Institutional Innovation and the Creation of Liquid Financial Markets: The Case of Bankers’ Acceptances, 1914–1934

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With passage of the Federal Reserve Act in 1913, the institutional structure necessary to support an American market for bankers’ acceptances was created. This article examines the development of the secondary market for bankers’ acceptances during its first 20 years. It provides evidence that discount market liquidity increased dramatically during the 1920s and helped the dollar acceptance challenge the sterling bill as an important source of trade finance around the world. The Federal Reserve Banks played a key role by reducing the risk borne by private dealers and propelling the market to a high-liquidity equilibrium.

The importance of the money market for the nation does not lie solely in its size. It lies rather in its liquidity, in its capacity for furnishing cash to any part of the country at a few hours’ notice.

W. Randolph Burgess

It is generally agreed that the development of liquid financial markets contributed to economic growth over the past several centuries. For example, John Hicks has argued that the creation of liquid capital markets helped ignite the industrial revolution in eighteenth-century England by making savers more willing to hold the bonds and stocks used to finance capital accumulation. Similarly, Lance Davis and Robert Gallman contend that the growth paths of frontier countries prior to World War I (i.e., Argentina, Australia, Canada, and the United States) were influenced by the pace at which liquidity-enhancing institutions were imported from abroad and adapted to the local environment.

One such institution was the set of rules that governed the market for bankers’ bills (or bankers’ acceptances as they became known in the United States) used to finance trade. By the start of the twentieth century, bankers’ bills created in London were so popular that they financed a large share of...
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international trade that did not directly involve Britain. The success of the “sterling bill” rested on three pillars. First, accepting banks in London provided an imprimatur of quality that reduced uncertainty discounts and made bills attractive to investors. Second, dealers in the discount market increased the value of bills by making them liquid. In fact, without a liquid secondary market, “even the guarantee of the clearing banks would probably have been insufficient to induce such widespread use of sterling bills.” Finally, the Bank of England supported the discount market by buying bills from dealers in times of stress.

The United States did not have a market for bankers’ acceptances at the dawn of the twentieth century because national banks were legally prohibited from accepting bills and there was no central bank to support a discount market. This all changed with passage of the Federal Reserve Act in 1913, which changed the institutional structure by permitting national banks to create acceptances and giving the newly formed reserve banks the power to purchase these bills.

The framers of the act were motivated by three goals. First, they wanted to build a market for bankers’ acceptances so that New York could become a financial center on a par with London, Amsterdam, Paris, and Berlin. Second, they believed that dollar acceptances would stimulate foreign trade by lowering the cost of trade finance. With dollar acceptances, American firms could avoid the high commission fees and foreign-exchange risk absorbed when they used sterling bills.

5 Bankers’ bills were created when, for example, a British importer would “draw” a bill and have it “accepted” by a London bank. The exporter willingly received the bill as payment because he knew it could be quickly sold, through the intermediation of the London discount market, to investors. When the importer received payment for the goods a few months later, he paid off the investor. Originally, bankers’ bills were used to finance inland commerce in Britain. However, by the end of the nineteenth century the expansion of branch banking networks made it more profitable for banks to provide direct accommodation, drawing on deposits of branches in surplus regions and using the funds to lend through branches in deficit regions. The absence of these banking networks at an international level meant that bankers’ bills remained a viable source of foreign trade finance. See Davis and Gallman, Evolving Financial Markets, pp. 127–29.

6 Davis and Gallman, Evolving Financial Markets, p. 130.

7 This is not to imply that domestic sources of trade finance did not exist. Trade acceptances, like bankers’ acceptances, were used to finance specific commercial transactions, were self-liquidating (funds that paid for the goods were used to repay the credit), and possessed the endorsement of a second party (i.e., hence the name “two-name” paper). Trade acceptances rose in popularity during the 1830s when the Bank of the United States, under the direction of Nicholas Biddle, an admirer of the British banking system, purchased large amounts of trade acceptances for its own account and encouraged “other banks to make such purchases by maintaining a market for this type of paper.” (Myers, New York Money Market, pp. 50–51). However, the market withered with the demise of the Bank of the United States. Instead, the promissory note, which was based on the personal security of the maker and backed by collateral often unrelated to the underlying transaction, enjoyed more widespread use during the nineteenth century. According to Margaret Myers, failure of the 1863 National Bank Act “to recognize the acceptance was one of the factors in the continued use of promissory notes” (p. 424). After the Civil War the promissory note evolved into one-name commercial paper. For foreign trade, Americans relied heavily on banker’s bills created in London.
Finally, with the turmoil of 1907 fresh in their memories the framers believed that a liquid market for dollar acceptances would stabilize American money markets and act as a “prophylactic against panics.” The American money market was subject to “most violent oscillations” because it was dominated by commercial paper and call loans, with call rates driven by erratic bursts in stock market speculation. In contrast, European money markets were less volatile because bankers’ bills took center stage and bill rates were driven by stable movements in trade. Also, the free flow of funds between the “great discount markets” in London, Paris, Berlin, and Amsterdam helped stabilize rates. For the United States, the absence of a liquid market prevented this stability-enhancing arbitrage from taking place:

New York is in a class by itself. Without bank-accepted bills it can have no discount market. Without a discount market funds cannot be moved to it as they do between the financial centers of Europe, because there are no bank-accepted bills in which foreign banks can invest. Our commercial paper is not suitable. Foreign banks will not purchase it because they are not acquainted with or sure of the rating of miscellaneous mercantile establishments and because such paper could not be readily disposed of in case it became necessary or profitable to withdraw funds from New York for remittance elsewhere.

The Federal Reserve Act made commercial paper more liquid by allowing member banks to rediscount it at the reserve banks. However, foreign and nonmember domestic banks did not have this privilege, and a liquid, two-way, secondary market for commercial paper did not develop until the 1980s. In contrast, the discount market for bankers’ acceptances came into being after 1913.

This article examines the development of the American discount market following passage of the Federal Reserve Act. We address three questions. First, how did liquidity in the discount market—measured by bid–ask spreads and other metrics—evolve during its first 20 years? Second, what changes in the economic and institutional environment influenced the willingness of dealers to carry inventories and bear the risk necessary to “make the market” in acceptances? Finally, did development of a liquid discount market contribute to the growth of the acceptance business? In theory, enhanced liquidity should have made acceptances more attractive to investors, thus lowering market interest rates, and inducing firms to substitute away from sterling bills and other sources of trade finance, toward dollar acceptances.

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9 This view was expressed in a 1910 National Monetary Commission report. See Jacobs, “Bank Acceptances,” p. 6.
12 See Marcia Stigum, Money Market, p. 1051.
Although the early experience of the American discount market has been well chronicled, quantitative analysis has not been brought to bear on these questions. This article fills this void in the literature. Moreover, we shed light on a puzzling aspect of U.S. financial market history: the relatively slow development of money market liquidity. We argue that reserve bank support was crucial for the nascent discount market given the potential for multiple equilibria in secondary markets. By serving as the market maker of last resort, the reserve banks reduced the risk borne by private dealers and helped propel the market to a high-liquidity equilibrium by the late 1920s. As liquidity increased, investor demand rose and the cost of acceptance financing declined.

