commercial paper market from collapsing. The conclusion relates the findings for the Great Depression with those on the current crisis.

II. Details and Hypotheses Regarding Bankers Acceptances and Commercial Paper

What Are Bankers Acceptances and What Purposes Do They Serve?

A bankers acceptance is a time draft drawn on a bank to finance the shipment or storage of goods. A draft is "accepted" when a bank guarantees payment to the holder. This makes the BA tradeable in securities markets because the issuing bank unconditionally promises payment to the investor at a specified date regardless of whether the goods-buying firm repays the bank and because investors usually have better information about the bank than the goods purchaser. The goods-buying firm essentially receives funding to pay the seller from a bank, which funds the extension by selling the bankers acceptance. From the perspective of banks guaranteeing BAs, the goods purchased or held in inventory collateralize the BAs. Thus, extending BAs entails less default risk than making an unsecured loan to a firm of similar credit quality.

Why Risk Premiums May Affect The Use of Bankers Acceptances

Theories of credit and financial frictions imply that lenders would pressure borrowers for more collateral, which is relevant for the BA market during an era when firms had fewer financing options. Goods sellers, for instance, may be reluctant to give trade credit for an extended period to a geographically distant customer who is unable to pay within the cash discount period because they have limited access to external finance. In such cases, the seller may pressure the buyer to pay using funds from a BA issued by the buyer's bank. The buyer's bank may be more willing to issue a BA than an unsecured loan owing to the difference in collateral or because it has better information about the buyer's credit quality and can signal this to BA investors in an incentive-compatible way by guaranteeing (accepting) the BA.

In addition, in the event that the goods-buying firm does not repay, the buyer's bank may be more able to repossess the goods financed with a BA using collection processes than the goods-selling firm. However, the extra paper and legal work in creating a BA versus a standard loan suggests that many borrowers would be better off with a loan unless the bank requires collateral that the borrower could not provide absent a BA or unless the value of collateral induces banks to offer loan rates on unsecured loans above those on BAs. These factors imply that the relative use of BAs increases with macro default risk, while that of commercial paper would, consistent with the ratios plotted in Figure 1 and real levels shown in Figure 2.[1]

Why Liquidity Risk May Affect The Use of Bankers Acceptances

Another attractive aspect of BAs was banks' ability to sell BAs, which made BAs easier to fund than business loans, for which deposits were needed (Duffield and Summers, 1981). The BA market was very liquid in the 1920s and 1930s because the Federal Reserve conducted open market operations in it (Federer, 2003) and Small and Clouse, 2006). For this reason, BA issuance reduced the impact of the risk of bank deposit runs on the banks' ability to meet customer credit needs. An additional funding advantage was that banks were required to hold reserves against deposits needed to fund loans, but not against BAs that they issued and sold.

Furthermore, even if banks held BAs they issued, BAs were more liquid than loans. Prior to 1932, only commercial paper and BAs held by banks were eligible as collateral for discount loans; and it was not until late 1935 that the Federal Reserve allowed some types of loans to serve as collateral for discount loans. In 1932, Congress granted the Federal Reserve limited temporary authority to rediscount promissory notes secured to the satisfaction of the Federal Reserve under the Glass-Steagall Act. The Federal Reserve interpreted this provision as giving it limited authority to accept government securities as well as commercial paper and BAs as collateral for discount loans (The New York Clearinghouse Association, 1953, p.76).[2] The

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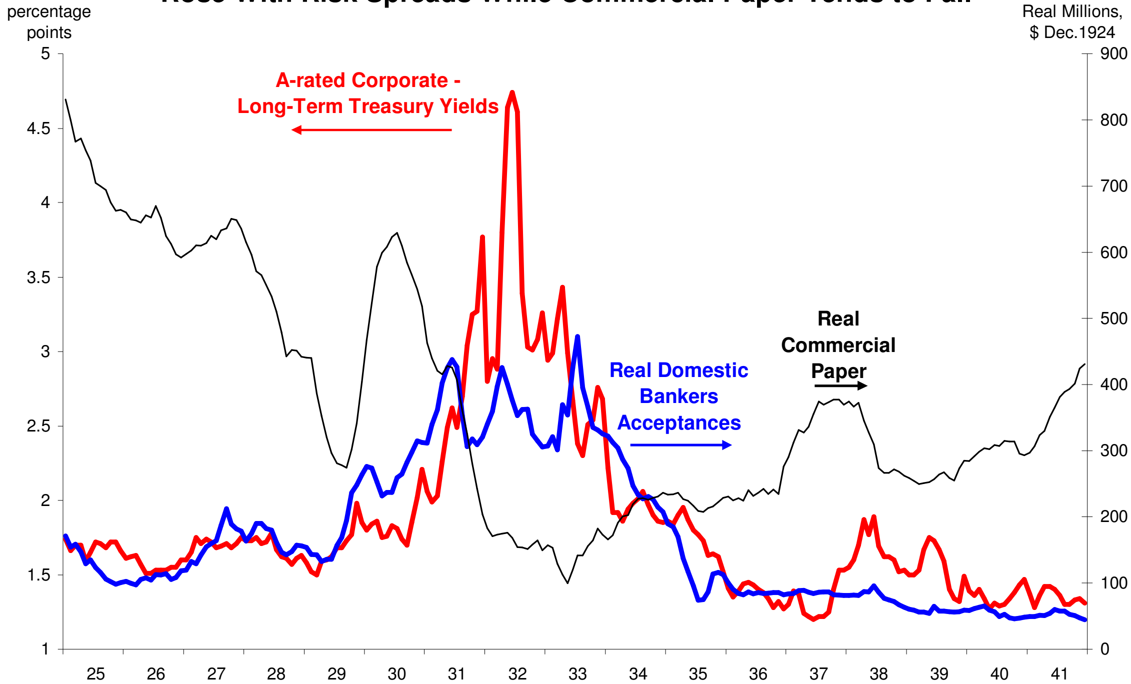
[1] Asset-backed commercial paper is relatively new. Unlike BAs which are collateralized by re-sellable goods, much "asset-backed" commercial paper is collateralized by paper assets, whose market values have fallen since mid-2007.
[2] Likely reflecting this limited change at the Fed, a dummy variable controlling for this limited and temporary authority was insignificant in regressions not shown.

Figure 2: During Depression Era, Real Levels of Domestic Bankers Acceptances Rose With Risk Spreads While Commercial Paper Tends to Fall



Banking Act of 1935 gave the Federal Reserve permanent authority to rediscount promissory notes secured by any sound asset. In response, the Federal Reserve explicitly expanded the types of eligible assets to include FHA and other satisfactory mortgages, installment credit, and U.S. government and municipal securities (pp. 34-35, Hunt, 1940). This Act was introduced in January 1935 and passed in August 1935. The provisions about assets eligible for rediscounting were not controversial unlike those about open market operations and the make-up of the Federal Reserve Board (Burns, 1974). Likely reflecting an anticipated easing of rediscounting eligibility which reduced the relative attractiveness of holding BAs, the stock of BAs declined rapidly early that year. Accordingly, some specifications include dummy variables for this regime shift.

Why Bank Run Risk May Affect The Use of Bankers Acceptances

These considerations imply that the relative use of BAs may also rise with the risk of bank runs, as proxied by the currency-to-deposit ratio. Nevertheless, there may be counter-vailing factors. One appealing aspect of owning BAs to investors is that the bank issuing the BA guarantees repayment of principal and implied interest regardless of whether the goods-buying firm repays the issuing bank. That said, confidence in the value of this guarantee may be low when the risk of bank failures is high. Finally, testing for the impact of bank run risk would be appropriate if the analysis focused on total BAs. However, in this study detecting any effect may be difficult because the analysis focuses on BAs that finance domestic commerce—which were not the bulk of total BAs—to focus on financial frictions effects on domestic borrowing.

Why Liquidity and Bank Run Risk May Also Affect The Use of Commercial Paper

The impact of default and liquidity risk on BA use may have been relevant to the Great Depression era, when borrower default risk and the liquidity risk posed by bank runs encouraged banks to shift their portfolios toward less risky assets (Calomiris and Mason, 2004). These types of risk may have also affected the relative use of commercial paper and bankers acceptances, both of which are highly liquid and have short-maturities. Since the mid-1970s, un-backed commercial paper has been issued by firms who pose negligible default risk (in line with Diamond, 1991). Firms issuing paper are typically required by the market to have back-up lines of bank credit that eliminate most liquidity risk associated with their ability to pay on time.

For two reasons, however, higher default and liquidity risk during the Great Depression also plausibly made BAs a more feasible source of external finance than commercial paper. First, even highly regarded paper issuers posed default risk in that unusual era which preceded the asset-backed commercial paper market and during which the credit-ratings of many highly rated firms had been cut by ratings agencies (Wigmore, 1985). Second, it was not until the late 1970s, when large banks had access to well-developed, large time deposit and other funding markets that paper-issuing firms could easily and normally obtain lines of bank credit to back up their issuance of paper. Thus, when concerns about liquidity risk rose dramatically, they may have affected investor perceptions about the liquidity risk of commercial paper during the 1930s.

III. Data and Variables

Bankers Acceptances and Commercial Paper

Federal Reserve data are used to construct the ratio of bankers acceptances to commercial paper (*BACP*). Both components were seasonally adjusted using a multiplicative X-11 procedure, which yielded a ratio that was similar had the ratio rather than the components been seasonally adjusted. The advantage of separately adjusting each component is that the same resulting BA series is used to construct a real BA series that is also modeled. The BA series that is analyzed excludes BAs used to finance international trade, which are less reflective of domestic activity and more reflective of swings in international trade that were buffeted by changes in trade barriers such as the Smoot-Hawley Tariff. A big advantage in using a ratio is that, in principle, it largely eliminates the need to scale for the level of business activity. Another advantage is that it generally avoids the need to deflate a nominal level, which entails choosing a price index from the very limited set of available pre-WWII price indexes. However, the overall producer price index is used to deflate BA's and commercial paper to see how each component behaved and to test for any impact of financial frictions on the real level of BA use. A decline in real commercial paper and a rise in real BAs were behind the jump in *BACP* during the early 1930s (Figure 2). This is consistent with a fall in the availability of non-collateralized finance (e.g., commercial paper) and a surge toward collateralized finance either from former paper issuers or traditional bank loan borrowers who lost access to unsecured bank loans.

