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Navigating Constraints: The Evolution of Federal Reserve Monetary Policy, 1935-59

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The 1950s are often pointed to as a decade in which the Federal Reserve operated a particularly successful monetary policy. The present paper examines the evolution of Federal Reserve monetary policy from the mid-1930s through the 1950s in an effort to understand better the apparent success of policy in the 1950s. Whereas others have debated whether the Fed had a sophisticated understanding of how to implement policy, our focus is on how the constraints on the Fed changed over time. Roosevelt Administration gold policies and New Deal legislation limited the Fed's ability to conduct an independent monetary policy. The Fed was forced to cooperate with the Treasury in the 1930s, and fully ceded monetary policy to Treasury financing requirements during World War II. Nonetheless, the Fed retained a policy tool in the form of reserve requirements, and from the mid-1930s to 1951, changes in required reserve ratios were the primary means by which the Fed responded to expected inflation. The inability of the Fed to maintain a credible commitment to low interest rates in the face of increased government spending and rising inflation led to the Fed-Treasury Accord of March 1951. Following the Accord, the external pressures on the Fed diminished significantly, which enabled the Fed to focus primarily on macroeconomic objectives. We conclude that a successful outcome requires not only a good understanding of how to conduct policy, but also a conducive environment in which to operate.

Keywords: Federal Reserve, monetary policy, reserve requirements, Fed-Treasury Accord, inflation

JEL codes: E52, E58, N12

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1. Introduction

Efforts to understand the "Great Inflation" of the 1960s and 1970s have noted that economic outcomes in the 1950s were good by comparison, perhaps because of well executed monetary policy. Romer and Romer (2002, 2004) argue that the Fed ran a "sophisticated" monetary policy in the 1950s that responded aggressively to expected inflation and contributed to the decade's good economic performance. Other studies have been more critical of the Fed's execution of monetary policy in the 1950s (e.g., Brunner and Meltzer, 1964; Meltzer, 2009); nonetheless, inflation was low and output growth relatively stable during the 1950s in contrast with many other decades of the Fed's first century.

Considerable research has sought to explain the apparent change in monetary policy between the 1950s and mid-1960s when inflation began to take hold.[1] However, rather than comparing monetary policy in the 1950s with later periods, in this paper we begin with the 1950s and look back to the preceding years from the mid-1930s through the 1940s in an effort to better understand the evolution of monetary policy from the failures of the Great Depression to the apparent successes of the 1950s. We argue that an important part of the Fed's success in the 1950s was the absence of political and international pressures that had constrained policy in earlier years.

The Great Depression resulted in major changes to the regulation of the U.S. banking and financial system, the international monetary system, and the structure and authority of the Federal Reserve System. Two acts were especially important for the Federal Reserve. First, the Gold Reserve Act of 1934 authorized the Treasury to intervene in gold and foreign exchange markets, and to negotiate international monetary agreements. The act created the Exchange Stabilization Fund (ESF), capitalized using a $2 billion "profit" on gold transferred from the Fed to the Treasury (as required by the act) and then revalued from $20.67 to $35 per ounce. The ESF rivaled the Fed's government securities portfolio in size. An internal Fed memorandum concluded that the ESF enabled the Treasury Secretary "to assume complete control of general credit conditions and to negate any credit policies that the Federal Reserve might adopt."[2] In the words of Meltzer (2003), the ESF and other powers granted to the Treasury Secretary relegated the Fed to a "backseat" position for monetary policymaking.

The second important piece of legislation was the Banking Act of 1935. That act created the Fed's Board of Governors and reconstituted the FOMC to consist of the seven governors and five Reserve Bank presidents. The act specified that the chairman of the Board of Governors also chair the FOMC.[3] The act reduced the authority and independence of the Reserve Banks, and placed responsibility for monetary policy largely in the hands of politically-appointed officials who, presumably, would be more responsive to the public will as expressed by Congress and the Administration.[4]

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[1] Recent examples include Bordo and Orphanides (2013) and the papers noted therein.
[2] Quoted in Meltzer (2003), p. 457.
[3] The Board of Governors replaced the Federal Reserve Board. However, throughout this paper, we use Board of Governors and Federal Reserve Board interchangeably. The Banking Act of 1935 also changed the title of the chief executive officers of Federal Reserve Banks from governor to president, and assigned the title of governor to all members of the Board of Governors.
[4] Prior to the Banking Act of 1935, the Secretary of the Treasury and Comptroller of the Currency had been members of the Federal Reserve Board (the Treasury Secretary was, in fact, chairman of the Board). The Banking Act of 1935 removed the Treasury Secretary and Comptroller from the Federal Reserve Board. However, given

Although the Fed's autonomy was reduced, particularly with regard to international monetary arrangements and policy, the Fed was also handed some new responsibilities and tools. For example, the Banking Act of 1933 authorized the Fed to set maximum rates that banks could pay on deposits; the Securities Exchange Act of 1934 authorized the Fed to set margin requirements for loans used to purchase or hold securities; and the Banking Act of 1935 permitted the Board of Governors to adjust required reserve ratios imposed on member banks. Thus, a new era began for the Fed in the mid-1930s involving both new constraints on policy, but also new policy instruments.

Our period of study includes World War II. Shortly after Pearl Harbor, the Fed announced that it would cooperate fully with the Treasury Department to finance the war effort. The Fed used open market operations to peg the yields on short- and medium-term Treasury securities and to enforce a 2.5 percent ceiling on the long-term government bond yield. The yields on shorter-term securities were permitted to rise somewhat in the late 1940s, but the ceiling on the long-bond yield remained in place until the Fed-Treasury Accord of March 1951. The war and its effects severely constrained the Fed's ability to direct monetary policy toward controlling inflation or stabilizing output.