OVERVIEW OF MARKET GROWTH

Figure 1 shows the volume of bankers’ acceptances outstanding at the end of each month from 1917 to 1933. Starting in 1925, acceptances were classified according to the activity they financed. These included U.S. exports, U.S. imports, goods shipped between and stored in foreign countries, shipment of goods within the United States, storage of readily marketable staples in U.S. warehouses, and the creation of dollar exchange. Most of the variation in bills outstanding between 1925 and 1933 resulted from fluctuations in the first three categories (labeled “Exports,” “Imports,” and “Foreign Shipment and Storage” in Figure 1). Acceptances issued to finance the other three activities (summed together and labeled “Other” in Figure 1) made up a small share of the total and varied much less over the sample.

Although acceptances were created in each Federal Reserve District by 1925, banks in New York dominated the business. In 1925, for example, 75 percent of all acceptances were created by New York banks. In 1930 this number stood at 74 percent. Boston and Chicago banks were the next biggest acceptors with, respectively, 9 and 5 percent of the market in 1930. The discount market was even more regionally concentrated, with New York dealers holding 92 percent of all bills held in inventory by dealers in 1930. In fact, reserve banks in four districts (Atlanta, Kansas City, Minneapolis, and St. Louis) reported no dealer activity in 1930.

Several forces caused the volume of acceptances outstanding to fluctuate over time. First, there was a pronounced seasonal cycle related to agricul-

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13 For an excellent early history, see Balabanis, *American Discount Market*.
14 For a discussion of this point, see Davis and Gallman, *Evolving Financial Markets*, p. 806.
15 Prior to 1925, values were only available in December (1917 to 1919) or April and December (1920 to 1924). Monthly values during these years were interpolated using December and April observations and knowledge of the seasonal variation in acceptances obtained by regressing outstanding volumes on monthly dummies over the 1925–1933 sample period. See the Appendix for a discussion of all data sources.
These restrictions were motivated by the belief that a period of learning was needed before unfeathered markets could be trusted: “The freedom of action and permissive exercise of good judgment—without set rules and regulations—which had always been a privilege of the London bankers, was not considered prudent in the United States, at least not until the thirty thousand banks in and outside the Federal Reserve System had mastered the technique of bankers’ acceptance credits.”


Notes: The figure shows the volume of bankers’ acceptances created to finance U.S. exports (“Exports”), U.S. imports (“Imports”), goods shipped between and stored in foreign countries (“Foreign Shipment and Storage”), and the total of goods shipped within the United States, goods stored in U.S. warehouses, and dollar exchange (“Other”).

Sources: See the Data Appendix.

ture, which is visible in Figure 1. Typically, the volume of acceptances outstanding rose beginning in July and August when crop shipments increased and began falling in January as they subsided. Second, cyclical changes in international trade and economic activity influenced acceptance volume. For instance, acceptance volumes increased when U.S. exports and imports rose between 1917 and 1919 and fell when trade flows contracted between 1921–1922 and 1930–1933.

Third, the rules of the game that governed the market influenced its growth. At the start, tight restrictions determined what activities could be financed with acceptances, which acceptances were eligible for purchase by reserve banks, and the types of institutions that could invest in them.17 How-
ever, many of these rules were liberalized over time. In addition, reserve bank policy toward the discount market, expressed by rates at which they bought acceptances from dealers, influenced the market’s liquidity and thus the willingness of investors to purchase acceptances. These institutional forces are discussed in greater detail in what follows.

Fourth, the market grew as borrowers, investors, and accepting banks learned more about this new instrument. The American Acceptance Council, an industry trade group formed in 1918, played a key role in the diffusion of this financial innovation through publication of the monthly Acceptance Bulletin. By embarking on an educational campaign, the council provided an important public good to the market. In addition, they appealed to a sense of duty to stimulate investor demand:

There can be no question of the duty of the big banks in the large centers... nevertheless, their [smaller banks’] duty as well as their profit lies in the direction of carrying as a secondary reserve acceptances of American banks.

By using moral suasion, they attempted to make private decisions about market entry reflect the social benefits associated with a large and liquid market.

Finally, changes in market structure influenced the relative costs of financing trade with dollar acceptances. At the outset, American accepting banks charged commissions of about 1.5 percent per annum for domestic credits. By the early 1930s, banks had lowered these commissions to about 1.125 percent. For foreign bills, commissions were even lower and fell from about 1 percent in 1925 to below three-fourths of 1 percent by the early 1930s. The fall in commissions was attributed to “competition between accepting banks for business and to some extent by the reduction of acceptance commissions charged by London banks in competition for international acceptance business.”

A more detailed analysis of these forces helps illustrate their impact on the acceptance market. As Figure 1 shows, acceptances outstanding expanded rapidly in the first five years, reaching one billion dollars in December 1919. Institutional liberalization was key during this period. By 1917 the Federal Reserve Act had been amended several times so that banks were allowed to create acceptances for activities other than U.S. imports and exports. In 1919 member banks were allowed to accept up to 100 percent of

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18 The council consisted primarily of bankers with a vested interest in seeing the acceptance business grow. The first chairman of the council’s Executive Committee was Paul Warburg who served as the Federal Reserve Board second-ranking member until 1918 and was described as “the single most powerful force in shaping the direction of the American Banking reform.” West, Banking Reform, p. 54. Quoted in Roberts, “Quis Custodiet,” p. 589.
20 Thus if the bid rate was, for example, 1 and 3/8 percent, the cost of acceptance financing was 2 and 7/8 percent.
their capital rather than 50 percent as originally mandated. Finally, rules about which acceptances were eligible for purchase by reserve banks were altered frequently during this period.

World War I contributed to the growth of the acceptance business in several ways. First, the war stimulated American trade—raw materials were imported into the United States to produce food, clothing, and munitions that were then exported to Europe. Second, wartime deficits in the United States were partially financed by money creation, and this caused the price level to double between 1916 and 1920. These two outcomes caused the dollar value of American imports and exports to rise, which led to an increase in the supply of acceptances. Finally, the pound sterling exchange rate became unstable during the war when Britain abandoned the gold standard and heavy government borrowing caused interest rates to rise in London. These disruptions to the British financial system benefited dollar acceptances by increasing the incentive for firms to borrow dollars in New York rather than sterling in London.

Acceptances outstanding stopped growing in 1920 and fell precipitously in 1921 and 1922. A sharp decline in U.S. trade and deflationary forces played an important role in this collapse. Once trade began to recover, so did the volume of acceptances. However, the explosive growth in acceptances outstanding between 1927 and 1929 cannot be attributed to U.S. trade growth: whereas American trade was unchanged between 1927 and 1929, the volume of acceptances used to finance U.S. exports and imports almost doubled. This suggests that Americans were substituting away from other sources of trade finance to dollar acceptances. In addition, as the disaggregated data in Figure 1 show, there was dramatic growth in dollar acceptances used to finance goods shipped between foreign countries or stored abroad. By the end of 1930 there were $561,000,000 in these “foreign” acceptances, more than one-third of total acceptances outstanding. Thus foreign firms were also utilizing dollar acceptances more intensively.

Several factors contributed to this substitution toward dollar acceptances. First, rules governing the market were further liberalized. In 1926 legislation was passed in New York that made it legal for life insurance companies to buy acceptances. In 1927 new rules allowed for acceptances to be drawn not only for the exportation and importation of goods, but also for the sale and distribution of those goods. Second, smaller commissions charged by American banks, stability of the dollar, and lower American interest rates all made dollar acceptances more attractive than European bills. Finally, we provide evidence that enhanced liquidity of the discount market contributed to the substitution toward dollar acceptances.