Monthly Federal Reserve data on BAs and commercial paper are available between December 1924 and December 1941. In 1940-41, there was a large jump in commercial paper, which plausibly reflected a surge in U.S. production of defense goods purchased by the U.S. and UK during 1940 and 1941. Because many firms with defense contracts could be viewed as having both safe revenue sources and even implicit government-backing on their debt obligations (like commercial paper), the data used in the analysis is restricted to December 1924 to

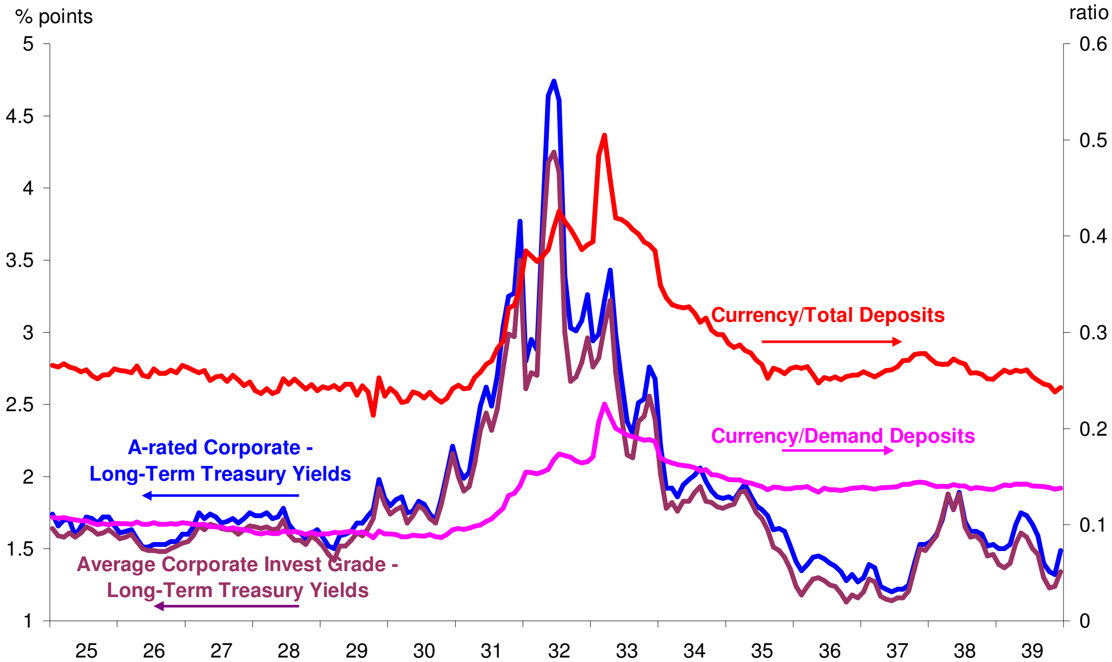
December 1939 to prevent the sample from being contaminated with the omitted variable bias associated with the ramping up of defense spending in the early 1940s.

Default and Liqiudity Risk

Default and liquidity risk combined are tracked by spreads between yields on investment grade corporate and long-term U.S. government bonds based on the view that yield spreads between risky and default free bonds generally reflect cyclical swings in default risk and default risk premiums (Jaffee, 1975). One such spread is that between yields on A-rated corporate bonds (Moodys) and long-term U.S. government bonds, denoted as *ATR* (source: Federal Reserve (1943), also available from NBER's Macrohistory Database). *ATR* was used instead of the spread between Baa-rated corporate and Treasury bonds (*BAATR*), which, unlike *ATR* and the BA variables, does not have a unit root on a quarterly frequency (upper panel, Table 5) and exhibits only marginal evidence of a unit root on a monthly basis (upper panel, Table 1).

Also used is the spread between average investment grade corporate bond yields and long-term U.S. government bonds (*COTR*). Under more "normal" market conditions, there is a preference in the empirical literature to look at spreads between yields on different ratings classes of bonds, as such spreads may arguably capture swings in the overall default risk. However, there were many downgrades of corporate bonds during the Depression in response to the worsening economy (Wigmore, 1985). This factor suggests that a quality spread based on the average corporate bond yield might better track changes in default risk than a spread based on a particular ratings class of bonds. Indeed, the spread between on average investment grade corporate and long-term Treasury bonds (*COTR*) somewhat outperforms the spread between yields on A-rated corporate and long-term U.S. government bonds (*ATR*). Although they tend to move closely together, the quality spread based on average corporate yields moved up a little less than the *ATR* during the 1931-1932 portion of the Depression era (Figure 3).

Figure 3: Bond Quality Spreads and Currency-Deposit Ratios



Because *ATR* and *COTR* are spreads of corporate yields over long-term Treasury yields, they arguably track both default risk and liquidity risk in contrast to spreads between yields on low-rated and high-rated investment grade bonds. *ATR* can be decomposed into the spread between Aaa- and A-rated corporate bonds, plus the spread between Aaa-rated corporate and long-term Treasury bonds. The Aaa-Treasury spread likely includes a premium reflecting both the extra liquidity of Treasury bonds and less prepayment risk—the latter because the Treasury has never prepaid and then refinanced outstanding bonds (Duca, 1999). Hence, in principle, the two spreads (Aaa-A and Aaa-Treasury) could be used instead of a single spread (A-Treasury).

However, in practice, several considerations favor using a single spread. First, in unusually risky periods like the Depression, even Aaa-rated firms posed some default risk. Second, such risk is also reflected in the unusually high incidence of corporate downgrades during the Great Depression. As a result, during this era even the Aaa-Treasury spread reflects movements in default risk. Third, this factor is even more important because logs of variables are used, which raises problems arising from Jenson's inequality associated with decomposing spreads like *ATR* and *COTR* into log subcomponents. Fourth, there is a high degree of correlation between the Aaa-Treasury and A-Aaa spreads during this era, raising problems of multi-collinearity—particularly using cointegration techniques on a sample spanning 15 years. Likely reflecting these considerations, other results (not shown in the tables) which used components like the logs of the Aaa-Treasury and A-Treasury spreads, gave unusual results.

For three reasons, the analysis uses bond quality spreads rather than interest rate spreads between BAs and commercial paper. First, the latter may introduce simultaneity bias. Second, switching to the BA-commercial paper rate spread did not materially affect the key results. Third, interpreting bond spreads is easier since the BA-commercial paper rate spread may also reflect relative money market conditions from factors other than default or liquidity risk.

Currency-To-Deposit Ratios

As suggested by much of the monetarist literature (e.g., Friedman and Schwartz, 1963), ratios of currency held outside of the banking system to bank deposits can be used as indicators of the risk of bank deposit runs or the public's lack of confidence in the banking system. Two such ratios are considered, both constructed with Friedman and Schwartz data that are available from the NBER. One is the ratio of currency to demand deposits (*CDRAT*) and the other is the ratio of currency to demand plus time deposits (*CTDRAT*). Both are plotted in Figure 3.

Other Financial Crisis or Regulatory Variables

Changes in bank regulation plausibly affected the use of BAs. Two monthly dummies are used to control for the impact of the Banking Act of 1935. *BANKACT359* equals zero before September 1935 (and one thereafter), when the Banking Act officially took effect. The other, *BANKACT351*, equals one since January 1935, when money market participants may have acted in anticipation of the Act's passage. These long-term dummy variables did not perform well.

This was particularly true with a quarterly dummy, *BANKACT35*, which equaled 1 from 1935:Q3 on. To conserve space these runs are not shown in the table. Nevertheless, there are some outsized swings in *BACP* and the real level of BAs just before and just after the Banking Act was enacted. As a check to see whether these short-run effects altered the short- and long-coefficients in quarterly vector-error correction models, a short-run dummy (*BACTDD*) was included in some models, which equaled 1 in 1935:q3, negative 1 in 1935:q4, and 0 otherwise.

In addition, some regressions also included a 0-1 variable to account for any temporary, outsized, impact of the banking crisis of March 1933. The monthly version of this variable, *BANKHOLID*, equals one in March 1933, when fears of a banking collapse gripped the U.S., inducing President Roosevelt to order a bank holiday. During that shutdown, regulators examined the books of banks and reopened only the ones deemed solvent ones that month. Reflecting that the holiday occurred late in March and that the public's confidence in banks was still shaken in April, the monthly version of *BANKHOLID* also equals one in April 1933 and the quarterly version of this variable equals 1 in 1933:q2 and 0 otherwise. The large jump in relative BA use without a large jump in default risk spreads during these months strongly suggests that extreme fears of bank runs at that time induced a flight to collateralized finance.

IV. Empirical Findings

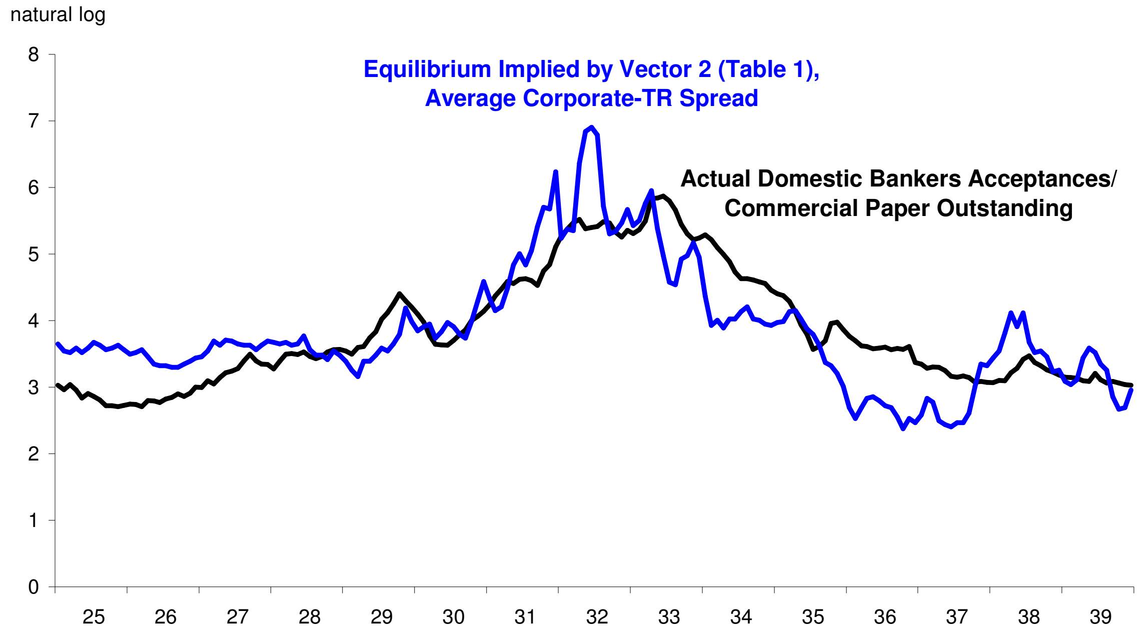
This section presents cointegration tests to assess the relationship between the relative use of BAs and the two measures of risk on a monthly basis. Then, short-run findings from vector error-correction models are reviewed. Quarterly results are provided as a robustness check. Finally, the absolute levels of real BAs are analyzed to see if findings regarding the relative use of BAs (e.g., *BACP*) are not merely an artifact of comparing BA use with commercial paper.

4.1 Montlhy Cointegration Results

Cointegration analysis should be used to detect long run relationships among nonstationary variables (Engle and Granger, 1987), preferably in logs. Since the logs of monthly and quarterly BA use (denoted with an L before *BACP*) have unit roots (allowing for possible time trends) as do the default risk spreads *LCOTR* and *ATR*, cointegration tests are used to test for long-run relationships among the relative use of BAs and one default risk spread (*LATR* or *LCOTR*). Each of these variables has a unit root, being nonstationary in levels and stationary in first differences, according to augmented-Dickey-Fuller statistics that are insignificant for the levels and significant for the first differences of each variable (upper panel Table 1). Somewhat stronger results were found using *LCOTR*, whose results are presented first in Table 1.