By contrast, in the 1950s, the Fed was relatively unconstrained by political pressures or international monetary forces. Unlike the 1930s, when large gold inflows swamped the Fed's ability to use open market operations or increases in its discount rate to absorb banking system reserves, or the 1940s, when monetary policy was focused on maintaining low interest rates for the Treasury, in the 1950s, the Fed was largely free to pursue macroeconomic policy objectives. Freed from political and international constraints, the Fed responded more aggressively to expected inflation and fluctuations in economic activity in the 1950s than it had during 1935-50.

This paper documents the evolution of Federal Reserve monetary policy from the mid-1930s through the 1950s. We begin by showing empirically that the response of monetary policy to macroeconomic variables in the 1950s did not hold in the 1930s or 1940s. Although quite concerned about inflation and output, prior to the Fed-Treasury Accord of 1951, political constraints and (in the 1930s) international capital movements seriously limited the Fed's ability to respond to macroeconomic conditions, especially with open market operations and discount rate changes. Drawing on both published reports and meeting transcripts, we then describe how Fed officials sought to achieve macroeconomic objectives using its newly acquired tools—especially changes in reserve requirements and credit controls—when its traditional monetary policy tools were either ineffective or dedicated to alternative uses by political realities.

We focus much of our narrative description on the Fed's use of reserve requirements. Changes in required reserve ratios were an important component of the Fed's policy strategy throughout the 1930s-50s. Fed officials did not change reserve requirements lightly. They recognized that changes could have large impacts on financial institutions and officials believed that changing requirements too often would be destabilizing. Each recommended change was discussed and debated at length, and those discussions are revealing about the policy views of Fed officials at the time.

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other New Deal changes, the ability of the Treasury Secretary to pressure the Fed likely became greater after 1933 than it had been before.

The paper is organized as follows: Section 2 provides an overview of how monetary policy responded to macroeconomic conditions over the entire period from 1935 to 1959, and in particular presents evidence that the Fed changed required reserve ratios in response to economic developments. We then consider the 1930s, 1940s, and 1950s separately and, using Taylor-style regressions, estimate the responsiveness of policy to inflation and output gaps during each period; we find that policy was most responsive during the 1950s. Section 3 delves into the narrative evidence to understand why the policy reaction functions differ in our three periods. We document how Fed policymakers used their tools to try to balance domestic economic performance objectives with objectives resulting from political or economic pressures. Section 4 offers conclusions. Overall we conclude that, during the 1950s, for the first time since the 1920s, neither international forces nor political pressures constrained the Fed. The resulting environment helped produce one of the most successful eras of the Fed's first 100 years.

2. An Empirical Description of Monetary Policy, 1935-59

Like Romer and Romer (2002), we begin by examining the responsiveness of monetary policy to macroeconomic conditions, specifically expected inflation and the output gap. Figures 1 and 2, respectively, plot the inflation rate (year-over-year percentage change in the CPI) and the output gap (calculated as the deviation of the log of an index of industrial production, IP, from trend).[5] Both figures also identify dates between 1935 and 1959 when the Fed changed required reserve ratios imposed on member banks (solid vertical lines identify dates when increases in reserve requirements took effect and dashed vertical lines indicate dates when reductions took effect).[6] Table 1 lists the required reserve ratios specified by the Federal Reserve Act and all subsequent changes in the ratios through 1959. Required reserve ratios were generally higher for central reserve city banks, i.e., member banks in New York City and Chicago, than for banks in other reserve cities, which in turn were higher than those for country banks. Ratios were also higher for demand deposits than for time deposits.[7]

Changes in reserve requirements were a prominent component of the Fed's monetary policy strategy from the mid-1930s through the 1950s. Originally, reserve requirements were imposed mainly to ensure the liquidity of individual banks.[8] However, by the 1930s, the Fed recognized that "it is no longer the primary function of legal reserve requirements to assure or preserve the liquidity of individual member banks. Rather, the two main functions … are, first, to operate in the direction of sound credit conditions by

[5] The trend is calculated using a Hodrick-Prescott filter applied to monthly industrial production data for 1919-2006.
[6] The dates shown in the figures are for changes in requirements applied to reserve city banks, which are listed in Table 1.
[7] Under the National Bank Act of 1863, all national banks were required to hold reserves equal to 25 percent of their notes and deposits. Banks located in central reserve cities were required to hold their required reserves in the form of gold or "lawful" money, whereas banks in reserve cities and country banks were permitted to hold a portion of their reserves in the form of deposits with national banks in central reserve cities or, in the case of country banks, reserve cities. Under the Federal Reserve Act, member banks were required to hold their required reserves in the form of deposits with Federal Reserve Banks or lawful money (vault cash). In 1917, an amendment to the Federal Reserve Act lowered required reserve ratios but specified that only deposits with Reserve Banks could be used to satisfy reserve requirements. In 1959, the Act was amended to once again allow vault cash to count toward a member bank's required reserves.
[8] See Carlson (2014) on the use of reserve requirements to ensure the liquidity of individual banks.

exerting an influence on changes in the volume of bank credit, and, secondly, to provide the Federal Reserve banks with sufficient resources to enable them to pursue an effective banking and credit policy."[9]

As shown in the figures, throughout the period, increases in required reserve ratios tended to occur when either inflation was rising or the output gap was positive, and decreases tended to occur when inflation was falling or the output gap was negative. This correlation suggests that the Fed used changes reserve requirements to "meet fundamental changes in the economy and the financial situation" (FOMC executive committee minutes, August 5, 1949). However, some changes in required reserve ratios did not line up with inflation or the output gap. Some of these deviations from "normal" policy may have reflected special factors affecting measured inflation and output, such as the removal of price controls and conversion of factories from defense to civilian uses after World War II. However, as we discuss below, before the Fed-Treasury Accord of 1951, changes in required reserve ratios were the Fed's primary tool for responding to inflation and the business cycle. Without the ability to change reserve requirements, the Fed would have had considerable difficulty responding to inflation or output gaps.[10] During 1935-41, the scale of gold inflows meant that the Fed had less scope for using open market operations to respond to macroeconomic conditions, and during 1941-51, political considerations dictated the use of open market operations primarily to monetize government debt.