The decline in acceptances outstanding that began in 1930 has been attributed to several factors. First, there was a precipitous decline in the physical volume of trade caused by the global depression, rising trade barriers, and currency instability. Second, price declines for cotton, wheat, and rubber—commodities whose shipment was financed largely by acceptances—were particularly severe. Third, American banks became less willing to accept bills for foreign customers following the European banking crisis and the “Standstill Agreement” of 1931, which effectively lengthened the maturity of acceptances and exposed American banks to greater default risk. As Figure 1 shows, acceptances created for shipment between and storage in foreign countries fell sharply in 1931. Finally, the emergence of the federal government as a source of trade finance—largely through the Commodity Credit Corporation—allegedly hurt the American acceptance business beginning in 1931.

THE DISCOUNT MARKET AND THE “DEALER PROBLEM”

The source of liquidity in the discount market was the acceptance dealer (or discount house), who served as an intermediary between sellers and buyers by buying and selling acceptances for his own account. To meet investor needs, dealers carried large portfolios of acceptances—bills differing in name, maturity, and denomination. By adjusting their inventories, dealers mitigated temporal imbalances in supply and demand, and allowed market participants to quickly buy and sell large quantities of acceptances, at low transaction costs and without disturbing market prices. Dealers were compensated for supplying the service of “immediacy” by the spreads they earned between their ask (selling) and bid (buying) prices.

According to the market microstructure literature, the price of immediacy (the bid–ask spread) is determined by the costs of carrying inventories. These include not only administrative costs, but also “the extent of prevailing risks and the ability of the dealer to assume these risks.” The key point is that dealers supply immediacy by holding large, undiversified portfolios that expose them to greater risk. When dealers are unwilling to bear these risks, the secondary market is not viable.

In many markets, the principal risk facing dealers is price risk. Although the ask price at time $t$ always exceeds the bid price at time $t$, there is no

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24 Although the dealer did not usually endorse bills for investors, their expertise in the evaluation of acceptances made them more attractive to investors. When requested, dealers would endorse bills and were compensated by a rate that was 0.125 percentage points below the market ask rate. Balabanis, *American Discount Market*, p. 24.
25 Demsetz, “Cost.”
26 O’Hara, *Market Microstructure Theory*.
27 Tinic, “Economics,” p. 82.
28 Stoll, “Theory.”
assurance that the ask price at time $t + 1$, when dealers actually sell a security, will exceed the bid price at time $t$. When prices become more volatile, dealers must be compensated for bearing this risk by earning a wider bid–ask spread.

When asymmetric information is present, dealers also face the risk of trading with investors who have superior information. Also, these informed investors have the option to trade whereas the dealer must continually quote prices to buy and sell. In this setting, the spread set by a dealer “reflects a balancing of losses to the informed with gains from the uninformed.”29 As Glosten and Milgrom have shown, a “lemons problem” can cause the market to collapse.30 If there are too many informed traders, the dealer has to set a large spread. Large spreads preclude trades from taking place, and thus less information is embodied in market prices.

Several other factors influence the risk borne by dealers and the price they charge for supplying immediacy. The more actively a security trades, the more likely it is that buy and sell orders balance each day. When the market self-equalizes in this way, dealer inventory participation—the size of his holdings and the length of time he carries them—is less necessary to maintain market depth and price continuity. In this setting, dealers hold bills for shorter periods and are exposed to less price risk.31 Economies of scale also play a role: increases in balanced transaction volume raise profits (for a given spread) and this induces market entry that drives the spread down.32 However, increases in one-way buying or selling raise the risk that dealer inventories will depart from optimal levels and causes them to increase the price of immediacy. Dealer capitalization can also influence the price of immediacy. Highly capitalized dealers with large borrowing capacities are able to increase inventory participation and supply greater immediacy. When dealers are less able to borrow, they increase spreads to avoid sizable participation. Increases in dealer risk aversion—as might occur during a financial crisis—can also lead to higher spreads.

During the early years of the discount market, dealers were highly levered and financed inventories with funds borrowed in the call market against acceptance collateral.33 The goal was to borrow money short-term to facilitate daily purchases of acceptances that were quickly sold.34 Given high

30 Glosten and Milgrom, “Bid, Ask, and Transaction Prices.”
31 Tinic, “Economics.”
32 Shen, “Bid–Ask Spreads.”
33 In 1921 six dealers in the New York discount market reported that, on average, 84 percent of their portfolio was obtained with borrowed funds. Three dealers borrowed 100 percent of the funds used to carry inventories, whereas one large dealer relied primarily on its own capital. Board of Governors, “Dealing in Acceptances,” p. 1169.
34 The rate was about 50 basis points below the call loan renewal rate. Thralls, “American Discount Market.”
leverage, dealer profit and risk levels were sensitive to call rate fluctuations. Contemporary observers recognized that dealer willingness to bear risk determined discount market viability:

It is obvious, therefore, that a very slight change in rates may bring big losses to the dealer, and if, when the demand for bills is light, he is carrying a heavy portfolio on money borrowed at rates higher than the average yield on his bills, his continuous daily loss may easily become so large as to force him to liquidate his bills at whatever they will bring and retire from the business. In any case, rapid turnover is essential if borrowed funds are to be used profitably.35

The relationship between call rate volatility and liquidity will be examined in greater detail in what follows.

One puzzling aspect of U.S. financial market history has been the slow development of a liquid, two-way secondary market for commercial paper.36 Although commercial paper houses bought paper for their own account from issuers before placing it with investors, they were generally not willing to buy it back from investors even after passage of the Federal Reserve Act.37 In fact, a liquid, two-way secondary market for commercial paper did not develop until the 1980s. In contrast, the secondary market for banker’s acceptances developed rapidly after the Federal Reserve Act.

One explanation for this outcome is that asymmetric information problems inhibited development of a secondary market for commercial paper. That is, the heterogeneous credit quality of “one-name” commercial paper raised holding costs to a point where it was not profitable for dealers to supply immediacy services to investors. Because acceptances were guaranteed by accepting banks, they were less risky and dealers needed to hold a limited selection to diversify their own risk and satisfy investor needs. Thus the discount market was more viable.38

Finally, it is well known that feedback effects can produce multiple equilibria in secondary markets. When agents expect a market to become more liquid, they are more willing to participate in it. This increases turnover, which lowers dealer risk and increases their willingness to make the market liquid. Thus, expectations become self-fulfilling and the market converges to a high-liquidity equilibrium. Of course, these feedback effects can work in the opposite direction leading to a low-liquidity equilibrium characterized by little turnover and volatile prices. From this perspective, the potential for a coordi-

36 In a two-way market, dealers are willing to buy back securities from investors. Because dealers are not willing to buy securities from investors in one-way markets, these markets are less liquid from the investor’s perspective.
37 See Burgess, Reserve Banks, p. 169.
38 For an excellent discussion of the link between variations in credit quality, holding costs, and spreads, see Melton and Mahr, “Bankers’ Acceptances.”
nation failure exists because “individual investors may have no incentive to enter the market although as a group they would benefit from entry.”

This insight helps explain the efforts of the American Acceptance Council discussed in the previous section: they used moral suasion to solve the coordination problem and move the discount market to a high-liquidity equilibrium. It also helps explain Federal Reserve Bank efforts to support the market as will be discussed next.