Tests found only one cointegrating vector for *LBACP* and *LCOTR* for samples including and excluding observations after the Banking Act of 1935 (vectors 1 and 8) based on two standard cointegration test statistics (Table 1). One is the trace statistic, which rejected only the absence of one cointegrating vector in each case at the 5 percent level using Johansen-Juselius's (1990) rank significance criterion. The other statistic is the maximum eigenvalue statistic, which also only rejected the absence of one cointegrating vector in each case at the 5 percent level. In each case, vectors minimizing the Akaike information statistic favored a lag length of 1 month. Combined with the insignificant statistics for the existence of more than 1 cointegrating vector (not shown), these findings support the hypothesis that one long-run (cointegrating) relationship exists among each group of variables. For the unique estimated vectors 1 and 2, the quality spread is highly significant with the hypothesized sign, since flipping the coefficient signs in the cointegrating vector (e.g., $LBACP_t = 1.798746 + 3.706096*LCOTR_t$ from vector 1) implies that equilibrium use of BA's relative to commercial paper is increasing in the spread between yields on investment grade corporate and long-term Treasury yields. Similar results that support the financial frictions hypothesis were obtained in vector error-correction models (VECMs, which jointly estimate long- and short-term relationships) that included *BANKHOLIDAY* as a short-run variable (vectors 2 and 8, Table 1). Also encouraging is that actual log levels of *BACP* are tracked well and are slightly led by the equilibrium levels implied by vectors 1 and 2 (Figure 4).

Figure 4: Estimated Equilbrium Relative BA Use Ratio Tracks and Slightly Leads Actual Use During the Depression Era



Although neither currency-to-deposit ratio has a unit root, vectors 3 and 4 added one such ratio to vectors 1 and 2 for robustness. Evidence of cointegration is weaker, since only the trace statistics and not the maxEignen statistics were significant and because the existence of mutliple vectors could not be rejected. Further, even if one significant vector were assumed (vectors 5 and 6), the currency-to-deposit ratio was insignificant, while the coefficients and significance of *LCOTR* were unaffected. Thus, there appears to be little role for the currency-to-deposit ratios.

As another robustness check, a dummy for the Banking Act of 1935 was added to vectors 1 and 2 in vectors 5 and 6. In the absence of the Bank Holiday dummy, a unique cointegrating vector (vector 5) was found in which the significance and magnitude of the bond spread variable were basically unaffected, whereas the Banking Act dummy was insignificant. In the presence of the bank holiday dummy, evidence of cointegration was weaker. Even assuming that a unique vector is found (vector 6), the banking act variable remained insignificant while the significance and magnitude of the bond spread variable were basically unaffected. Combined with evidence excluding the 1935-39 sub-period yielded results (vectors 7 and 8) that were similar to those of vectors 1 and 2, the financial frictions hypothesis is not overturned by controlling for the effects of the Banking Act of 1935, which appear to be minor and largely insignificant.

All of the above patterns of results are also obtained when the average corporate-Treasury spread (*COTR*) was replaced by the A-Treasury bond yield spread (*ATR*), as can be seen by comparing models in Table 2 with corresponding models in Table 1.

4.2 Monthly Vector-Error Correction Results

Models of changes in variables whose levels have unit roots and are cointegrated, should not omit information about long-run relationships to avoid misspecification (Engle and Granger, 1987). In addition to seeing how controlling for short-run effects may alter estimates of long-run relationships (see Tables 1 and 2), estimating those vector-error correction models (VECM's), which jointly estimate long-run and short-run relationships, is helpful in seeing whether the long-run relationships help explain short-run movements. In estimating short-run movements (first differences of log-levels), the VECM's regress the first difference in each long-run variable on lagged first differences of each long-run factor and include a lagged error-correction (EC) term equal to actual minus the estimated equilibrium values of the long-run variable modeled. Table 3 presents the short-run models of the relative use of BAs, with the error-correction terms based on the correspondingly numbered cointegrating vectors in Table 1 that use the spreads between the average investment grade corporate bond and long-term U.S. government bond yield. Thus, the even numbered models each include the bank holiday dummy, while other models differ in the construction of their error-correction term and whether they include an extra t-1 lag first difference term from adding any additional long-run variable to the cointegrating vector.

Several interesting patterns arise. First, the error-correction term is highly significant, with the anticipated negative sign. Since the EC term equals actual minus equilibrium use, the negative coefficients imply that the change in actual use will decline if actual use exceeded its estimated equilibrium level in the prior period. Since the bond spread variable is significant with the anticipated sign in the long-run relationships, the short-run portions of the VECM's also support the financial frictions view that high default risk will induce a greater relative use of collateralized finance. Second, the sizes of the EC coefficients are reasonable, implying that 3 to 4 percent of disequilibria are eliminated on average each month or roughly 30-40 percent per year. A third pattern is that the bank holiday variable is highly significant, implying some additional flight to collateral effect beyond that captured by the bond risk spread, either implicitly either through the error-correction or the short-run *ΔLCOTR* term. Fourth, consistent with the comparisons of vectors 1 and 2 with vectors 7 and 8 in Table 1 (and 2), models 1 and 2 have similar coefficients when the sample excludes the 1935-39 sub-period, as in models 7 and 8 which are placed next to models 1 and 2 in Table 3. This implies that evidence in support of the financial frictions hypothesis is unaffected by the Banking Act of 1935. Fifth, although the banking act variable is statistically insignificant in the long-run relationships (in vectors 5 and 6 in Table 1), its first difference is significant in models 5 and 6, suggesting that the Banking Act of 1935 might have had some short-run effects on the patterns of finance. Sixth, only models 1, 2, 7, and 8, all of which focus solely on a long-run relationship between relative BA use (*LBACP*) and the corporate-Treasury yield spread (*LCOTR*), had residuals that were well behaved in contrast to other models that tried to include other (statistically insignificant) long-term factors. Finally, any evidence for short-run effects captured in the currency-to-deposit ratio is obtained in model 5, but disappears in the presence of the bank holiday variable (model 6).

As a robustness check, similar short-run models from VECM's that replace the average corporate bond-Treasury yield spread (*LCOTR*) with the corporate A-Treasury (*LATR*) were estimated. Comparing models in Table 4 with corresponding ones in Table 3 indicates that the results are qualitatively and quantitatively similar. The only difference is that the models using the average corporate-Treasury yield spread have slightly better fits and more statistically significant error-correction terms than models using the corporate A-Treasury spread.

4.3 Exogeneity

A natural question is whether the bond yield spreads may be driven by the composition of the demand for business finance, which would greatly complicate the interpretation of the above findings. In vector-error correction systems modeling monthly relative BA use, quarterly relative BA use (analyzed in section 4.4), and quarterly real use of BA's, the error correction terms are highly significant in modeling BA use but are highly insignificant in modeling the corporate-Treasury bond yield spreads, indicating that these yield spreads are weakly exogenous to BA use. These results point to an asymmetry to how the vector components adjust to disequilibria, with BA use making the significant adjustments. Thus, consistent with theory, the equilibrium composition of short-term, external business credit is driven by the combination of default and liquidity risk measured in the spreads of corporate over Treasury bond yields.

4.4 Quarterly Models of Relative BA Use

Because monthly data are noisy and might obscure long-run patterns, the approach was repeated using quarterly averages of monthly data. Table 5 and 6 summarize findings that correspond to the monthly results in Tables 1-4, with three differences. First, Tables 5 and 6 omit results that included a long-run dummy for the Banking Act of 1935 (=1 from 1935:q3-1939:q4), which were similar to monthly results but were excluded to conserve space. Nevertheless, some models were tested to control for any short-run effects by including a short-run dummy, *BACTDD*, which equals 1 in 1935:q3 and -1 in 1935:q4. Second, because the number of degrees of freedom is greatly smaller, a sample excluding 1935-1939 was not presented owing to a very short-sample. Third, a quarterly dummy variable for the stock market crash of 1929 (*STCRASHDD*, equals 1 in 1929:q4, -1 in 1930:q1, and 0 otherwise) was included in some models as a robustness check. By construction, *STCRASHDD* imposes that any short-run boost to the use of BA's relative to commercial paper in 1929:q4 is unwound completely in the first quarter of 1930. Likely reflecting an unwinding that is faster than the normal error-correction process, this variable outperformed a dummy that equaled 1 in 1929:q4 and 0, otherwise in regressions not shown. In monthly models not reported, a monthly dummy for the October 1929 crash was very insignificant, in contrast to the significant quarterly coefficient found in every model. This difference may reflect that the noisiness of monthly data might obscure some short-run effects. In fact, virtually all the patterns seen in the monthly results were obtained in the quarterly models. The notable exception is that the inclusion of controls for the short-run effects of the bank holiday, the October 1929 stock market crash, and the Banking Act of 1935 more substantially improves the fit of the short-run models. Nevertheless, corresponding monthly and quarterly models that omit such short-run variables had similar fits.

4.5 Quarterly Models of Real BA Use

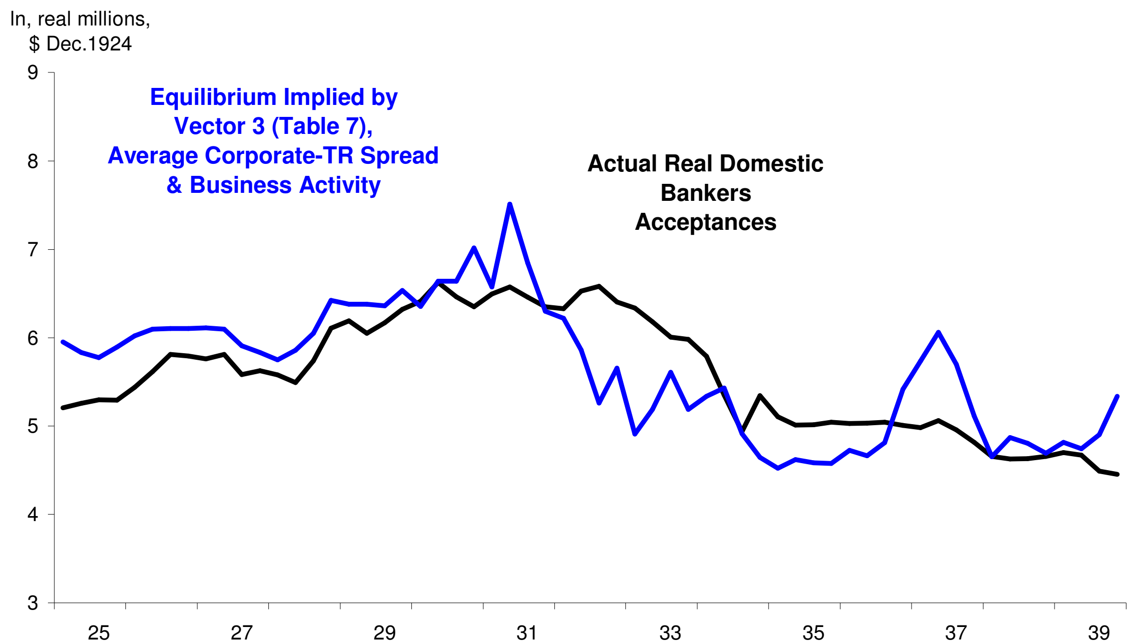
To see whether these basic results are robust to using absolute rather than relative levels of BA use, the log level of real BAs (*BALEV*) is analyzed with similar variables with a few adjustments. First, BAs are deflated using the overall wholesale price index (source: NBER Macrohistory Database). Second, reflecting the need for some control for the impact of overall economic activity on the demand for finance, the NBER index of business activity (*BUSACT*) is included in addition to the long-run variables used earlier. As indicated in the upper-panel of Table 7, the log levels of both variables (denoted with L's at the start of level variable names) have unit roots according to augmented Dickey-Fuller statistics. Cointegration tests were first conducted on vectors (numbers 1 and 5 in Table 7) that included just *LBALEV*, one spread variable (*LCOTR* or *LATR*), and *LBUSACT*. Third, also tested were other vectors (numbers 2 and 6, Table 7) that added the bank holiday variable, as well as vectors (numbers 3 and 7) that added all three short run variables, *BANKHOLIDAY*, *BACTDD*, and *STCRASH*. These are similar to variables used in analyzing quarterly, relative BA use (*BACP*) except that the October

1929 stock crash dummy equals 1 in 1929:4 and 0 otherwise. This implicitly assumes less of an unwinding effect in 1930:q1 than in the stock crash dummy in the *BACP* models, which also equaled minus 1 in 1930:q1. Consistent with the differences in the construction of these stock crash variables was a sharp plunge of commercial paper in 1929:q4 followed by a sharp recovery in 1930:q1, which would affect *LBACP* more than *LBALEV*. Finally, corresponding to vectors 3 and 7 which include all three short-run financial variables, vectors 7 and 8 also include the log of the currency-to-demand deposit ratio, *LCDRATIO*, which had a.d.f. statistics closer to exhibiting a unit root than the currency-to-total deposits ratio (*LCTDRATIO*). (In other models—not presented to conserve space—a long-run dummy for the Banking Act of 1935 was insignificant.)