We test formally whether changes in reserve requirements responded to macroeconomic conditions. There were considerable structural changes in the economy during this period, so rather than attempt to model the level of required reserve ratios, we look simply at whether ratios were increased or decreased. Thus our measure for the response of reserve requirements can take on three values: 1 if requirements were increased in the current quarter relative to the previous quarter, –1 if requirements were lowered from one quarter to the next, and 0 if there was no change. Our measures of macroeconomic conditions are related to inflation and output. For inflation, we use the change in the consumer price index measured as the percentage change from the last month in one quarter to the last month in the next.[11] Our measure of the output gap is the deviation of log IP from trend shown in Figure 2. We use the average monthly gap for the quarter. A positive gap indicates that the economy is performing above trend. Because policymakers have limited access to real time data when formulating policy, we follow Clarida, Gali, and Gertler (2000) and Romer and Romer (2002) in using measures of expected inflation and the output gap that are the predicted values derived from regressions of current values on three lagged values of inflation and one lagged value of the output gap.[12] Given the discrete and ordered nature of our dependent variable, we estimate an ordered logit.[13] The results, shown in Table 2, are consistent with the idea that the Federal

[9] "Member Bank Reserves—Report of the Committee on Bank Reserves of the Federal Reserve System." *Federal Reserve Board Annual Report*, 1932, pp. 260-61.

[10] We are not claiming that the Fed was particularly successful in controlling inflation or stabilizing output, just that given the economic and political constraints, changes in reserve requirements were the only feasible tool the Fed had for attempting to control inflation or close gaps.

[11] The seasonally adjusted series is not available until 1947. We thus seasonally adjust the unadjusted consumer price index ourselves.

[12] In these prediction equations we omit the years around World War II (specifically, we omit 1941q4-1946q4). We also allow for separate constants during the three periods of interest: 1930s, the post-war period until shortly after the accord is signed (1951q4), and from that point until the end of 1959.

[13] We use same time periods as used in the prediction equations (i.e. omitting the years around World War II). Alternative estimations that use all observations from 1935 to 1959 yield similar results.

Reserve used reserve requirements to help implement monetary policy. The coefficients indicate that the Fed increased required reserve ratios in response to increases in predicted inflation and output gaps.

Comparisons of Fed reaction functions across different eras

The regressions reported in Table 2 suggest that the Fed responded to macroeconomic conditions. However, in changing required reserve ratios, the Fed's proximate objectives were to adjust bank reserve positions and influence credit conditions, which policymakers saw as the mechanism by which they could achieve their ultimate macroeconomic objectives. Thus, we next examine whether the proximate targets or indicators of monetary policy evolved in a manner consistent with a response of policy to macroeconomic conditions. Further, we are interested in whether this responsiveness varied across three periods: 1935q1-1941q3; 1947q1-1951q4; and 1952q1-1959q3.[14] For this comparison, we conduct an exercise similar to Romer and Romer (2002) in that we regress indicators of monetary policy on macroeconomic variables to see whether they were systematically related to macroeconomic conditions.

Romer and Romer (2002) argue that the Fed targeted short-term interest rates in the 1950s, and they use the federal funds rate as the dependent variable in a forward-looking Taylor rule for that decade. However, data on the federal funds rate are not available before the 1950s, when the funds market reawakened after being moribund from the latter part of the 1930s through the 1940s. Instead, we use the average market rate on 4-to-6 month commercial paper as one indicator of the stance of monetary policy.[15]

We also use the level of net free reserves, i.e., total member bank reserves in excess of legal requirements less borrowed reserves, as a second indicator of policy. The Fed began to interpret the level of borrowed reserves as a meaningful guide to the stance of monetary policy in the 1920s, and then watched free reserves closely in the 1930s when banks began to hold substantial excess reserves and borrowed reserves declined to negligible levels. In the 1950s, FOMC deliberations often included discussion of the level of free reserves that would most likely be consistent with the Committee's desired policy objectives, and open market operations often targeted a specific range for free reserves (Brunner and Meltzer, 1964; Calomiris and Wheelock, 1998; Meltzer, 2009). We regress the two policy indicators on measures of predicted inflation and output gap as described above.

Tables 3 and 4 report our regression estimates. The models in Table 3 use free reserves as the policy variable, whereas those in Table 4 use the commercial paper interest rate. Similar to Romer and Romer (2002), we find that in the 1950s, monetary policy tended to tighten (indicated by a reduction in free

[14] We end the first period in the quarter before the United States entered World War II. We exclude 1946 in part as it may have taken sometime to convert to a more peace time economy and as the peg on short-term Treasury Bills, which ended in early 1947, would distort some of these results. We classify all of 1951 as part of the second period as it was some months after the Accord before the Federal Reserve was fully implementing monetary policy. Our results for the response to policy to inflation are weaker if we include all of 1959 in our estimation period. Romer and Romer (2002) report a similar result, which they attribute to a tightening of policy in response to an increase in expected inflation that failed to materialize. As with the ordered logit regression, we use predicted inflation and the predicted output gap. As described in footnote 12, when estimating these first stage regressions we use only the years included in the three regime periods (so that the World War II years are excluded).

[15] Although data on short-term Treasury security yields are also available for the entire period, because the Fed pegged the rate on those securities during and for several years after the war, they exhibit little variation over time and are unrelated to economic activity or inflation over much of our sample period.

reserves or an increase in interest rates) when expected output exceeded trend or inflation rose. However, we find no evidence that either free reserves or the interest rate responded to inflation or the output gap in the earlier periods. Of course, the short sample periods make estimating reliable relationships difficult, but the evidence is consistent with the idea that monetary policy, as reflected in short-term interest rates and free reserves, did not respond systematically to inflation or the output gap during 1935-41 or 1946-51 (let alone during the war years, 1941-45).