**FEDERAL RESERVE BANK SUPPORT OF THE DISCOUNT MARKET**

The Federal Reserve Act of 1913 authorized the Federal Reserve Banks to buy and sell bankers’ acceptances (and other eligible securities) in order to: a) influence general credit conditions in the economy and b) serve the specific needs of the discount market (e.g., relieve oversupply in the market). There was a mutual dependency between the reserve banks and the discount market in the early years; the reserve banks relied on the discount market as a conduit for expressing monetary policy, while the discount market depended on the reserve banks to make it viable.

The reserve banks acquired bankers’ acceptances in one of two ways. First, each of the 12 reserve banks announced its own schedule for acceptance buying rates (different rates for different maturities) and bought eligible bills offered to them from the open market at those rates. In some cases, open market purchases were outright. In others, dealers agreed to repurchase them from the reserve banks within 15 days. Second, reserve banks rediscounted bills directly for member banks, bypassing dealers.

The 1913 act made no provision coordinating the policies of the 12 reserve banks. During the early years of the system, each reserve bank set its own discount and acceptance buying rates and was free to conduct open-market operations as it wished. Although the Federal Reserve Board could approve and disapprove rediscount and acceptance buying rate changes, its role was largely supervisory. In 1923 the Open Market Investment Committee was created to coordinate policymaking among the reserve banks. Nevertheless, “the Federal Reserve Bank of New York largely dictated policy throughout much of the 1920s.”

Figure 2A illustrates the New York Federal Reserve Bank (NYFRB) buying rate for 90-day acceptances and its rediscount rate. Buying rates were usually set below rediscount rates to induce banks to sell bills to the NYFRB through the discount market, rather than bypass the secondary market by rediscounting them at the NYFRB. This was the primary way that the discount market received support from the reserve banks.

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41 Reserve banks also refused to rediscount bills held by accepting banks unless previously accepted by other banks. This was done to encourage order flow through the discount market. Rediscounting
bills with the reserve banks was a less attractive option, not only because rediscount rates were generally higher, but also because banks had a limited rediscount line and did not wish to incur increased indebtedness at the reserve banks. In addition, in determining which bills were eligible for purchase by the reserve banks, the Federal Reserve Board was much more lenient with regard to maturities, character of issuer and nature of the underlying transaction for bills that were bought and sold in the open market rather than rediscounted by reserve banks. See Balabanis, *American Discount Market*, p. 64.

Figure 2B illustrates the NYFRB buying rate and market rate for 90-day bills. A striking feature of the Figure is the strong correlation between the two rates. This correlation led some contemporary observers to conclude that the market rate was “artificial” in the sense that it was primarily determined by the reserve bank rate. However, the NYFRB disputed this claim, arguing that changes in open market rates generally preceded changes in

Notes: The buying rate is the minimum rate offered by the Federal Reserve Bank of New York on prime 90-day bankers’ acceptances purchased from the discount market. The rediscount rate is the rate offered by the Federal Reserve Bank of New York for eligible paper purchased directly from member banks. The market rate is the average of bid and ask rates set by dealers in the discount market for 90-day acceptances.

Sources: See the Data Appendix.
their buying rates.42 When demand for acceptances was “sufficient to clear the market independently of Reserve-bank support, the open market rates rule considerably below the buying rates of the Reserve banks, and the dealers lead rather than follow the Federal Reserve banks in changing their own rates.”43 However, when market rates rose to the reserve bank rate, they were prevented from rising further and the reserve banks accumulated bills. This policy is visible in Figure 3A, which shows bills outstanding and the volume held by all reserve banks. When the supply of acceptances increased rapidly and market rates rose to the fixed reserve bank buying rates—such as in 1919 or during the autumn months when seasonal demand for trade credit rose—bills held by the reserve banks increased as well.

By holding their buying rates relatively steady, the reserve banks stabilized market rates. In addition, this policy allowed the reserve banks to support the discount market by buying eligible bills when supply outstripped demand and dealers were at risk of carrying large inventories at a loss. Contemporary observers clearly recognized the dependence of the discount market on the reserve banks:

> It is true that for several years the dealers were obliged to depend rather heavily on the Reserve Banks. Excessive portfolios had to be carried at a rate below the cost of money in the open market. The offer of the Federal Reserve Banks to carry dealers’ bills under a repurchase agreement was and still is a favorable influence. Without it, portfolios would have, of necessity, been kept at not more than day-to-day requirements.44

In essence, the reserve banks served as the market maker of last resort and promoted the private supply of immediacy by limiting the risk borne by dealers.

Nevertheless, reserve bank support of the discount market varied over time. This can be seen in Figure 3B, which shows the ratio of acceptances held by the reserve banks to the total outstanding. Between 1917 and 1919, reserve banks purchased, on average, over half of the bills outstanding. In contrast, the proportion of bills held by reserve banks fell dramatically in 1920 and 1921. Policymakers believed that discount market support was less necessary because currency instability in Europe had created a bias for dollar acceptances. As a result, “The Reserve banks stopped buying bills primarily with a view of encouraging the use of dollar acceptances. Low preferential rates were no longer quoted on bills, and the buying rates of the System began to reflect more and more firmer or easier credit conditions.”45 This withdrawal of support can be seen in Figure 2A; both the buying and redis-
Bill rates rose in late 1919, reflecting a shift to tighter monetary policy, but buying rates increased more.

Federal Reserve Bank support of the market declined again in 1929. To stem stock market speculation, the Federal Reserve Bank of New York began raising its rediscount and buying rates in 1928. However, the rates were not raised by equal magnitudes and during the first half of 1929 the buying rate was set 50 basis points above the rediscount rate. As a result, bills held by the reserve banks fell sharply.

During the 1930s, market rates fell as decreased trade reduced bill supply and increased investor desire to hold liquid assets raised bill demand. As a
result, market rates fell below reserve bank buying rates and the proportion of bills held by the reserve banks fell. Two exceptions to this trend occurred during the crises of late 1931 and early 1933 when banks in need of cash and foreign investors fearing dollar devaluation dumped acceptances. Market rates and reserve bank holdings rose during both episodes.

Overall, the downward trend seen in Figure 3B suggests that reserve bank support of the discount market diminished over the 1920s and early 1930s. As one observer noted: “The mothering by the Federal Reserve Banks had accomplished its purpose. Investors were taking over the burden of moving the constantly increasing volume of bills and the market prospered accordingly.” Foreign investors, in particular, were heavy buyers of bills by the late 1920s. This can be seen in Figure 3A. This raises an important question: Why were foreign investors so keen to buy bankers’ acceptances? Had discount market liquidity risen to the point where investors believed that dollar acceptances could be “readily disposed of in case it became necessary or profitable to withdraw funds from New York for remittance elsewhere”? If so, what forces caused liquidity to rise? It is to these questions that we now turn.

DISCOUNT MARKET LIQUIDITY

To measure discount market liquidity, we use bid–ask spreads quoted by dealers. Figure 4 shows weekly spreads for 30-, 90-, and 180-day acceptances. Quotes for 30- and 90-day acceptances were first published in the Acceptance Bulletin in August 1917 and spreads varied between 6.25 and 37.5 basis points over the sample, with 12.5 basis points the most common spread. Clearly, the price of liquidity decreased at the short end of the market by the late 1920s. Quotes for 180-day acceptances were first published in late 1923, and spreads fluctuated between 12.5 and 25 basis points.