Unique cointegrating relationships were found in each case, with lag lengths of 4 for all but the two VECMs (vectors 1 and 5) that excluded *BANKHOLIDAY*, *BACTDD*, and *STCRASH*, in which case 5 lags were needed to find a unique vector. Several patterns emerge from these vectors in Table 7 and the short-run models in Table 8. First, the quality spread and business activity variables are statistically significant, with the hypothesized signs, reflecting that BA use is increasing in the levels of default risk and economic activity. Second, the currency-to-deposit ratio is statistically significant, with a sign indicating that high currency-to-deposit ratios are associated with lower BA use, ceteris paribus. This result suggests that the negative effects of investor concerns about the value of bank guarantees on BAs that may have been reflected in the currency-deposit ratio likely outweighed the positive effects of increased incentives for banks to issue BAs than make traditional loans. Third, the inclusion of the currency-deposit ratio increases the magnitude of the coefficient on the quality spread, while reducing that of the business activity index. Nevertheless, the qualitative results regarding the effects of liquidity/default risk and business activity on BA use are unaffected by the presence of currency-deposit ratios. Also noteworthy is how the inclusion of the short-run banking/financial variables very noticeably improves the fit of the corresponding models, implying that the banking act of

1935 had temporary depressing effects on the real level of BA use, while the stock market crash and bank holiday episodes induced more use of BA financing, consistent with a flight to collateral during flights to quality in the corporate debt markets. Nevertheless, in the presence of these short-run event controls, the implied long-run equilibrium relationship from quality spreads and the business activity index track and slightly lead actual log levels of real BAs well (Figure 5). Overall, the findings for the level of real BA use are consistent with those for the use of BAs relative to commercial paper.

Figure 5: Estimated Equilbrium Real BA Levels Tracks and Slightly Leads Actual Levels During the Depression Era



V. Bond Yield Spreads and Business Credit Composition During the Current Crisis

5.1 An Empirical Specification of the Paper-Bank Loan Mix

Since the late 1930s, BAs have become much less important reflecting the deepening of credit markets and the Fed's shift to conducting open market operations in Treasuries. This makes the ratio of BAs to commercial paper less informative. Also, the deepening of the commercial paper market from the rise of asset-backed paper implies that the links between commercial paper and real activity are more complicated than during the 1930s. Accordingly, instead of *BACP or the* real levels of BAs or commercial paper, we model commercial paper as a share of commercial paper plus business loans (*CPBLMIX*, Kashyap, Wilcox, and Stein, 1997). *CPBLIMIX* is total commercial paper outstanding (consistently defined since 2001) as a share of commercial paper and commercial and industrial loans at all commercial banks.

To make the analysis more comparable with that for the Great Depression, *CPBLMIX* is modeled as a function of the spread between Baa corporate and 10-year Treasury bond yields *(BAA10TR*). Rises in this spread reflect that investors demand higher premiums for corporate default and liquidity risk. Such rises are less of a threat to the funding of bank loans, as banks had greater access to insured deposits and the Fed's liquidity facilities, particularly before mid-October 2008. As a result, the price and non-price terms of commercial paper would likely rise relative to those of bank loans, implying a negative relationship between the commercial paper share of short-term business credit (*CPBLMIX*) and the corporate yield spread (Figure 6). To capture nonlinear effects, some regressions replaced *BAA10TR*, with its square, *BAA10TRSQ*. Interestingly, spreads between Baa and Aaa-rated corporate bond yields rose almost as high in late 2008 as during the worst of the Great Depression (Figure 7). Being the largest component of the Baa-10-year Treasury yield spread, this spread suggests that default and liquidity risk between corporate and Treasury bonds likely rose to levels not seen since late 1933.

Other than for comparability with the Great Depression models, we use the Baa-10-year Treasury yield spread instead of the LIBOR-OIS or TED spread for two reasons.[3] First, a spread containing the LIBOR potentially introduces more simultaneity bias, especially given the use of LIBOR as a base rate for many adjustable interest rate business loans. Second, the Federal Reserve, Treasury, and some G-7 nations acted in concert to improve liquidity conditions in the

[3] Results were qualitatively similar using the A-10-year Treasury spread but model fits were higher in 6 of 7 models in Table 9) using the Baa-10-year Treasury spread.

interbank and commercial paper markets at nearly the same time. As a result, any LIBOR variable is likely to be highly collinear with actions taken to improve liquidity in commercial

Figure 6a: Relative Use of Commercial Paper Usually Varies Inversely with the Corporate Bond Yield Spread

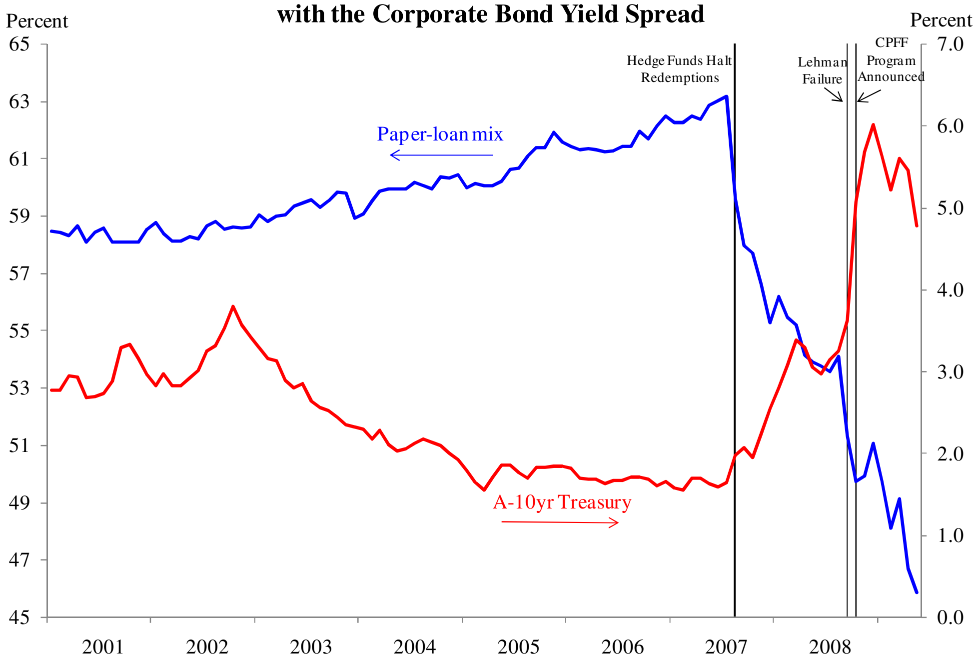


Figure 6b: Changes in the Relative Use of Commercial Paper Usually Vary Inversely with Changes in the Corporate Bond Yield Spread

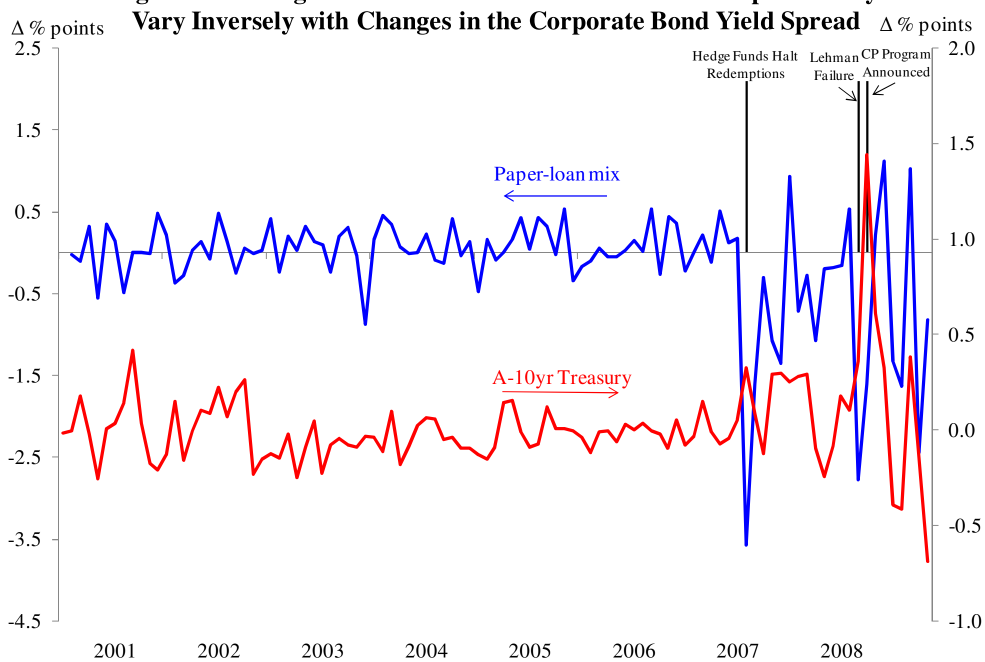
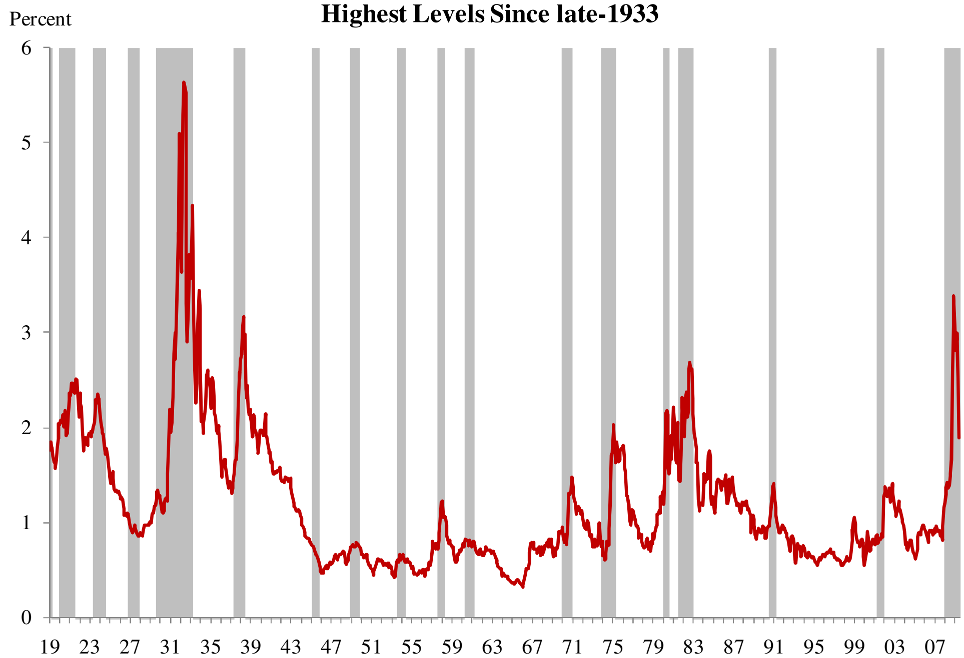