Typically, Taylor-type interest rate rules such as those shown in Table 4 have coefficients on inflation that are fairly close to 1, whereas our coefficients are notably smaller. We find that the coefficient estimates for inflation are sensitive to the specific measure of the output gap and method of adjusting for serial correlation. For instance, using the unemployment rate in the 1950s rather than the IP based output gap, we obtain a coefficient on inflation that is just over 1 (quarterly data on the unemployment rate are not available for the entire period). However, whereas the magnitudes of the coefficients are sensitive to model specification, qualitatively, the relative responsiveness of monetary policy to macroeconomic conditions is not. The finding that monetary policy was more responsive in the 1950s than in earlier years is quite robust. Thus, we are less concerned here with the absolute size of the coefficients than with the relative size and significance of the relationships with macroeconomic variables across time periods.

Our failure to detect a response of monetary policy indicators to macroeconomic conditions during the late 1930s or the late 1940s might reflect the fairly short sample periods, which makes precise estimation difficult. It could also be that policymakers simply had incorrect models of the economy and thus were not responding appropriately. However, the monetary authorities were probably considerably more constrained in their ability to respond to economic developments during 1935-51 than they were after the Accord. We illustrate this point statistically using a second series of regressions.

Policymakers had three tools to implement monetary policy: open market operations, the discount rate and changes in reserve requirements. The Fed's open market purchases of Treasury securities add reserves to the banking system, putting downward pressure on interest rates, whereas open market sales drain reserves and put upward pressure on rates. The Fed's other policy tools do not affect the quantity of banking system reserves directly. An increase in the Fed's discount rate would tend to put upward pressure on interest rates, however, by discouraging member banks from borrowing reserves from the Fed. Changes in reserve requirements alter the distribution of reserves between required and excess reserves. Increases in required reserve ratios reduce excess reserves and thus free reserves, whereas reductions in required ratios increase free reserves.

We next investigate the extent to which free reserves were determined by Federal Reserve policy actions during the late 1930s, late 1940s, and during the 1950s.[16] Table 5 reports estimates of regressions of the level of net free reserves on Federal Reserve holdings of Treasury securities, the Federal Reserve Bank of New York discount rate, and the required reserve ratio on demand deposits averaged across central reserve cities and reserve cities.[17] We use monthly data in this analysis. For the 1930s, we find little relationship between the levels of the Fed's policy tools and net free reserves. In the second period, the level of free reserves is strongly related to reserve requirements. This finding is consistent with the idea

[16] Results are generally similar if we use interest rates rather than free reserves as the dependent variable.
[17] We use a simple (unweighted) average of the reserve ratios for banks in the central reserve and reserve cities. Using the reserve requirement for either type of city individually gives similar results.

that the Fed could use required reserve ratios to implement policy, but the tool was fairly blunt and the Fed's ability to fine tune policy was limited. We do find a relationship between the Fed's Treasury security holdings and free reserves, but the negative coefficient indicates that increased Fed holdings of Treasury securities *reduced* net free reserves, suggesting a spurious correlation. For the third period, we observe positive and highly significant relationships between both the discount rate and the Fed's Treasury holdings and net free reserves, consistent with the idea that during the 1950s, the Fed had multiple tools at its disposal to implement policy.

Of course, the regressions in Table 5 should be viewed with considerable caution. The time periods are short and the regressions omit other sources and uses of reserves besides Fed policy actions (as will be discussed more below). For example, if the Fed sought to keep the level of free reserves constant, it might use open market operations to offset changes in reserves from other sources. In that case the coefficient on the Fed's security holdings would be insignificant even though open market operations were effectively determining the level of free reserves. Nevertheless, the regressions do suggest that Fed policy actions were a more important determinant of free reserves in the 1950s than before.

Section 3. The Historical Record

The information in the previous section suggests that during 1935-51, the Fed adjusted reserve requirements in response to economic conditions, but that broader measures of policy—free reserves and short-term interest rates—did not respond to inflation or output gaps before 1951. The following sections draw on Federal Reserve records and other sources to understand better how the Fed used its various tools, especially reserve requirements, to implement policy during the pre-war period (1935-41), wartime and early postwar period (1941-51), and after the Fed-Treasury Accord (1951-59).

The "Backseat" Era, 1935-41

From the mid-1930s to U.S. entry into World War II, monetary policy was dominated by two competing considerations that limited the Fed's ability to use open market operations and the discount rate to achieve macroeconomic policy objectives. On the one hand, large gold inflows gorged the banking system with reserves, many of which accumulated as excess reserves. Fed officials grew increasingly concerned that the growth in excess reserves could lead to an inflationary expansion of credit. By June 1935, the excess reserves held by member banks exceeded the size of the Fed's holdings of government securities and were continuing to grow. As excess reserves rose, the proportion that the Fed could eliminate through open market sales became smaller. Consequently, the Fed turned to its newly acquired authority to increase required reserve ratios to convert a portion of excess reserves into required reserves.

Pressure from the Treasury Department further constrained the Fed in its desire to control inflation. Treasury officials desired to avoid increases in government security yields, which would raise the cost of financing federal deficits. FOMC transcripts and other documentary evidence described below illustrate some of the political pressures on the Fed in this era.

Whereas gold outflows had contributed to monetary contraction and deflation during 1930-33, beginning in 1934, gold inflows added considerably to the stock of high-powered money and were the primary driver of changes in the money supply during 1934-41 (Friedman and Schwartz, 1963; Romer, 1992; Hanes, 2006).

We shed further light on possible changes in the extent that gold flows constrained or dominated monetary policy over time by adding the gold stock to regressions of net free reserves on the Fed's policy tools for our three periods. As shown in Table 6, gold had a substantial impact on the level of free reserves during 1935-41. Moreover, other policy instruments now appear more strongly related to the targets. We find little evidence that changes in the monetary gold stock influenced money market rates or free reserves in other periods. Gold flows ceased to be an important determinant of the stocks of bank reserves or money once capital controls were imposed at the start of World War II, and apparently had little impact on monetary policy again until the early 1960s (Bordo and Eichengreen, 2013). We return to this below.