What factors caused the bid–ask spreads to vary over the sample? To examine this issue, the spreads are regressed on a set of potential determinants. Because the spreads take on a finite number of discrete values that are ordinal in nature (e.g., 6.25, 12.5, 25.0, and 37.5 basis points), it is appropriate to use an ordered probit model. The ordered probit model is built around a latent regression of the form

$$y^* = \beta' X + \epsilon$$

where $y^*$ is an unobservable index of illiquidity, $X$ is a vector of explanatory variables, $\beta$ is a coefficient vector, and $\epsilon$ is a normally distributed error

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47 As quoted earlier in the article, Jacobs, “Bank Acceptances,” p. 9.
48 See Greene, Econometric Analysis, pp. 926–27.
term. We observe \( y = 6.25 \) if \( y^* \leq \delta_1 \), \( y = 12.5 \) if \( \delta_1 < y^* \leq \delta_2 \), \( y = 25.0 \) if \( \delta_2 < y^* \leq \delta_3 \), and \( y = 37.5 \) if \( \delta_3 < y^* \). The \( \delta \)s are unknown threshold parameters that are estimated along with the vector \( \beta \) using maximum likelihood.

The set of explanatory variables includes the conditional standard deviation of weekly bill rate changes (BASD), the conditional standard deviation of changes in the rate charged for call loans (CALLSD), the level of call loan

\[\text{Sources: See the Data Appendix.}\]
rates ($CALL$), and the spread between the NYFRB’s buying rate for acceptances and their rediscount rate ($SUPPORT$). The first two variables are estimated using GARCH(1,1) models and shown in Figure 5B. Interestingly, the acceptance rate was much less volatile than the call rate—a testament to the stabilizing impact of the dealers and the NYFRB on the acceptance market. To the extent that these two variables reflect risk facing dealers and risk affects dealer holding costs, we expect $BASD$ and $CALLSD$ to be positively associated with bid–ask spreads. The level of the call rate, shown in Figure 5A, should exert a positive influence on the spread to the extent that it reflects the cost of financing inventories. Finally, $SUPPORT$ takes on negative values for most of the sample period because the NYFRB set the acceptance buying rate below the rediscount rate to induce banks to sell bills.
### TABLE 1
ORDERED PROBIT MODELS FOR BID–ASK SPREADS

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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>828</td>
<td>828</td>
<td>828</td>
<td>670</td>
<td>619</td>
<td>566</td>
</tr>
<tr>
<td>BASD</td>
<td>0.924 (2.22)**</td>
<td>1.042 (2.66)**</td>
<td>1.316 (2.81)**</td>
<td>0.575 (1.68)*</td>
<td>0.037 (0.15)</td>
<td>0.077 (0.30)</td>
</tr>
<tr>
<td>CALLS</td>
<td>0.178 (1.96)**</td>
<td>0.226 (2.85)**</td>
<td>0.300 (3.32)**</td>
<td>1.023 (8.59)*****</td>
<td>-0.022 (0.52)</td>
<td>1.402 (7.83)*****</td>
</tr>
<tr>
<td>CALL</td>
<td>0.252 (5.27)****</td>
<td>0.095 (2.72)****</td>
<td>0.076 (2.18)**</td>
<td>0.059 (1.54)</td>
<td>-0.022 (0.52)</td>
<td>-0.122 (2.69)****</td>
</tr>
<tr>
<td>SUPPORT</td>
<td>0.292 (2.05)**</td>
<td>0.293 (2.37)**</td>
<td>0.188 (1.43)</td>
<td>0.378 (1.74)*</td>
<td>0.748 (4.16)*****</td>
<td>0.740 (3.61)*****</td>
</tr>
<tr>
<td>Observations</td>
<td>828</td>
<td>828</td>
<td>828</td>
<td>670</td>
<td>619</td>
<td>566</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-405.7</td>
<td>-418.2</td>
<td>-389.8</td>
<td>-221.6</td>
<td>-233.5</td>
<td>-194.8</td>
</tr>
<tr>
<td>Pseudo-$R^2$</td>
<td>0.2</td>
<td>0.11</td>
<td>0.10</td>
<td>0.24</td>
<td>0.18</td>
<td>0.22</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>90.7</td>
<td>74.3</td>
<td>66.2</td>
<td>158.2</td>
<td>117.3</td>
<td>103.4</td>
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<tr>
<td>p-value</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* = significance at the 10 percent level.
** = significance at the 5 percent level.
*** = significance at the 1 percent level.

**Note:** The dependent variable is the spread between bid and ask rates on bankers’ acceptances, $BASD$ is the conditional standard deviation of the change in the acceptance rate, $CALLS$ is the conditional standard deviation of the change in the call loan rate, $CALL$ is the level of the call rate, and $SUPPORT$ is the difference between the buying rate for acceptances and the rediscount rate set by the New York Federal Reserve Bank. Numbers in parentheses are $z$-statistics constructed with consistent estimates of the covariance matrix, pseudo-$R^2$ is a measure of model goodness of fit, and the $\chi^2$ is a chi-squared statistic used for a Wald test of the hypothesis that the coefficients are jointly equal to zero.

to them through the discount market. However, $SUPPORT$ takes on positive values in 1920 and 1929 when the NYFRB set the acceptance buying rate above the rediscount rate and reduced its support of the discount market. If reserve bank support influenced the willingness and ability of dealers to make the market, the coefficient on $SUPPORT$ should be positive.

The results are presented in Table 1. Each column contains coefficient estimates for a different model and numbers in parentheses are $z$-statistics that are distributed asymptotically standard normal under the null hypothesis that the corresponding coefficient is zero. The pseudo-$R^2$ provides a measure of model fit and $\chi^2$ is a chi-squared statistic used for a Wald test of the null hypothesis that the model’s parameters are jointly equal to zero. In each case, the latter hypothesis is rejected at high levels.

For 30-, 60-, and 90-day acceptances, both risk measures have positive coefficients that are significantly different from zero. These findings provide evidence that dealers raised spreads when acceptance and call rate volatility increased. The call rate is also highly significant in these three models, suggesting that dealers raised spreads when the cost of borrowed funds...
Although Dickey-Fuller tests suggest that the series are generally stationary, results were inconclusive for the call rate. When the models were estimated with first-differences in the call rate rather than the level, its coefficient is close to zero.

<table>
<thead>
<tr>
<th>Maturity of Bankers’ Acceptances</th>
<th>30-Day</th>
<th>60-Day</th>
<th>90-Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASD</td>
<td>0.764 (0.70)</td>
<td>3.367 (4.93)***</td>
<td>5.435 (5.42)***</td>
</tr>
<tr>
<td>CALLSD</td>
<td>0.328 (0.52)</td>
<td>0.239 (0.65)</td>
<td>0.330 (0.63)</td>
</tr>
<tr>
<td>CALL</td>
<td>0.240 (2.48)**</td>
<td>0.043 (4.20)***</td>
<td>0.393 (4.20)***</td>
</tr>
<tr>
<td>SUPPORT</td>
<td>0.095 (0.32)</td>
<td>0.408 (1.71)*</td>
<td>0.390 (1.71)*</td>
</tr>
<tr>
<td>Observations</td>
<td>413</td>
<td>413</td>
<td>413</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-242.2</td>
<td>-264.2</td>
<td>-235.2</td>
</tr>
<tr>
<td>Pseudo-( R^2 )</td>
<td>0.15</td>
<td>0.10</td>
<td>0.23</td>
</tr>
<tr>
<td>( \chi^2 )</td>
<td>36.2</td>
<td>63.2</td>
<td>64.5</td>
</tr>
<tr>
<td>p-value</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

\* = significance at the 10 percent level.