Figure 7: In late-2008, Baa-Aaa Bond Yield Spreads Jumped to Their Highest Levels Since late-1933

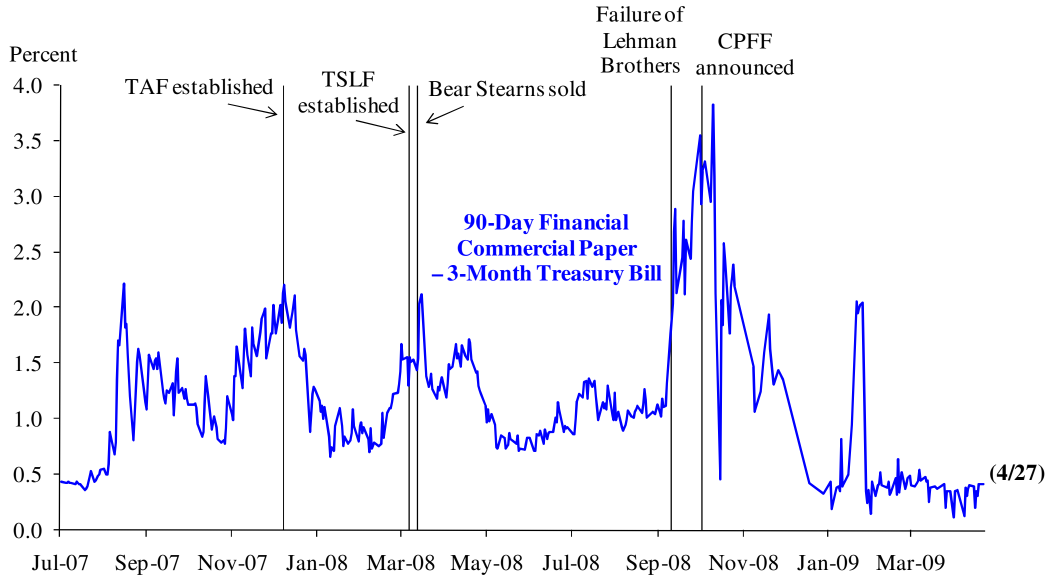


paper markets, hampering our ability to try to assess the impact of such actions.[4] Indeed, the TED and Paper-Bill spreads essentially widened and narrowed at similar times (Figures 8 and 9).

To model the impact of Federal Reserve and Treasury actions and announcements in October 2008, interactive variables are tested. These variables multiply the corporate bond yield spreads (*BAA10TR* or *BAA10TRSQ*) and a dummy (*FP*) equal to 1 since October 2008 and 0, otherwise. The dummy is designed to proxy for the combined effects of three Federal Reserve and Treasury initiatives. The first was the Treasury's extension of deposit insurance to many money market mutual funds. The second was the Fed's decision to directly offer money funds discount loans from a new funding facility to prevent a flood of money-fund redemptions from setting off a disorderly sale of commercial paper into an unsettled market. Because this action was unlikely to fully alleviate increased uncertainty that firms might be unable to issue new

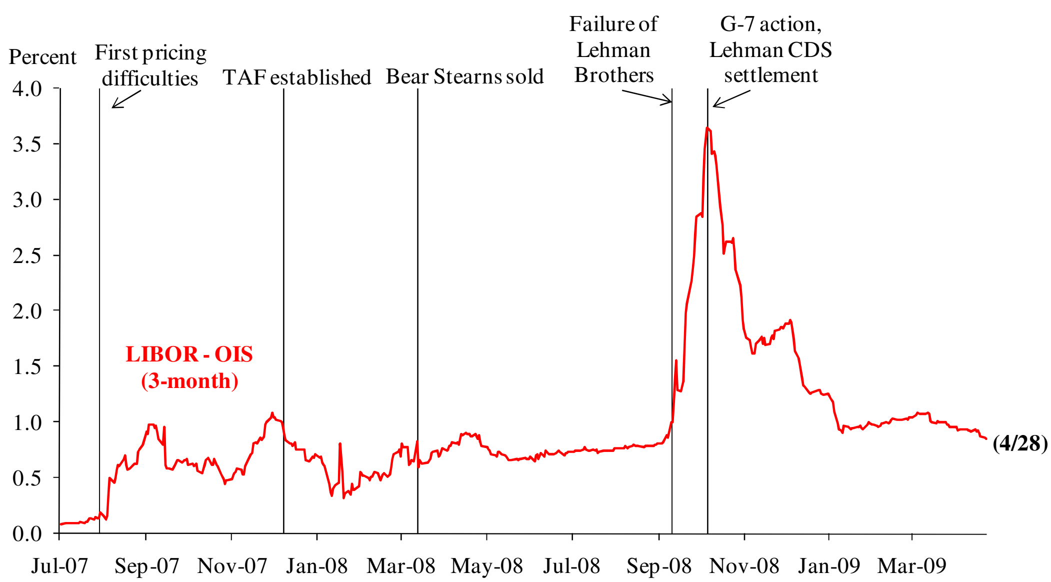
[4] For the impact of Fed actions on the LIBOR market, see Armantier, et al. (2008), Williams and Taylor (2009), and Wu (2008). For information on Fed credit programs , see www.federalreserve.gov/newsevents/recentactions.htm, www.newyorkfed.org/markets/Forms_of_Fed_Lending.pdf , and www.federalreserve.gov/monetarypolicy/bst.htm.

Figure 8: Commerical Paper Spreads Narrow Following Announced Fed Actions Affecting Money Funds and Commercial Paper



Note: Spreads based on prime (nonfinancial and financial) commercial paper rate until 1996; financial paper thereafter.

Figure 9: Interbank Loan Costs Retreat After Rescue Efforts



paper to repay maturing debt if investors became too risk averse, the Fed also announced it would fund purchases of top-rated commercial paper via a new facility capitalized by the Treasury—the commercial paper funding facility (*CPFF*). Basically, the Treasury raises funds by issuing new debt, and the Fed uses the Treasury's deposits and excess reserves to fund purchases of top-tier paper under a limited penalty pricing formula. Under this back-stop facility, unsecured three-month A1/P1-rated paper is purchased at a rate equal to the three-month OIS rate plus 100 basis points, and if the issuer does not provide sufficient collateral, plus another 100 basis points. Unsecured asset-backed, A1/P1-rated paper is purchased at a rate equal to the three-month OIS rate plus 300 basis points.

Reflecting the cushioning effect of such actions on the impact of higher default and liquidity risk pressures, the interactive terms *FP*BAA10TRSQ* and *FP *BAA10TR* and are hypothesized to have opposite signs from the non-interactive yield spreads. Those hypothesized signs implicitly assume that the net effect of Fed and Treasury actions to bolster money market conditions and the banking system had larger short-run cushioning effects on commercial paper market than on bank loans, which, a priori, is an empirical issue.

Under another liquidity program, the Term Asset-Backed Securities Loan Facility (TALF) which was started after a long delay in March 2009 (announced in December 2009), the Fed purchases top-tier rated asset-backed paper that funds several types of loans, included business loans backed by the Small Business Administration, equipment loans, credit cards, student loans, and auto loans. In this program, issuers voluntarily approach the facility for funding after packaging such securities in accordance with the terms of the program. The start of TALF in March 2009 was accompanied by a revival of commercial paper issuance that later ebbed in April when markets were apparently disappointed by the very low volumes of purchases. Indeed, in all the models March 2009 was a large, positive outlier that largely unwound in April. Some models include a dummy equal to 1 in March 2009, and 0 otherwise (*ΔTALF*); this dummy cleans up model residuals without altering estimates of key coefficients.

To handle unusual event risks that boosted liquidity risk, a dummy variable (*Aug14*, = 1 in 2007:08, = 0 otherwise) is included for the market reaction to the August 14, 2007 decision by some European hedge funds to halt redemptions, owing to the lack of market trades on many of their subprime mortgage-related assets. This induced a surge in LIBOR-OIS and LIBOR-Treasury spreads that was not immediately picked up by a surge in corporate bond yield spreads. On similar grounds, a dummy for the September 2008 failure of Lehman (*Lehman* = 1 in 2008:09, 0 otherwise) is also included, and a dummy for any lingering impact of Lehman's failure on the liquidity and availability of commercial paper (*PostLehman* = 1 since 2008:10, 0 otherwise). Finally, reflecting that commercial paper issuance (and hence *CPBLMIX*) is more dependent on the need to finance inventories (see Kashyap, Wilcox, and Stein, 1993), regressions also included the log of the monthly ISM purchasing managers' (manufacturing) index of inventory demand, which tracks the change in inventories and is more timely than inventory-shipment ratio data and much less subject to revisions (*INVISM).*

In the short time period over which commercial paper data are consistently defined (2001:01-2009:05), the paper-mix and bond yield spread variables are I(2),[5] reflecting that at the end of the sample, the paper mix plunges while the bond yield spreads soar, leading to serial correlation in both levels and first differences at the sample's end. To limit distortions from such trends, the models regress first differences of the paper-loan mix on first differences of yield spreads in the presence of control variables (*Aug14*, *Lehman*, *PostLehman*, and *INVISM*).

5.2 Empirical Results From Modeling the Paper-Bank Loan Mix During the Crisis

Table 9 presents results from eight regressions that reflect different first difference rate spread variables (*Δrspread*) and ends of sample periods. Models (1)-(4) use the linear change in the Baa-Treasury yield spread. Model 1 covers the sample through October 2008 and omits any controls for Federal Reserve and Treasury programs. As hypothesized, *ΔBAATR* is negative and significant, as are the financial crisis dummies (*Aug14*, *Lehman*, and *PostLehman*). However, when the sample is extended to end in May 2009, *ΔBAATR* is no longer significant and even has

[5] As per the modified AIC and SIC criteria.

a positive sign, while the constant becomes marginally significant. This does not appear to be an artifact of nonlinear effects. Among models (5)-(8) which replace *ΔBAATR* with its quadratic to see if rate spreads have more of a nonlinear effect, models 5 and 6 have slightly better fits, but show the same pattern in coefficient changes as between models 1 and 2. This shift in coefficients suggests that the new credit programs may have affected the impact of liquidity and default risk premiums on the relative use of commercial paper and bank loans.

To shed more light on that hypothesis, models 3, 4, 7, and 8 are estimated over the full sample and include a 0-1 variable (*FP*) for the liquidity programs multiplied by the linear and quadratic bond yield spreads, respectively. The inclusion of these terms yields non-interactive rate spread coefficients that are similar to those in samples ending in October 2008, and yields interactive rate spread coefficients that are highly statistically significant and oppositely signed from the non-interactive rate spreads, consistent with liquidity programs having a desired effect. One caveat is that March 2009 is a big enough positive outlier, that there is evidence of serial correlation in the residuals for all the full sample models (2, 3, 6, and 7) that omit the TALF program variable. This problem appears corrected by the presence of the *ΔTALF* variable in the interactive-spread models (4 and 8). In those two models, there is evidence that a nonlinear approach to modeling the impact of bond yield spreads outperforms the linear spread approach in tracking changes in the paper-bank loan mix variable; in particular, the non-interactive rate spread variable has greater statistical significance and the model fit is slightly higher in model 8.