The Fed's concern with gold inflows and the growth of reserves in the mid-1930s is clear from Federal Reserve reports, meeting transcripts and histories of the Fed (e.g., Friedman and Schwartz, 1963; Meltzer, 2003). Officials were particularly concerned about the growth of reserves in excess of requirements, and the potential for rapid growth in bank lending and inflation (Carpenter, 1940). To reduce excess reserves, the Board increased reserve requirements in three steps during 1936-37 that in sum doubled all required reserve ratios and brought them to the maximums allowed by law. The first increase was announced in July 1936. The Board's *Annual Report for 1936* outlined the case: "Excess reserves by the summer of 1936 amounted to over $3,000,000,000. On the basis of these excess reserves and the legal reserve ratios then in effect, bank credit could have been expanded to twice the volume in use at the peak of business activity in 1929; and the gold inflow was still in progress." (p. 1)

In December 1936, the Treasury Department began to sterilize gold inflows to prevent them from further increasing bank reserves. According to Meltzer (2003, pp. 504-507), Treasury Department staff proposed sterilization as an alternative to a Fed plan to conduct open market sales or increase reserve requirements further. The Fed subsequently agreed not to sell securities but went ahead with the second and third reserve requirements hikes in early 1937.

The Fed stressed that the increases in reserve requirements (and gold sterilization) "did not reflect changes in Federal Reserve credit policy, which continued to be directed toward monetary ease. They were adopted with a view to reducing redundant reserves created by the gold movement and did not affect the existing volume of currency and bank deposits which had been built up in recent years." (*Annual Report for 1936*, p. 2) The Board asserted that "member banks had large amounts of unused reserves, and … the demand for credit for business purposes was relatively small." (ibid, p. 2) The Board went on to argue that "The part of excess reserves thus eliminated [by the increase in reserve requirements] was superfluous for prospective needs of commerce, industry, and agriculture, and, if permitted to become the basis of a multiple expansion of bank credit, might have resulted in an injurious credit expansion." (ibid, p. 14)

The Board noted that even after the doubling of reserve requirements, "Banks continue to have a substantial amount of excess reserves on which to expand credit and can obtain additional reserves by recourse to Federal Reserve Banks." (ibid, p. 2) Further, "The existing volume of bank deposits … was not reduced by the increase in requirements, and these deposits, if actively utilized, would be sufficient to finance a volume of business far greater than was transacted in 1936." (ibid, p. 2)

One of the Fed's goals in raising reserve requirements was to make it feasible for the System's other tools, chiefly open market operations and the discount rate, to influence bank reserves and credit

conditions: “The necessity of calling Federal Reserve credit into use would once again make the banking system more directly responsive to Federal Reserve policy.” (ibid, p. 2) The Board went on to argue that “The Federal Reserve System is again placed in a position where such reduction or expansion of member bank reserves as may be deemed in the public interest may be effected through open market operations.” (ibid, p. 15)

Figure 3 plots the monetary gold stock, the total reserves of Federal Reserve member banks, and the ratio of excess-to-total reserves of member banks during 1934-41. Vertical lines identify the dates when the three increases in reserve requirements of 1936-37 took effect, and April 16, 1938 when reserve requirements were lowered. As the figure shows, during 1934-36 the growth in total reserves and increase in the ratio of excess-to-total reserves reflected growth of the monetary gold stock. The figure also shows the impact of the increases in reserve requirements on the excess/total reserves ratio, and of the gold sterilization program on the growth of total reserves.

Pressure from the Treasury Secretary

The initial hike in reserve requirements, which took effect in August 1936, elicited almost no reaction in financial markets. However, interest rates increased somewhat following the subsequent hikes in March and May 1937. Yields on long-term government bonds rose from 2.25 percent in February to 2.75 percent in early April 1937. Figure 4 plots the long-term Treasury bond yield and 3-month Treasury bill yield alongside the dates of changes in required reserve ratios to illustrate the behavior of interest rates around dates when the Fed changed required reserve ratios. The increase in yields following the 1936-37 increases in ratios displeased Treasury Secretary Morgenthau. At a meeting of the FOMC executive committee on March 13, Chairman Eccles reported that Morgenthau had informed him that the Treasury stood ready to end gold sterilization or to use the resources of the Exchange Stabilization Fund to lift government bond prices. (FOMC, *Memorandum of Discussion*, March 13, 1937) The FOMC subsequently met with Morgenthau and assured him of their desire to maintain an “orderly” market for government securities. At its meeting on March 15, the FOMC voted to make open market purchases to preempt action by the Treasury. (FOMC, March 15, 1937, p. 7).

Perhaps because of further pressure from Morgenthau, Eccles began to argue for open market purchases of government securities, the prices of which he viewed as “quite out of line.” (FOMC Executive Committee, March 23, 1937). At an FOMC meeting on April 3, Eccles proposed that the Fed engage in open market purchases because “it would take the banks some time to accustom themselves to operating with a smaller amount of excess reserves.” (FOMC, April 3, 1937, p. 7) Eccles went on to argue that open market purchases were justified because the hikes in reserve requirements had “disturbed” the government securities market.

Morgenthau continued to press the Fed to prevent government security yields from rising. Nonetheless, the Board decided to implement the planned third and final hike in reserve requirements on May 1. Prior to the increase, however, the FOMC agreed to use open market purchases to expand member bank excess reserves by as much as $250 million. In this instance, both the Fed and the Treasury appear to have perceived a need to support government securities prices when the Treasury was issuing debt.

By its meeting on September 11, 1937, the FOMC recognized that the economy had slowed.[18] Further, Fed staff forecast that New York City banks would soon have no excess reserves and they suggested that the Committee might wish to take steps to increase the excess reserves of New York City banks to $250 million in order to maintain a neutral policy stance. After reviewing their options, the Committee agreed to undertake open market purchases and recommend that the Treasury desterilize gold. Eccles relayed the idea to Morgenthau and, at an FOMC meeting on September 12, Eccles reported Morganthau's support for the plan. The Committee then voted to purchase up to $300 million of securities while the Treasury desterilized $300 million of gold.