\** = significance at the 5 percent level.

\*** = significance at the 1 percent level.

Note: The dependent variable is the spread between bid and ask rates on bankers’ acceptances, \( BASD \) is the conditional standard deviation of the change in the acceptance rate, \( CALLSD \) is the conditional standard deviation of the change in the call loan rate, \( CALL \) is the level of the call rate, and \( SUPPORT \) is the difference between the buying rate for acceptances and the rediscount rate set by the New York Federal Reserve Bank. Numbers in parentheses are \( z \)-statistics constructed with consistent estimates of the covariance matrix, pseudo-\( R^2 \) is a measure of model goodness of fit, and \( \chi^2 \) is a chi-squared statistic used for a Wald test of the hypothesis that the coefficients are jointly equal to zero.

Interestingly, the coefficient on \( SUPPORT \) is positive and significant for 30- and 60-day acceptances. That is, spreads were higher when reserve bank support for the market declined. Although the coefficient on \( SUPPORT \) is positive for the 90-day acceptances, we cannot reject the hypothesis that it is equal to zero at standard significance levels. To the extent that there was more turnover in the 90-day market, the price of liquidity should have been less sensitive to reserve bank support.

For 120-, 150-, and 180-day acceptances, coefficients on acceptance rate risk and the call rate level are generally not different from zero. In contrast, the coefficients on call rate volatility are large and highly significant. One explanation for the dominance of \( CALLSD \) is that dealer risk is not a simple linear function of the standard deviation of rates, but the standard deviation multiplied by expected holding periods. If dealers were forced to hold 180-day acceptances longer and call rates were more variable than acceptance

\(49\) Although Dickey-Fuller tests suggest that the series are generally stationary, results were inconclusive for the call rate. When the models were estimated with first-differences in the call rate rather than the level, its coefficient is close to zero.
rates, the coefficients on \textit{CALLSD} should be larger than those for \textit{BASD}. Importantly, the coefficients on \textit{SUPPORT} are also positive and significant in these three models. The large magnitude of the \textit{SUPPORT} coefficient in the model for 180-day acceptances suggests that the price of liquidity was more sensitive to reserve bank support at the long-end of the market.

Did the willingness and capacity of dealers to bear risk change over time? To address this question, Table 2 reports results from ordered probit models for spreads on 30-, 60- and 90-day acceptances estimated over two sample periods: February 1919 to December 1926 and January 1927 to November 1934. With one exception, the size and significance of the coefficients on call and acceptance rate risk fall by a large amount in the later sample. The lone exception occurs for the 30-day spread, where the coefficient on acceptance risk rises in the later sample. Interestingly, the coefficients on \textit{SUPPORT} fall as well, though they are not highly significant in the early sample period. Overall, the results provide some evidence that the price of liquidity charged by dealers was less sensitive to risk and reserve bank support by the late 1920s.

\textbf{HISTORICAL NARRATIVE}

Although informative, these results do not tell the full story because we are unable to quantify other factors that should also explain variation in spreads. These include: transaction volume, dealer capitalization, asymmetric information premia, and dealer market power that determined their ability to markup spreads above costs. To assess the role of these factors we rely on an historical narrative.

One striking feature of Figure 4 is the variability of the spreads between 1917 and 1923. Spreads on 90-day acceptances were high in 1917, but fell in 1918 and 1919. In fact, spreads remained at 6.25 basis points for much of 1919—levels not reached again until 1934. Spreads on 30-day acceptances show a similar pattern through 1919, but were higher on average—they reached 25.0 basis points on numerous occasions and even touched 37.5 basis points during several weeks in 1917 and 1918. The higher spreads for 30-day acceptances likely reflected the fact that they were locked away in portfolios and not heavily traded. Beginning in late 1919, spreads on both 30- and 90-day acceptances rose once again and fluctuated between 25.0 and 12.5 basis points over the next three years.

What explains this behavior? There is anecdotal evidence that the high spreads in 1917 and 1918 reflected monopoly markups of dealers. The historical record indicates that there were no “specially organized dealers [who understood the] details of making acceptances and the selling arguments . . . or had the expertise for acquiring and disposing of a great volume of bank-
ers’ acceptances daily." It was not until 1918 that the first substantial acceptance corporation, one with adequate capital and strong bank support, appeared on the scene. Thus there was little competition prior to 1919 and dealers were rewarded by high spreads.

Another factor that played a role was turnover. The small volume of acceptances outstanding in 1917 and 1918 meant that turnover was low and dealers were exposed to higher risk. When acceptances outstanding exploded in 1918 and 1919, the volume passing through dealer hands increased. This should have led to higher profits, lower risk exposure, market entry, and lower spreads. In fact, there were six substantial dealers operating in New York by 1921 and some commercial paper houses began dealing in acceptances.

The rising liquidity during 1919 was short-lived, with spreads increasing late in the year. Several factors contributed to the rise. First, the level and volatility of interest rates rose after monetary policy tightened in December 1919. Second, the large decline in trade during the 1920/21 recession caused acceptances outstanding, and thus turnover, to fall sharply. Finally, as discussed previously, dealers were exposed to greater risk when the reserve banks withdrew support from the market in 1920 and 1921.

Despite a rise in foreign trade in 1922, the volume of acceptances outstanding fell to levels not seen since 1917. With low turnover, dealer profits fell and risk exposure increased. Commentary from the financial press suggests that dealers were less willing to bear risk: "[dealers were] adverse to loading up their portfolios, for the slightly easier conditions in the general money market . . . . were not regarded by them as indicating such stability as to warrant them keeping more paper on hand than they were certain of marketing quickly." Between 14 September and 25 October of 1922, acceptance rates rose from 4 to 5 percent and dealers suffered massive losses. This event lead to what one observer described as "the darkest period—for the dealer—in the history of our discount market." By this time, most commercial paper houses had discontinued dealing in bankers’ acceptances because profits were so small.

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51 However, infrastructure for the discount market did not have to be created from scratch; most acceptances dealers also sold commercial paper, bonds, or stocks and were in a position to distribute acceptances to their established clientele through branch offices and correspondents. Board of Governors, “Dealing in Acceptances,” p. 1169.
54 American Acceptance Council, Acceptance Bulletin, June 1924, p. 14. Also, one observer remarked: "For many months past the open market for bank acceptances has virtually been in a state of suspended animation. The daily volume of transactions has fallen to its smallest totals for years and the transactions of the discount houses have not been sufficient to constitute what might properly be termed an open market." See Fry, “Future,” p. 9.
55 Albert Greef, Commercial Paper House, p. 222.
By the second half of 1923 spreads on 30- and 90-day bills returned to normal levels (12.5 basis points) and remained low for the next five years. There is evidence that market depth—anoter dimension of liquidity that measures the volume of acceptances traders can buy and sell at given ask and bid prices—had increased substantially by 1925:

The ease with which $800,000,000 in bankers acceptances are handled by the discount houses and dealers who constitute the “Exchange” in the Acceptance Market, shows conclusively that we now have a real discount market with sufficient capacity to absorb and distribute prime bankers acceptances to a still further increased volume.56

Several fundamental factors helped shift the short-end of the market to a high-liquidity equilibrium during the second half of the 1920s. First, the rapid expansion in acceptances outstanding and associated turnover in the discount market, particularly between 1927 and 1929, raised dealer profits and induced market entry. In fact, by the end of the decade there were more than ten highly capitalized dealers operating in the market.57 Second, interest rates were stable during this period. Third, reserve bank support of the market returned after 1922. Finally, smaller and less known accepting banks exited the market during the 1920s and this increased credit standardization and lowered the risk borne by dealers.58