The overall patterns of results suggest that the Federal Reserve and Treasury liquidity programs have helped stabilize the relative use of commercial paper by counteracting the influence of wider liquidity and default risk premiums. Nevertheless this interpretation and the findings as a whole should be viewed with caution in light of the lingering, negative effect captured by the *PostLehman* variable and the short sample.

During the early 1930s, the Federal Reserve did not actively intervene in commercial paper purchases when commercial paper plunged in tandem with rising corporate liquidity and default risk premiums, even after it was granted discretion to do so in the summer of 1932 in an amendment (section 13(3)) of the Federal Reserve Act. In contrast to that episode, the Federal Reserve has intervened to provide liquidity in the commercial paper market during the current crisis, especially since October 2008. Although the samples are too short to be definitive, the evidence thus far supports the working hypothesis that these actions have helped stabilize the use of commercial paper by countering rising liquidity premiums on corporate debt.

VI. Conclusion

This study analyzes the relative use of a collateralized and easily funded source of external business finance during the Great Depression and relates those results to money market conditions during the current financial crisis. Because the forms of finance examined (bankers acceptances and commercial paper) are short-lived, the timing of their movements should have been more closely related to contemporaneous changes in default risk spreads than were bank/firm failures or movements in the stock of bank loans, which lag the economy more and have been used in prior studies of the Great Depression. The analysis uses spreads on yields between on A-rated corporate and U.S. Treasury bonds, as well as those between average investment-grade corporate bonds to track ex ante default and liquidity risk premiums. Also assessed were currency-to-deposit ratios, which could have risen with liquidity risk pressures on banks, which would tend to boost BA use or which could have increased with investor doubts about the value of banks' backing of BAs, which would lower BA use. Evidence of a net impact of bank run risk, as proxied by currency-to-deposit ratios, is weak or mixed—with a negative effect on balance—perhaps reflecting that the ratios may track countervailing factors.

Consistent with Bernanke (1983) and the pre-World War II studies of Kimmel (1939) and Young (1932), evidence indicates that the provision of credit shifted towards collateralized debt and debt whose funding sources were less vulnerable to liquidity shocks in reaction to swings in default and possibly liquidity risk during the Great Depression. In particular, the real level of bankers acceptances and their use relative to non-collateralized commercial paper were strongly and positively related to bond quality yield spreads. Furthermore, these shifts in the composition of external finance were large and persistent, supporting the view that financial frictions and reduced credit availability played an important role in depressing the U.S. economy in the 1930s. Also significant were short-run events, such as the October 1929 stock market crash and the 1933 bank holiday that sparked flights to quality in the bond market and a flight to quality (BAs) in the money market and perhaps from the loan market. Overall, the findings from the Great Depression era are consistent with the implications of research on financial frictions and flights to quality (e.g., Bernanke and Blinder, 1988; Bernanke and Gertler, 1989; Bernanke, Gertler, and Gilchrist, 1996; Jaffee and Russell, 1976; Kashyap, Wilcox, and Stein (1993); Keeton, 1979; Lang and Nakamura, 1995; and Stiglitz and Weiss, 1981).

Those findings are analogous to analyzing the composition of short-term business credit during the current financial crisis. In particular, up until the Federal Reserve and Treasury actions of October 2008, when corporate-Treasury bond yield spreads rose, the use of security-markets funded commercial paper fell relative to bank business loans, which could be funded with insured deposits. This linkage broke down after the Fed and Treasury's announcements to purchase commercial paper, provide discount loans to money market funds, and insure money market fund accounts. The pre-October 2008 pattern and the ensuing break from it suggest that the 2008 pullback in commercial paper outstanding owed to spikes in liquidity premiums. This interpretation is plausible because higher liquidity premiums on the commercial paper are more amenable to being addressed by the post-September 2008 actions of the Fed and the Treasury, than are most of solvency questions about commercial paper issuers. Thus far, these actions appear to have helped prevent an even sharper pullback in commercial paper and helped foster a reversal of the jump in the commercial paper-Treasury bill spread around the failure of Lehman.

Such an interpretation is tentative and preliminary mainly because of the short sample available for analyzing consistent measures of commercial paper and because the financial crisis is not yet over. Nevertheless, earlier evidence from the Great Depression era indicates that security-funded sources of external finance, such as commercial paper, are highly vulnerable to the jumps in liquidity risk premiums that typically characterize financial crises. Indeed, real commercial paper outstanding fell 84 percent between July 1930 and May 1933. Furthermore, recent experience suggests that such surges in liquidity premiums can be countered by appropriate central bank asset purchases, thereby cushioning the supply of security-funded credit to high quality borrowers. By means of comparison, real commercial paper fell 73 percent during the 22 months between July 1930 and May 1932 (and 85 percent between July 1930 and July 1933), but by a less dramatic 42 percent in the 22 months between July 2007 and May 2009. Of course, some of this difference may also reflect any impact on credit demand and supply of the stronger macroeconomic policy response in the recent episode. Nevertheless, the impacts of rate spread variables on the relative use of commercial paper were estimated in the presence of some controls for credit demand in both periods. With appropriate caveats, findings from both the Great Depression and the recent financial crisis suggest that new liquidity programs in the U.S. have, thus far, helped prevent the money markets from melting down by as fast as they did during the early 1930s.

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Appendix A: How This Paper's Study of the Great Depression Relates to the 2007 Turmoil in Asset-Backed Commercial Paper Markets

Compared to the current menu of corporate finance, financial markets were much less developed during the era examined. Partly to offset liquidity risk to investors, commercial paper issuers are forced by market forces to obtain formal back-up lines of bank credit to ensure timely payment, a practice which generally began in the 1970s.

However, default risk remains an important aspect facing securities markets. Ostensibly to address such concerns and to expand the availability of commercial paper, the asset-backed commercial paper (ABCP) market had grown rapidly and by yearend 2006, provided slightly more finance than more traditional commercial paper. Many of the assets backing commercial paper were securities, including now-suspect subprime mortgage instruments. As unanticipated increases in problem subprime mortgages mounted, the value of the assets backing this paper became highly suspect in the summer of 2007. Ironically, it was asset-backed commercial paper that was hardest hit, probably because the paper had been viewed as safe based on the financial assets serving as collateral rather than the underlying strength of the issuing firm as in the case of traditional nonfinancial commercial paper. Nevertheless, this event is consistent with this study's findings from the 1930s because the recent turmoil ultimately stemmed from markets no longer seeing much ABCP as really being collateralized, whereas BAs were and still are backed by more concrete and re-sellable commodities and products. In this regard, the evidence presented in this study provides insights about how and why surges in default risk, coupled with considerations about collateral, may result in flights to quality that sometimes affect the commercial paper market.

Table 1: Monthly Cointegration Results

Unit Root Test Statistics Using 1924-39 Data: Augmented Dickey-Fuller Statistics (constant with trend)

Variable	*Level (lag)*	*5% Critical*	*1% Critical*	*First Difference (lag)-*	*5% Critical*	*1% Critical*	*Integration*
LBACP	-0.985635(3)	-3.435413	-4.010740	-6.218884** (2)	-3.435413	-4.010740	1
LCOTR	1.465370(4)	-3.435413	-4.010740	-9.850798** (2)	-3.435413	-4.010740	1
LATR	-1.250924 (4)	-3.435560	-4.011044	-8.815711** (3)	-3.435560	-4.011044	1
LBAATR	-2.019656 (13)	-3.436957	-4.013946	-3.149696^{+} (12)	-3.436957	-4.013946	1?
LCTDRAT	-2.453605 (13)	-3.436957	-4.010740	-2.976100 (10)	-3.436957	-4.013946	2
LCDRAT	-2.702255 (9)	-3.436318	-4.012618	-2.745561 (10)	-3.436634	-4.013274	2

Vec #	Cointegrating Vector (monthly data: 1924:12-1939:12)	Trace Statistic (no vector)	MaxEigen (no vector)
1	$LBACP_t$ - 3.706096 $LCOTR_t^{**}$ - 1.798746	20.36427**	19.24108**
	(-7.45)	(other statistics imply one significant vector)	
2	$LBACP_t$ - 3.416463 $LCOTR_t^{**}$ - 1.958835 (Bank Holiday Dummy Present)	22.48272**	19.62396**
	(-7.20)	(other statistics imply one significant vector)	
3	$LBACP_t$ - 4.040193 $LCOTR_t^{**}$ - 0.308124 $LCTDRAT_t$ - 0.840934	49.07472*	29.03159
	(-7.19) (-0.51)	(other statistics could not reject at most 2 significant vectors)	
4	$LBACP_t$ - 3.977967 $LCOTR_t^{**}$ - 0.258835 $LCTDRAT_t$ - 0.999007 (with Bank Holiday)	37.54708*	20.46756
	(-7.16) (-0.42)	(trace statistics could not reject at most 2 significant vectors)	
5	$LBACP_t$ - 3.769151 $LCOTR_t^{**}$ - 0.289142*BANKACT35* – 1.681512	20.36427**	19.24108**
	(-7.01) (-0.93)	(other statistics imply one significant vector)	
6	$LBACP_t$ - 4.099829 $LCOTR_t^{**}$ - 0.3684*BANKACT35* – 1.476143 (with Bank Holiday)	25.89842	22.11003*
	(-7.33) (-1.13)	(other statistics imply one or no significant vector)	
	data: 1924:12-1934:12		‘
7	$LBACP_t$ - 4.155675 $LCOTR_t^{**}$ - 1.345904	16.58185*	15.34367*
	(-7.28)	(other statistics imply one significant vector)	
8	$LBACP_t$ - 3.904907 $LCOTR_t^{**}$ - 1.509059 (Bank Holiday Dummy Present)	18.56457*	15.31146*
	(-6.97)	(other statistics imply one significant vector)	

t-statistics in parentheses. *(**) significant at the 5- (1-) percent level. Flipping the signs in the vectors yields the estimated equilibrium; vector 1 implies that equilibrium $LBACP_t$ = 3.706096 * $LCOTR_t$ + 1.798746. Significant vectors found using 1 lag. ADF test lags based on the AIC criterion. ADF on second difference of *LCTDRAT* was 5.618684** and that on *LCDRAT* was 10.24613**.