The Fed continued to cooperate closely with the Treasury Department. At a meeting on April 15, 1938, the Board of Governors voted to reduce reserve requirements as part of a Roosevelt Administration program to boost the economy (Carpenter, 1940). The program also desterilized $1.4 billion of gold and ended the sterilization of gold inflows (Meltzer, 2003, p. 531). The Board explained that "Although there had been excess reserves in amounts considered ample to meet all probable needs of agriculture, commerce and business, the volume of business activity had declined with such rapidity as to produce injurious deflationary effects upon commodity prices, the capital market, and industry generally. In these circumstances … the Board decided that a reduction in reserve requirements of member banks might be helpful … by assuring the continued availability of ample funds for meeting business requirements and thereby preventing injurious credit contraction." (*Annual Report*, 1938, pp. 73-74)

World War II to the Accord

Inflationary pressures began to build as the economy recovered from the 1937-38 recession. Although gold inflows ended in mid-1941, inflation did not abate. On November 1, 1941, the Fed responded by lifting required reserve ratios to their legal maximums.

World War II changed the environment for the Fed. Gold inflows ceased. During the war, the Fed directed its open market operations entirely to assisting in the goal of funding war expenditures at low interest rates. Price controls and rationing were imposed to limit inflation and allocate scarce resources (Sproul, 1951). The Fed made one change in reserve requirements during the war—a reduction affecting only central reserve city banks.

The Fed's close cooperation with the Treasury grew stronger after Pearl Harbor. The Fed pledged to peg the existing structure of yields on shorter-term securities and enforce a ceiling of 2.5 percent on the yield for long-term Government bonds.[19] At the short-end of the yield curve, the Fed capped the rate on the 90-

[18] The contribution of the doubling of reserve requirements in 1936-37 to the subsequent recession has been debated. Friedman and Schwartz (1963) argue that the action was an important cause of the recession. They contend that banks held excess reserves as a precaution against bank runs, and that banks reduced credit supply in an effort to rebuild their excess reserves after reserve requirements were increased. Subsequent analysis, however, suggests that the hikes were more benign. Calomiris, Mason and Wheelock (2011) estimate a forecasting model of member bank reserve ratios (both reserves/assets and reserves/deposits) using December 1935 data for individual banks. The study finds that the actual reserve ratios of member banks after the increases in reserve requirements were no higher, and often lower, than predicted by the model, suggesting that the hikes were not contractionary, at least not in the way argued by Friedman and Schwartz (1963). Other studies, such as Velde (2009), find that the hikes may have contributed to the recession, but were not the only cause of it.

[19] See Wicker (1969) for a detailed discussion of the negotiations between the Treasury and the Fed on implementing the ceiling.

day Treasury bill at 3/8 percent. Moreover, the Fed guaranteed that a seller of bills to the Fed could buy back securities of a like amount and maturity at the same rate of discount. For banks, this policy effectively made Treasury bills the equivalent of cash; in essence, they were excess reserves that drew interest (Friedman and Schwartz, 1963; Sproul, 1951; Walker, 1954). The bill rate was below 3/8 percent when the cap was established, but rates soon rose to that level and the Fed was forced to purchase a growing amount of bills to maintain the cap. This gave the Treasury even greater ability to influence monetary policy. Simply by increasing the amount of bills it issued, the Treasury put upward pressure on money markets and forced the Fed into additional purchases that increased the supply of bank reserves.

During 1942, the Fed's holdings of government securities rose by $3.9 billion. Although the purchases added to the stock of reserves, higher reserve requirements as well as increased demand for currency reduced member banks' excess reserves by $1.1 billion. Because New York City and Chicago banks experienced especially heavy reserve outflows, the Board reduced reserve requirements on demand deposits in central reserve city banks from 26 percent to 20 percent in three equal-size cuts in August, September and October 1942. The cuts left the required reserve ratio on demand deposits for central reserve city and reserve city banks identical, while the ratio for country member banks remained 14 percent. According to Meltzer (2003, p. 600), the Board was reluctant to lower reserve requirements for central reserve city banks but did so at the request of the Treasury. The Board made clear in its annual report for 1942 that the cut in the required reserve ratio was intended to support the government securities market: "The smooth functioning of the money market and the success of the war finance program required the participation of central reserve city banks, and it was therefore necessary to supply these banks with the reserves required for such participation. Banks elsewhere, on the other hand, had large amounts of unused reserves and were constantly gaining funds. For those reasons the reductions in reserve requirements were made applicable solely to central reserve city banks." (*Annual Report for 1942*, p. 20)

No further changes were made to required reserve ratios during the war. However, in 1943, Congress passed legislation exempting government war loan deposit accounts from reserve requirements and deposit insurance assessments. The legislation, which the Fed had recommended, facilitated the placement of new Treasury debt issues by increasing temporarily the amount of excess reserves in the banking system.

After the War

The end of the war left the external environment for the Fed largely unchanged. Capital controls remained in place for many countries and, for the most part, gold flows and the balance of payments were of little concern to the Fed over the remainder of the 1940s and most of the 1950s. As shown by the regression estimates in Table 6, gold flows had little impact on the level of free reserves in this period.

The absence of pressures from gold flows or the balance of payments did not mean that the Fed was free to use monetary policy to control inflation or smooth the business cycle. The Fed remained committed to low and stable interest rates on government securities, including enforcement of a ceiling on the long-term bond yield. Low long-term bond yields were important for containing government borrowing costs when the ratio of government debt-to-GDP was exceptionally high, and they were a priority of the Truman Administration. Moreover, a substantial amount of government debt was owned by commercial banks, which would have had sizable mark-to-market losses if interest rates rose (Wallich and Keir,

1979). However, with the lifting of price controls and rationing, and expiration of some credit regulations, inflation once again became a concern. Thus the Fed had two potentially conflicting goals. With open market operations used primarily to enforce the 2.5 percent ceiling on the long-term government bond yield and otherwise support Treasury funding operations, the Fed again turned to reserve requirements and credit controls to regulate the growth of private credit in an attempt to control inflation.