A different story emerges at the long-end of the market. Despite the fact that the reserve banks were allowed to purchase 180-day acceptances (up from 90 days) beginning in 1921, dealer quotes were not reported in the Acceptance Bulletin until late 1923. The absence of published quotes suggests that the market was not active in the early 1920s. The fact that spreads on 180-day acceptances were high for most of 1924 suggests that the market remained relatively thin in its first few years—just as the market for short-term acceptances had in 1917/18. Spreads on 180-day acceptances eventually fell to 12.5 basis points during 1925 and remained at the level until 1928. Then spreads increased to 25.0 basis points on 14 December 1928 and remained at that level until 30 August 1929. The increase was driven by a rise in the level and volatility of call rates. The former “made it impossible for discount houses to obtain the necessary accommodations on the security of bankers acceptances at a rate that the discount houses could afford to

57 These include: The American Securities Co. of California, The Discount Corporation of New York, The First-National Old-Colony Corporation, The Fort Worth National Company, The National City Co. of Boston, The National City Co. of New York, The National City Co. of California, Salomon Brothers & Hutzler, Shawmut Corporation of Boston, and The Union National Co. of Houston. See Senate Hearings, p. 848.
58 In the early days there were more than 500 accepting banks and the 40 most active created about 50 percent of acceptances. By the end of 1934 there were only 112 accepting banks, and the top 40 accounted for about 95 percent of acceptances.
Moreover, as discussed previously, reserve bank support of the market fell during 1929.

Whereas spreads rose at the long-end of the market for much of 1929, spreads on 30- and 90-day acceptances increased only briefly. This behavior contrasts sharply with that of early 1920 when, in the face of similar increases in call rate volatility, there were persistent increases in spreads at the short-end. This suggests that the short-end of the market had become more resilient and less susceptible to liquidity withdrawal during the 1920s.

59 Comments of a dealer as quoted by Balabanis, American Discount Market, p. 32.
Another way to assess dealers’ willingness to bear risk is to examine their inventory holdings. Figure 6A shows weekly acceptance inventories of New York dealers. Dealer inventories fell to low levels in the first half of 1929, likely reflecting anticipated increases in rate levels and risk. When the level and volatility of rates fell following the stock market crash in October 1929, inventories rose and remained high for much of 1930. Figure 6B shows absolute weekly inventory changes along with a trend line fit to these changes. Larger values are presumed to reflect greater dealer wealth and, therefore, greater willingness to bear risk. The Figure shows an upward sloping trend: the coefficient on time in the regression was 0.23 with a \( t \)-statistic of 4.75. This finding provides further evidence that the willingness of dealers to bear risk increased between 1924 and early 1931.

Despite this progress, liquidity fell during the financial crisis of late 1931:

Very seldom does the bill market come to the standstill condition of the past two weeks . . . Heretofore there has been an ebb and flow of bills that has kept the wheels moving but on this occasion nearly all the bills are in the Federal Reserve Banks and as the Federal Reserve buys from but never sells to the market the total bill volume is therefore locked up to be held to maturity.

Whereas spreads on 180-day acceptances remained at 25.0 basis points between 16 October 1931 and 8 January 1932, spreads on 30- and 90-day acceptances rose to 25.0 basis points for only one week in October. Following the crisis, the reserve banks backed away from the market and their holdings fell to almost zero by mid-1932. The reserve banks accommodated dealers once again during the 1933 crisis. However, spreads at both the short and long end did not rise in 1933. In 1934 spreads on 30- and 90-day acceptances actually fell to 6.25 basis points.

To summarize, dealers were more willing to bear risk and the discount market became more liquid by the 1930s. Several factors explain this development. Increases in trading volume during the 1920s—driven by both economic and institutional changes—played a role by raising dealer profits and inducing market entry. The reserve banks contributed by serving as the market maker of last resort and limiting the risk borne by dealers. Finally, a fewer number of large banks provided acceptances and this also lowered the risk borne by dealers.

THE PRICING OF LIQUIDITY

The discount market for bankers’ acceptances became more liquid during its first 20 years. This is exactly what the architects of the market had hoped for. It was believed that a liquid market would enhance demand for accept-

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Ferderer

tances, particularly among foreign investors, which would drive rates down and induce firms to substitute away from sterling bills and other sources of trade finance, toward dollar acceptance.

This section examines whether changes in liquidity affected the level of acceptance rates. To examine this issue, weekly changes in acceptance rates are regressed on: the level of the acceptance rate lagged one week, \( BA[T-1] \); changes in the Federal Reserve Bank of New York buying rate \( NYFBRD \); changes in the call money rate \( CALLD \); changes in the commercial paper rate \( CPAPERD \); and the bid–ask spread \( SPREAD \). If acceptance rates are mean reverting, the coefficient on the lagged rate should be negative. Both call loans and commercial paper are substitutes for bankers’ acceptances in investors’ portfolios. Thus increases in call and commercial paper rates should put upward pressure on acceptance rates. The reserve bank buying rate should also exert a positive influence on market rates to the extent that it is binding or signals future rate changes. Finally, the spread should have a positive coefficient if liquidity is priced.

The results are reported in Table 3. Coefficients on the lagged acceptance rate are negative and significantly different from zero in all six regressions, indicating that acceptance rates were mean reverting. Coefficients on the call and commercial paper rates are positive, but only significant for the latter. This finding suggests that commercial paper was a closer substitute for bankers’ acceptances in investors’ portfolios. However, the nonsynchronous nature of the data—call rates are weekly averages of daily rates, whereas both acceptance and commercial rates are generally measured on the last day of the week—might also explain this finding. Interestingly, the coefficients suggest that a 100-basis-point change in the commercial paper rate was associated with about a 12-basis-point change in acceptance rates at the short-end and over 23 basis points for 180-day acceptances. Thus long-term acceptances were closer substitutes for commercial paper in investors’ portfolios than were short-term acceptances. As expected, coefficients on the New York Federal Reserve Bank acceptance buying rate were positive and significantly different from zero at high levels of confidence in all six models.

Finally, coefficients on the bid–ask spreads are positive and significantly different from zero in each model, though the coefficients and \( t \)-statistics are larger for shorter-term acceptances. The size of the coefficients in the regressions for 30- and 90-day acceptances indicates that a 12.5-basis-point in-

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62 There is considerable empirical evidence that liquidity affects asset prices, but most of it is based on post–World War II data from bond and stock markets (see Amihud and Mendelson, “Asset Pricing” and “Liquidity”; Kamara, “Liquidity”; and Shen and Starr, “Liquidity”). One exception is recent work by Charles M. Jones who examines liquidity in U.S. equity markets over the twentieth century. He finds that liquidity rose a great deal and was an important determinant of expected returns. Jones, “Century.”
One potential problem with these models is that the influence of the reserve bank buying rate depended on its level relative to the market-clearing rate. When the buying rate is above the market-clearing rate, the former should have little influence. In contrast, buying rates should have a strong impact when they are binding. To capture this effect in the model, the change in the reserve bank buying rate was interacted with a dummy variable that equals one when reserve bank bill holdings increased and zero otherwise. When this variable was used in place of \( NYFBRD \), its coefficient was close to one and the adjusted \( R^2 \)-squared rose by about five percentage points in all six models. Interestingly, the coefficient on the call rate rose and became significant in each model and those on the commercial paper rate and bid–ask spread remained similar to those in Table 3. Overall, these results support the conclusion that liquidity was priced in the acceptance market.