Table 2: Montlhy Cointegration Results Using the A-Treasury Spread (*LATR*)

Vec. #	Cointegrating Vector (data: 1924:12-1939:12)	Trace Statistic	MaxEigen
		(no vector)	(no vector)
1	$LBACP_t$ - 3.559119 $LATR_t^{**}$ - 1.680696 (-8.18)	21.43845**	20.23087**
		(other statistics imply one significant vector)	
2	$LBACP_t$ - 3.314697 $LATR_t^{**}$ - 1.829482 (Bank Holiday Dummy Present) (-7.95)	23.72093**	20.70300**
		(other statistics imply one significant vector)	
3	$LBACP_t$ - 4.063107 $LATR_t^{**}$ - 0.031889 $LCTDRAT_t$ - 6.454662 (-7.88) (-0.06)	34.89087*	22.82765*
		(other statistics could not reject at most 2 significant vectors)	
4	$LBACP_t$ - 3.969935 $LATR_t^{**}$ + 0.044550 $LCTDRAT_t$ -1.542406 (with Bank Holiday) (-7.85) (0.07)	39.28708**	22.69815*
		(other statistics could not reject at most 2 significant vectors)	
5	$LBACP_t$ - 3.772371 $LATR_t^{**}$ - 0.208187*BANKACT35* – 1.491567 (-7.80) (-0.72)	25.95849	22.24518*
		(other statistics found no significant vectors)	
6	$LBACP_t$ - 3.479845 $LATR_t^{**}$ - 0.144739*BANKACT35* – 1.386432 (-7.50) (-0.53)	28.58202	22.59858*
		(other statistics found no significant vectors)	
	data: 1924:12-1934:12		‘
7	$LBACP_t$ - 3.815608 $LATR_t^{**}$ - 1.366526 (-7.11)	15.40299*	14.19244*
		(other statistics imply one significant vector)	
8	$LBACP_t$ - 3.561570 $LATR_t^{**}$ - 1.545166 (Bank Holiday Dummy Present) (-6.86)	17.57511*	14.42267*
		(other statistics imply one significant vector)	

t-statistics in parentheses. *(**) significant at the 5- (1-) percent level. Trace and Maxeigen statistics were strongest using 1 lag when estimating the cointegrating vectors. Flipping the signs in the cointegrating vectors yields the estimated equilibrium; thus, vector 1 implies that equilibrium $LBACP_t$ = 3.559119 * $LATR_t$ + 1.680696.

Table 3: Monthly Models of the Change in the Ratio of Domestic Bankers Acceptances to Commercial Paper Outstanding

(all models use the spread between investment grade corporate bond yields and the long-term U.S. Treasury yield)

	Models Without Currency-Deposit or Bank Holiday Variables				***Models With***		***Models With***	
	1925:02-1939:12 Sample		**1925:02-1934:12 Sample**		***LCTDRAT Shift Variable***		***Banking Act Dummy***	
Variable	**Model 1**	**Model 2**	**Model 7**	**Model 8**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
constant	-0.0002	-0.0002	0.0059	0.0032	-0.0010	-0.0022	-0.0015	-0.0037
	(-0.04)	(-0.42)	(0.78)	(0.44)	(-0.17)	(-0.38)	(-0.27)	(-0.65)
EC_{t-1}	-0.0367**	-0.0397**	-0.0362**	-0.0379**	-0.0263**	-0.0285**	-0.0361**	-0.0388**
	(-3.58)	(-3.77)	(-2.80)	(-2.93)	(-2.70)	(-2.92)	(-3.63)	(-3.81)
$\Delta LCOTR_{t-1}$	0.0049	-0.0195	-0.0034	-0.0304	-0.0143	-0.0143	0.0259	0.0024
	(0.05)	(-0.21)	(-0.03)	(-0.29)	(-0.15)	(-0.14)	(0.28)	(0.03)
$\Delta LBACP_{t-1}$	0.4093**	0.3885**	0.4426**	0.4166**	0.3936**	0.3892**	0.3946**	0.3736**
	(6.23)	(6.08)	(5.52)	(5.39)	(6.00)	(6.00)	(6.12)	(5.97)
$\Delta LCTDRAT_{t-1}$					0.5625*	-0.198		
					(2.47)	(-0.42)		
$\Delta BANKACT35_t$							0.2411**	0.2441**
							(3.07)	(3.22)
$BANKHOLID_t$		0.1914**		0.1812**		0.1442*		0.1893**
		(3.46)		(3.22)		(2.20)		(3.51)
$\bar{R}^2$	.260	.305	.267	.324	.273	.290	.308	.338
VECLM(1)	7.53	4.30	5.99	3.01	20.07*	18.06*	21.51*	16.59+
VECLM(24)	4.00	3.30	3.58	5.28	12.66	14.06	7.78	7.41

t-statistics in parentheses. *(**) denotes significant at the 5- (1-) percent level. *EC* terms from same-numbered vectors in Table 1. Except for models 7 and 8, sample period is 1925:02-1939:12, using lagged first differences of data available over 1924:12-1939:12.

Table 4: Monthly Models of the Change in the Ratio of Domestic Bankers Acceptances to Commercial Paper Outstanding

(all models use the spread between A-rated corporate bond yields and the long-term U.S. Treasury yield)

	Models Without Currency-Deposit or Bank Holiday Variables				Models With		Models With	
	1925:02-1939:12 Sample		1925:02-1934:12 Sample		LCTDRAT Shift Variable		Banking Act Dummy	
Variable	Model 1	Model 2	Model 7	Model 8	Model 3	Model 4	Model 5	Model 6
constant	-0.0003	-0.0024	0.0058	0.0031	-0.0010	0.0023	-0.0016	-0.0038
	(-0.04)	(-0.42)	(0.77)	(0.42)	(-0.17)	(0.39)	(-0.27)	(-0.66)
EC_{t-1}	-0.0396**	-0.0427**	-0.0351**	-0.0380**	-0.0267**	-0.0308**	-0.0391**	-0.0424**
	(-3.55)	(-3.76)	(-2.63)	(-2.84)	(-2.67)	(-3.04)	(-3.62)	(-3.85)
$\Delta LATR_{t-1}$	0.0006	-0.0226	0.0031	-0.0240	-0.0193	-0.0204	0.0184	-0.0046
	(0.01)	(-0.25)	(0.03)	(-0.23)	(-0.20)	(-0.22)	(0.20)	(-0.05)
$\Delta LBACP_{t-1}$	0.4106**	0.3894**	0.4482**	0.4211**	0.3919**	0.3851**	0.3964**	0.3747**
	(6.25)	(6.10)	(5.58)	(5.45)	(5.96)	(5.94)	(6.15)	(6.00)
$\Delta LCTDRAT_{t-1}$					0.5562*	0.2308		
					(2.43)	(0.87)		
$\Delta BANKACT35_t$							0.2403**	0.2438**
							(3.06)	(3.22)
$BANKHOLID_t$		0.1928**		0.1853**		0.1530*		0.1928**
		(3.49)		(3.29)		(2.33)		(3.58)
$\bar{R}^2$	.259	.305	.261	.321	.272	.293	.291	.339
VECLM(1)	6.86	4.82	5.84	3.65	19.27*	16.13+	20.76*	24.13*
VECLM(24)	4.98	4.29	4.23	6.22	13.66	18.05*	7.51	7.08

t-statistics in parentheses. *(**) denotes significant at the 5- (1-) percent level. EC terms from same-numbered vectors in Table 2. Except for models 7 and 8, sample period is 1925:02-1939:12, using lagged first differences of data available over 1924:12-1939:12.

Table 5: Quarterly Cointegration Results for the Ratio of Domestic Bankers Acceptances to Commercial Paper

Unit Root Test Statistics Using 1925-39 Data: Augmented Dickey-Fuller Statistics (constant with trend)

Variable	*Level (lag)*	*5% Critical*	*1% Critical*	*First Difference (lag)-*	*5% Critical*	*1% Critical*	*Integration*
LBACP	-1.362154 (3)	-3.492149	-4.130526	-5.398530** (1)	-3.490662	-4.127338	1
LCOTR	-1.564508 (0)	-3.487845	-4.121303	-8.786970** (0)	-3.489228	-4.124265	1
LATR	-1.500086 (0)	-3.487845	-4.121303	-8.838056** (0)	-3.489228	-4.124265	1
LBAATR	-2.165331 (6)	-3.496960	-4.140858	-1.694477 (10)	-3.506374	-4.161144	2
LCTDRAT	-2.983856 (5)	-3.495295	-4.137279	-2.710456 (6)	-3.498692	-4.144584	2
LCDRAT	-2.609681 (3)	-3.492149	-4.130526	-2.947708 (1)	-3.490662	-4.127338	2

Vec #	Cointegrating Vector (monthly data: 1924:12-1939:12)	Trace Statistic (no vector)	MaxEigen (no vector)
1	$LBACP_t$ - 3.963979 $LCOTR_t$** - 2.942468	19.40161*	16.91762*
	(-7.99)	(other statistics imply one significant vector)	
2	$LBACP_t$ - 4.003536 $LCOTR_t$** - 2.964642 (with banking & stock crash variables)	19.82609*	17.23445*
	(-7.92)	(other statistics imply one significant vector)	
3	$LBACP_t$ - 3.493070 $LCOTR_t$** + 1.285545 $LCTDRAT_t$+ - 5.327311	32.15650*	21.14548*
	(-6.22) (1.88)	(other statistics imply one significant vector)	
4	$LBACP_t$ - 3.565933 $LCOTR_t$** + 1.733188 $LCTDRAT_t$*-6.301709 (banking & stock variables)	39.41407**	27.40861**
	(-6.54) (2.60)	(other statistics imply one significant vector)	
5	$LBACP_t$ - 3.817962 $LATR_t$** - 3.075199	19.74074*	17.05792*
	(-8.67)	(other statistics imply one significant vector)	
6	$LBACP_t$ - 3.880861 $LATR_t$** - 3.113993 (with banking & stock crash variables)	19.59003*	16.87102**
	(-8.45)	(other statistics imply one significant vector)	
7	$LBACP_t$ - 3.503198 $LATR_t$** + 1.267785 $LCDRAT_t$+ - 5.493776	32.46190**	20.84089
	(-6.53) (1.96)	(trace statistics could not reject at most 2 significant vectors)	
8	$LBACP_t$ - 3.538532 $LATR_t$** + 1.805353 $LCDRAT_t$** -6.636519 (banking & stock variables)	39.08555**	26.43566**
	(-6.53) (2.76)	(other statistics imply one significant vector)	

t-statistics in parentheses. *(**) significant at the 5- (1-) percent level. Trace and MaxEigen statistics were strongest when estimating the cointegrating vectors using 2 lags for vectors 1, 2, 5, and 6 and using 4 lags for vectors 3, 4, 7, and 8. Flipping the signs in the cointegrating vectors yields the estimated equilibrium.