For a time, the post-war regime worked reasonably well. Inflation spiked when price controls were lifted, but then subsided. The Board of Governors considered raising required reserve ratios for central reserve city banks in 1946, but dropped the idea when the New York Fed president expressed opposition (Meltzer, 2003, pp. 604-41). Treasury bond yields remained below 2.5 percent. Eichengreen and Garber (1991) interpret the immediate postwar environment in terms of target zones, arguing that the Fed had an explicit target zone for interest rates and an implicit target zone for inflation. In the absence of large real shocks, the Fed's commitment to preventing sustained inflation was credible, which kept the yields on long-term government securities from rising above the 2.5 percent ceiling. Moreover, the yields on short-term government securities were gradually allowed to rise and the Federal Government budget was in balance, both of which helped keep inflation expectations in check.[20]

Shortly after the war ended, the Fed's official statements began to make a case for allowing greater flexibility in the market yields on Treasury securities. For example, the Board's *Annual Report for 1946* states that "In view of the large public debt outstanding, it is desirable to maintain at the existing low levels the rate at which the Government can borrow on its long-term obligations." However, "the relationship between rates for various types of market issues might be permitted to become more response to demand .... A readjustment of short-term rates and the introduction of some flexibility would provide some check to further … credit expansion." (p. 6)

In 1947, the Fed and Treasury agreed to let the yields on shorter-term government securities rise, but retained the ceiling of 2.5 percent on long-term bonds. The Treasury ran a budget surplus in 1948, which further eased pressure on the Fed to monetize government debt.

The Fed was unwilling, or perhaps unable, to step further away from supporting the Treasury's debt financing operations. The Fed's 1947 *Annual Report* expressed concerns both about the stability of the government securities market and the likely effect of even a gradual relaxation of the ceiling on long-term government bond yields: "Constant Federal Reserve operations are essential for the maintenance of an orderly market and reasonable stability of prices…. To permit a gradual decline in prices of government securities, moreover, might result in heavy liquidation of investor holdings." (p. 7)[21]

Its unwillingness (or inability) to withdraw further from supporting the government securities market led the Fed to ask Congress for additional tools to control the growth of private credit. Those tools included additional authority to raise reserve requirements and to impose them on nonmember banks: "Strengthening of monetary policy to regulate over-all bank credit expansion in accordance with the

[20] Including both on- and off-budget accounts, the Federal budget swung from a deficit of $16 billion in 1946 to surpluses in 1947-49.

[21] Moreover, Sproul (1951) noted that, with large government debt outstanding and ongoing adjustment to a peacetime economy, significant action by the Fed at that time would have had "a cost in fiscal and financial disorder, and in terms of reduced production and employment which few would have wanted to contemplate" (p.315).

economy's needs could be accomplished by legislation extending authority to increase the statutory reserve requirements of member banks and to require nonmember banks to hold additional reserves in an amount corresponding to the increase for member banks." Further, the Fed suggested a secondary reserve requirement that banks could satisfy by holding short-term Treasury securities: "Under this measure banks would be restricted as to the amount and types of securities they could sell to obtain additional reserves but would not have to reduce their total holdings of securities in order to meet the requirement." This "would make it possible for the Federal Open Market Committee to require banks to immobilize a portion of their greatly expanded holdings of Government securities instead of permitting them to treat these holdings as excess reserves, which can be used at will to expand loans." (*Annual Report for 1957*, p. 9) The proposed requirement was designed to increase the demand for Treasury securities, and thereby hold down the cost of Treasury financing, while enhancing the Fed's ability to control the growth of private credit. In short, the Fed was asking for a new tool that would help it achieve two goals—low Treasury funding costs and control of inflation—that increasingly were in conflict with one another.

In addition to enhanced authority to set reserve requirements and impose a secondary requirement, the Fed sought expanded authority to regulate specific types of private credit. The Securities Exchange Act of 1934 had authorized the Fed to set margin requirements on loans used to purchase stocks and other securities. In September 1941, President Roosevelt had issued an executive order authorizing the Fed to also regulate installment and other forms of credit, but Congress terminated that authority on November 1, 1947. The Fed asked Congress to reestablish that authority, which the Board argued would "help curb prevailing inflationary credit tendencies." (*Annual Report for 1947*, p. 10)

Congress did not act on the Fed's proposals to extend reserve requirements to nonmember banks or to authorize a secondary reserve requirement. However, in August 1948, Congress granted temporary authority to the Board to increase reserve requirements on member banks and to reinstate controls on consumer installment credit. Earlier in 1948 the Fed had increased reserve requirements on central reserve city banks. In September, the Board raised requirements on all classes of member banks to equal or exceed their highest rates since the establishment of the Federal Reserve System (see Table 1).[22] The Board also reimposed regulations on consumer installment credit and maintained high margin requirements on loans for purchasing and carrying securities, all in an effort to slow the growth of private-sector credit.

Discussions at the September 8, 1948 meeting of the FOMC executive committee provide an illuminating example of the challenges the Fed faced in coordinating its various tools to meet multiple objectives. At this time, the FOMC desired tighter monetary conditions to counter rising credit demand and inflation. However, the executive committee knew that raising shorter-term interest rates would make maintaining the ceiling on the long-term bond yield more difficult. Chairman McCabe noted that "the Federal Reserve System probably would be called upon to continue substantial purchases of Government securities from nonbank investors which would supply banks with additional reserves which, in turn, would permit further credit expansion. He proposed an increase in reserve requirements, noting that they would absorb

[22] The tightening of conditions resulted in some conflict between the Federal Reserve and the Treasury. Minutes of the FOMC Executive Committee for August 11, 1948 suggest that the FOMC believed that the Treasury was seeking power to approve or disapprove any change in reserve requirements, which prompted a letter from the Federal Reserve stating its prerogative to change reserve requirements as necessary to meet its responsibilities in the field of monetary policy.