---

**Table 3**

<table>
<thead>
<tr>
<th>Maturity of Bankers’ Acceptances</th>
<th>30-Day</th>
<th>60-Day</th>
<th>90-Day</th>
<th>120-Day</th>
<th>150-Day</th>
<th>180-Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>–0.025</td>
<td>–0.017</td>
<td>–0.025</td>
<td>–0.009</td>
<td>–0.005</td>
<td>–0.008</td>
</tr>
<tr>
<td>( (1.70)^* )</td>
<td>(1.18)</td>
<td>(1.61)</td>
<td>(0.56)</td>
<td>(0.26)</td>
<td>(0.41)</td>
<td></td>
</tr>
<tr>
<td>( BA(T – 1) )</td>
<td>–0.007</td>
<td>–0.006</td>
<td>–0.006</td>
<td>–0.006</td>
<td>–0.009</td>
<td>–0.10</td>
</tr>
<tr>
<td>( (2.75)^{**} )</td>
<td>(2.42)^**</td>
<td>(2.39)^**</td>
<td>(2.02)^**</td>
<td>(2.29)^**</td>
<td>(2.44)^**</td>
<td></td>
</tr>
<tr>
<td>( NYFBRD )</td>
<td>0.671</td>
<td>0.668</td>
<td>0.670</td>
<td>0.735</td>
<td>0.749</td>
<td>0.672</td>
</tr>
<tr>
<td>( (24.62)^{***} )</td>
<td>(23.70)^{***}</td>
<td>(24.03)^{***}</td>
<td>(21.22)^{***}</td>
<td>(19.80)^{***}</td>
<td>(17.46)^{***}</td>
<td></td>
</tr>
<tr>
<td>( CALLD )</td>
<td>0.006</td>
<td>0.008</td>
<td>0.006</td>
<td>0.007</td>
<td>0.011</td>
<td>0.008</td>
</tr>
<tr>
<td>( (1.29) )</td>
<td>(1.55)</td>
<td>(1.14)</td>
<td>(0.82)</td>
<td>(1.189)</td>
<td>(0.84)</td>
<td></td>
</tr>
<tr>
<td>( CPAPERD )</td>
<td>0.125</td>
<td>0.121</td>
<td>0.126</td>
<td>0.152</td>
<td>0.155</td>
<td>0.231</td>
</tr>
<tr>
<td>( (5.07)^{**} )</td>
<td>(4.78)^{**}</td>
<td>(5.03)^{**}</td>
<td>(4.93)^{**}</td>
<td>(4.48)^{**}</td>
<td>(5.88)^{**}</td>
<td></td>
</tr>
<tr>
<td>( SPREAD )</td>
<td>0.356</td>
<td>0.281</td>
<td>0.348</td>
<td>0.217</td>
<td>0.217</td>
<td>0.266</td>
</tr>
<tr>
<td>( (3.07)^{**} )</td>
<td>(2.60)^{**}</td>
<td>(2.89)^{**}</td>
<td>(1.90)^*</td>
<td>(1.73)^*</td>
<td>(2.02)^**</td>
<td></td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.52</td>
<td>0.50</td>
<td>0.51</td>
<td>0.51</td>
<td>0.50</td>
<td>0.50</td>
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<tr>
<td>D-W</td>
<td>2.03</td>
<td>2.03</td>
<td>1.99</td>
<td>1.86</td>
<td>1.96</td>
<td>1.95</td>
</tr>
</tbody>
</table>

* = significance at the 10 percent level.

** = significance at the 5 percent level.

*** = significance at the 1 percent level.

Note: The dependent variable is the weekly change in the market rate on bankers’ acceptances, \( BA(T – 1) \) is the level of the rate lagged one week, \( NYFBRD \) is the weekly change in the Federal Reserve Bank of New York acceptance-buying rate, \( CALLD \) is the weekly change in the call loan rate, \( CPAPERD \) is the weekly change in the commercial paper rate, and \( SPREAD \) is the bid–ask spread on bankers’ acceptances.

crease in the spread leads to about a 4.5-basis-point increase in the acceptance rate. Although this effect is relatively small, it suggests that a sustained increase in the spread over several weeks could lead to a substantial rise in the acceptance rate. The smaller and less significant \( SPREAD \) coefficients for the longer-term acceptances could be due to the different sample periods over which the models are estimated. Overall, the results provide evidence that liquidity was priced.

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63 One potential problem with these models is that the influence of the reserve bank buying rate depended on its level relative to the market-clearing rate. When the buying rate is above the market-clearing rate, the former should have little influence. In contrast, buying rates should have a strong impact when they are binding. To capture this effect in the model, the change in the reserve bank buying rate was interacted with a dummy variable that equals one when reserve bank bill holdings increased and zero otherwise. When this variable was used in place of \( NYFBRD \), its coefficient was close to one and the adjusted \( R^2 \)-squared rose by about five percentage points in all six models. Interestingly, the coefficient on the call rate rose and became significant in each model and those on the commercial paper rate and bid–ask spread remained similar to those in Table 3. Overall, these results support the conclusion that liquidity was priced in the acceptance market.
This article has examined the development of liquidity in the secondary market for bankers’ acceptances after it was given birth by the Federal Reserve Act of 1913. We show that bid–ask spreads in the discount market fell by more than 50 percent and dealers were willing to bear greater risk by the late 1920s. Increased liquidity was driven by several factors. First, it was an endogenous response to rising foreign trade, which increased market turnover and lowered the risk borne by dealers. Second, trading volume and liquidity increased as rules governing the market were liberalized. Third, the Federal Reserve Banks encouraged market entry by stabilizing interest rates and limiting the risk borne by private dealers. Fourth, the American Acceptance Council provided important public goods to the market by disseminating information and using moral suasion to raise demand for acceptances. Finally, a reduction in the number of accepting banks over the 1920s reduced problems associated with asymmetric information.

One way to interpret the efforts of the reserve banks and the American Acceptance Council was that they were attempting to solve a coordination problem and move the market to a high-liquidity equilibrium. With a more liquid discount market, investor demand increased and the cost of financing trade with dollar acceptances fell. European investors, in particular, increased their demand for dollar acceptances, fulfilling the aspirations of the National Monetary Commission. By the start of the Great Depression the dollar acceptance—a financial instrument created almost from scratch a mere 15 years earlier—had risen to seriously challenge the mighty sterling bill, and New York was rapidly becoming the financial center of the world.

Data Appendix

Total Bankers’ Acceptances Outstanding (dollars, NSA, end-of-December from 1917 to 1919; end-of-April and end-of-December from 1920 to 1924; and end-of-month from 1925 to 1933). Source: Facts and Figures Relating to the American Money Market (1931) and various issues of the Acceptance Bulletin.


Bankers’ Acceptances Bought in the Open Market by Federal Reserve Banks (dollars, NSA, Wednesday figures from 1919 to 1933). Source: Banking and Monetary Statistics (1943), table 103.


Bid and ask rates for Bankers’ Acceptances (closing rates reported by dealers on various weekdays from 1917 to 1923; and Fridays from 1924–1934). Source: various issues of the Acceptance Bulletin.

Federal Reserve Bank of New York Rediscount Rate (weekly from 1919–1934). Source:
various issues of the *Acceptance Bulletin*.


### REFERENCES


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