Table 6: Quarterly Models of the Change in the Ratio of Bankers Acceptances to Commercial Paper (Sample: 1925:q1-39:q4)

	SPREAD=Investment Grade Corporate-Treasury Yield Spread				***SPREAD=A-Rated Corporate-Treasury Yield Spread***			
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
constant	0.0047	0.0049	-0.0070	-0.0082	0.0046	0.0046	-0.0052	-0.0075
	(0.20)	(0.26)	(-0.33)	(-0.82)	(0.20)	(0.24)	(-0.24)	(-0.42)
EC_{t-1}	-0.1222**	-0.0961*	-0.1800**	-0.1649**	-0.1279**	-0.0946*	-0.1921**	-0.1709**
	(-3.58)	(-2.59)	(-3.63)	(-4.44)	(-2.62)	(-2.35)	(-3.56)	(-4.35)
$\Delta LSPREAD_{t-1}$	0.2074	-0.3279	-0.1219	-0.0257	0.2125*	0.3541^{+}	-0.1313	-0.0181
	(0.83)	(-1.58)	(-0.48)	(-1.23)	(2.52)	(1.65)	(-0.50)	(-0.08)
$\Delta LSPREAD_{t-2}$	-0.1151	0.0154	-0.3458	-0.2058	-0.0563	0.0594	-0.3011	-0.1879
	(-0.48)	(0.08)	(-1.49)	(-1.07)	(-0.23)	(0.29)	(-1.23)	(-0.93)
$\Delta LBACP_{t-1}$	0.3403*	0.3358**	0.1518	0.0797	0.3331**	0.3358**	0.1635	0.0899
	(2.60)	(3.00)	(1.03)	(0.65)	(2.52)	(2.98)	(1.12)	(0.73)
$\Delta LBACP_{t-2}$	-0.2337^{+}	-0.1675^{+}	-0.2929*	-0.2049^{+}	-02380^{+}	-0.1756^{+}	-0.2898^{+}	-0.2021^{+}
	(-1.89)	(-1.62)	(-1.99)	(-1.66)	(-1.90)	(-1.67)	(-1.95)	(-1.62)
$\Delta LCTDRAT_{t-1}$			1.8972**	1.3862*			1.9107**	1.3508*
			(3.11)	(2.46)			(3.06)	(2.36)
$BACTDD_t$		-0.3277**		-0.3045**		-0.3176**		-0.2922**
		(-3.17)		(-3.28)		(-3.06)		(3.12)
$BANKHOLID_t$		0.3610**		0.3627*		0.3796**		0.4003*
		(3.41)		(2.18)		(3.56)		(2.32)
STCRASHDD		0.2351*		0.2412*		0.2257*		0.2294*
		(2.25)		(2.57)		(2.15)		(2.44)
$\bar{R}^2$	.269	.501	.437	.622	.259	.492	.427	.615
VECLM(1)	0.37	2.08	7.27	7.25	0.55	2.25	9.00	8.24
VECLM(12)	5.64	7.21	8.51	7.55	4.84	4.82	7.86	4.59

t-statistics in parentheses. *(**) denotes significant at the 5- (1-) percent level. EC terms from same-numbered vectors in Table 5. Except for models 7 and 8, sample period is 1925:02-1939:12, using lagged first differences of data available over 1924:12-1939:12. Some statistically insignificant lag first difference coefficients in models 3, 4, 7, and 8 are not reported to conserve space.

Table 7: Quarterly Cointegration Results for the Log Level of Real Domestic Bankers Acceptances

Unit Root Test Statistics Using 1925-39 Data: Augmented Dickey-Fuller Statistics (constant with trend)

Variable	*Level (lag)*	*5% Critical*	*1% Critical*	*First Difference (lag)-*	*5% Critical*	*1% Critical*	*Integration*
LBAREAL	-0.857813 (0)	-3.487845	-4.121303	-6.320672^{**} (0)	-3.489228	-4.124265	1
LBUSACT	-1.188095 (4)	-3.493692	-4.133838	-4.066359^{*} (3)	-3.493692	-4.133838	1

Vec #	Cointegrating Vector (monthly data: 1924:12-1939:12)	Trace Statistic (no vector)	MaxEigen (no vector)
1	$LBALEV_t$ - 2.633622 $LCOTR_t^{**}$ - 1.538562 $LBUSACT_t^{**}$ + 2.592309	34.96885^{*}	21.55812^{*}
	(-8.35) (-3.94)	(other statistics imply one significant vector)	
2	$LBALEV_t$ - 2.940340 $LCOTR_t^{**}$ - 1.756124 $LBUSACT_t^{**}$ + 3.736286	32.39268^{*}	21.49691^{*}
	(-8.17) (-4.02) (banking act variable included, other statistics imply one significant vector)		
3	$LBALEV_t$ - 2.361469 $LCOTR_t^{**}$ - 2.027957 $LBUSACT_t^{**}$ + 4.609104	43.62225^{**}	28.92987^{**}
	(-6.16) (-4.35) (banking & stock variables included, other statistics imply one significant vector)		
4	$LBALEV_t$ - 3.158840 $LCOTR_t^{**}$ - 1.626813 $LBUSACT_t^{+}$ + 4.006494 $LCDRAT_t^{*}$ + 8.415600	64.95828^{**}	38.10868^{**}
	(-3.68) (-1.79) (2.19) (banking & stock variables included, statistics imply 1 sign. vector)		
5	$LBALEV_t$ - 2.788043 $LATR_t^{**}$ - 1.677544 $LBUSACT_t^{**}$ + 3.451023	34.67038^{*}	21.43028^{*}
	(-9.45) (-4.40)	(other statistics imply one significant vector)	
6	$LBALEV_t$ - 2.952517 $LATR_t^{**}$ - 1.869143 $LBUSACT_t^{**}$ + 4.408328	33.92810^{*}	23.26891^{*}
	(-9.08) (-4.54) (banking act variable included, other statistics imply one significant vector)		
7	$LBALEV_t$ - 2.592176 $LATR_t^{**}$ - 2.103709 $LBUSACT_t^{**}$ + 5.219554	41.77930^{**}	27.09670^{**}
	(-7.39) (-4.71) (banking & stock variables included, other statistics imply one significant vector)		
8	$LBALEV_t$ - 3.641904 $LATR_t^{**}$ - 1.172154 $LBUSACT_t^{+}$ + 3.935691 $LCDRAT_t^{**}$ + 6.797444	61.49279^{**}	36.11129^{**}
	(-5.69) (-1.75) (2.80) (banking & stock variables included, statistics imply 1 sign. vector)		

t-statistics in parentheses. $^{*}(^{**})$ significant at the 5- (1-) percent level. Trace and MaxEigen statistics were strongest when estimating the cointegrating vectors using 4 lags for vectors 2, 3, 4, 6, 7, and 8; while using 5 lags for vectors 1 and 5. Flipping the signs in the cointegrating vectors yields the estimated equilibrium.

Table 8: Quarterly Models of the Change in the Real Level of Bankers Acceptances (Sample: 1925:q1-39:q4)

	Using Investment Grade Corporate-Treasury Yield Spread				*Using A-Rated Corporate-Treasury Yield Spread*			
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
constant	-0.0211	-0.0159	-0.0318^{+}	-0.0318*	0.0046	-0.0159	-0.0304^{+}	-0.0321*
	(-0.89)	(-0.87)	(-1.93)	(-3.51)	(0.20)	(-0.87)	(-1.85)	(-2.07)
EC_{t-1}	-0.2900**	-0.2136*	-0.1817**	-0.1140**	-0.3115**	-0.2281**	-0.1921**	-0.1589**
	(-2.98)	(-3.34)	(-4.00)	(-4.50)	(-2.98)	(-3.38)	(-3.56)	(-4.36)
$\Delta LSPREAD_{t-1}$	-0.6126^{+}	-0.4217	-0.4123^{+}	-0.0257	06444^{+}	-0.4761^{+}	-0.1313	-0.7123**
	(-1.70)	(-1.59)	(-1.89)	(-1.23)	(1.81)	(-1.81)	(-0.50)	(-2.99)
$\Delta LBALEV_{t-1}$	0.2797^{+}	0.2598*	0.1554	0.0522	0.2797**	0.2696*	0.1635	0.0994
	(1.82)	(2.12)	(1.42)	(0.50)	(1.82)	(2.18)	(1.12)	(0.94)
$\Delta LBUSACT_{t-1}$	-0.8243	-0.9185*	-0.9875**	-1.1539**	-0.8274	-0.9478*	1.9107**	-1.1101**
	(-1.40)	(-2.22)	(-2.77)	(3.20)	(-1.51)	(-2.40)	(3.06)	(-3.20)
$\Delta LCDRAT_{t-1}$				-0.0964				0.1222
				(-0.21)				(0.25)
$BACTDD_{t}$		-0.4307**	-0.4101**	-0.4353**		-0.4116**	-0.3890**	-0.4171**
		(-4.23)	(-4.62)	(-5.09)		(-4.09)	(-4.40)	(-4.88)
$BANKHOLID_{t}$			0.4003**	0.6571**			0.3595*	0.6019**
			(2.71)	(3.66)			(2.35)	(3.21)
STCRASH			0.3130**	0.3004**			0.3030*	0.3025**
			(2.65)	(2.67)			(2.54)	(2.65)
$\bar{R}^2$	.070	.373	.525	.585	.074	.369	.517	.573
VECLM(1)	12.72	5.92	3.92	13.14	10.48	6.98	5.94	9.90
VECLM(12)	17.61*	25.57**	13.16	15.50	13.83	17.98*	8.96	12.51

t-statistics in parentheses. *(**) denotes significant at the 5- (1-) percent level. EC terms from same-numbered vectors in Table 7. t-2 through t-4 lagged first difference coefficients are not reported to conserve space.

Table 9: Monthly Models of the Change in the Commercial Paper-Bank Loan Mix

(Sample periods: Jan. 2001 – May 2009 or Jan. 2001 – October 2008)

	Using Linear Bond Yield Spreads (ΔBAATR)				*Using NonLinear Yield Spreads (ΔBAATR*|ΔBAATR|)*			
Sample End:	**2008:10**	**2009:05**	**2009:05**	**2009:05**	**2008:10**	**2009:05**	**2009:05**	**2009:05**
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
constant	-1.1255	-1.5667	-0.5203	-2.1376	-1.0146	-1.1280	-0.4244	-2.2037
	(-0.61)	(-0.67)	(-0.28)	(-1.03)	(-0.55)	(-0.49)	(-0.23)	(-1.06)
$\Delta rspread_{t-1}$	-0.6095*	-0.0622	-0.7325*	-0.5986^{+}	-2.9987*	0.3867	-3.6000**	-2.8739*
	(-2.06)	(-0.25)	(-2.20)	(-1.78)	(-2.57)	(1.45)	(2.85)	(-2.22)
$(FP*\Delta rspread)_{t-1}$			1.4390**	1.6392**			4.3225**	3.6137**
			(3.15)	(3.65)			(3.34)	(2.77)
$LINVISM_t$	0.2918	0.4068	0.1343	0.5566	0.2661	0.2914	0.1131	0.5771
	(0.60)	(0.66)	(0.27)	(1.02)	(0.56)	(0.48)	(0.24)	(1.06)
$Aug14_t$	-3.3805**	-3.4061**	-3.6977**	-3.3751**	-3.4182**	-3.4112**	-3.7300**	-3.4110**
	(-8.83)	(-6.38)	(-7.43)	(-7.24)	(-8.73)	(-6.46)	(-7.75)	(-7.33)
$\Delta Lehman_t$	-2.6170**	-2.7000**	-2.4872**	-2.6080**	-2.6614**	-2.6836**	-2.4712**	-2.6504**
	(-6.78)	(-5.00)	(-4.87)	(-5.58)	(-6.79)	(-5.08)	(-5.04)	(-5.69)
$PostLehman_t$	-1.1576**	-0.5734*	-0.7794**	-1.1117**	-0.9969**	-0.7347**	-0.8346**	-1.0329**
	(-2.82)	(-2.31)	(-3.76)	(-2.82)	(-3.38)	(-2.91)	(-4.15)	(-4.45)
$\Delta TALF_{t-1}$				2.7173**				2.3318**
				(4.93)				(4.51)
$\bar{R}^2$	.588	.420	.472	.557	.599	.433	.499	.559
ρ(1)			-0.2685*				-0.2940**	
S.E.	0.3944	0.5303	0.5088	0.4634	0.3892	0.5245	0.4988	0.4625
LM(1)	0.00	1.78	1.70	1.00	0.03	3.13^{+}	1.49	0.74
LM(2)	1.04	2.97	7.73*	1.79	0.52	3.65	5.59^{+}	1.04
Q(4)	5.54	11.80*	7.70^{+}	7.13	4.73	14.50*	6.62	5.01
Q(12)	14.80	18.21	13.06	12.13	13.19	19.89^{+}	11.32	9.48

Δrspread denotes change in rate spread listed at top of column. t-statistics in parentheses. *($^{**,+}$) significant at the 5- (1-, 10-) percent level.