the reserves which would be supplied by Reserve System purchases from nonbank investors." (FOMC Minutes of the Executive Committee Sept. 8, 1948, p. 3) However, others expressed concern that an increase in reserve requirements would be ineffective. Chicago Fed president Young, for example, argued that raising reserve requirements would not achieve the Fed's intended objective of controlling inflation because the Fed would likely be forced to purchase Treasury securities, and thereby increase total reserves, in order to prevent market yields from rising as banks sold securities to adjust to an increase in reserve requirements. That is, the Fed's commitment to keep Treasury security yields from rising meant that it would end up using open market purchases to nullify the tightening effects of any increase in reserve requirements. (Meltzer, 2003, p. 666; FOMC Minutes of the Executive Committee, Sept. 8, 1948)

Pressures on the Fed diminished in 1949 as the economy slipped into recession. Loans to businesses and other forms of private credit declined in the first half of the year. The Fed responded to the slackening pace of economic activity by reducing margin requirements in March, easing regulations on consumer installment credit in March and April, and reducing reserve requirements in May and again in August. The Fed also sold short-term government securities, however, "in order to prevent a disorderly decline in short-term yields" in the face of strong demand. (*Annual Report for 1949*, p. 7) Thus, the Fed's use of reserve requirements in the pursuit of general macroeconomic goals again conflicted somewhat with the objective of maintaining orderly conditions in the government securities market.

Interestingly, international concerns may have prompted a stronger Federal Reserve response to this recession; with most of the international economy still recovering from the war, at least some Fed policymakers were concerned that a U.S. recession would prompt even greater difficulties abroad "because of the importance of the American economy in the world picture and the danger to the rest of the world of a serious depression in this country, every effort should be made to prevent such a condition from concurring." (FOMC executive committee minutes August 5, 1949)

Rising inflation once again became a problem for the Fed in 1950. International issues also played a role as the outbreak of the Korean War brought increased government spending. Economic activity also picked up. The Fed was again faced with two pressing, and conflicting, objectives: controlling inflation and supporting the Treasury's funding operations by maintaining the ceiling on the long-term bond yield and ensuring that the Treasury's issuance of new debt was successful. In an effort to slow the growth of credit, in August the Fed increased Reserve Bank discount rates and engaged in small open market sales. However, the Fed soon reversed course and bought government securities, "principally for the purpose of assuring the successful refunding of maturing securities and … to maintain a stable market for long-term bonds." (*Annual Report for 1950*, pp. 2-3) The Fed then resorted to using reserve requirements and other regulations in an effort to slow the growth of private credit. The Defense Production Act of September 1950 gave the Fed new powers to regulate consumer and real estate credit markets. The Fed immediately tightened existing regulations on consumer installment lending and issued new regulations on construction and real estate lending. On December 29, the Fed also announced increases in reserve requirements to take effect in January 1951.

The Fed's commitment to the Treasury meant that it was largely unable to use open market sales to slow the growth of bank reserves, so the Fed resorted to raising reserve requirements (and imposing credit controls) in an effort to contain the growth of private credit without increasing the cost of credit for the Treasury. This effort was at best only partly successful, and ultimately broke down when the Korean War

brought increased government expenditures. Inflation expectations rose and the Fed's commitment to preventing the yield on Treasury bonds from rising above 2.5 percent became untenable. As Eichengreen and Garber (1991, p. 195) write, "The cap on interest rates was rendered inconsistent with foreign policy imperatives and their fiscal implications." The Fed and Treasury were forced to compromise, and in March 1951 they reached an accord that freed the Fed from its commitment to prevent increases in government bond yields.

Post-Accord Policy

The story of the conflict and negotiations leading to the Accord is well known (e.g., see Meltzer, 2003). The Accord came about because the Fed found itself in an untenable position: "As the year [1951] opened, business and consumer psychology reflected the impact of the Chinese intervention in Korea…. Buying activity was intense, and upward pressure on prices was strong and was supported by active use of credit." (*Annual Report for 1951*, p. 1) Despite the imposition of additional credit controls and higher reserve requirements, "inflationary pressures in the private sector of the economy continued and extension of bank credit … proceeded at an unusually rapid rate. In the light of these developments it became increasingly clear that anti-inflationary credit and monetary measures could not be made effective—in fact that credit and monetary developments would tend to be inflationary—as long as Government securities were given a 'monetary quality' by support of their prices." (ibid, pp. 3-4)

After several rounds of discussion, and an awkward meeting of the Board of Governors with President Truman at the White House, the Treasury Department agreed to release the Fed from its commitment to hold the yield on long-term government bonds at or below 2.5 percent and to allow market forces to determine the yields on Treasury securities. In return, the Fed acknowledged that the "successful financing of the Government's requirements" remained an important goal of debt management and monetary policies. (ibid, p. 4)

The Accord removed the formal constraint on Fed policy associated with pegging interest rates. Nevertheless, the Fed still felt an obligation to provide support for Treasury issuance, and for some time, the Fed acted to assist the Treasury without ceding control of monetary policy. Figure 5 shows the dollar amount of securities issued by the Treasury Department during 1935-59. We include securities issued for cash as well as securities issued in exchange for outstanding issues, and we divide the amount issued by total member bank reserves to show the volume of securities issued relative to a measure of the capacity of the banking system to absorb them. As shown in Figure 5, Treasury issuance resumed in the early 1950s after having been negligible in the late 1940s. At the time, Treasury securities were offered by subscription rather than at auctions (Garbade, 2012). The Treasury would announce the amount, price, and coupon rate that they intended to sell about a week before an offering closed. This procedure risked having an offering fail if market interest rates rose before the closing. Part of the Fed's support was to refrain from actions that that might be interpreted as a change in monetary policy near dates of Treasury financings—so called "even-keel" policy (Wallich and Keir, 1979; Humpage 2014). Additionally, also shown in Figure 5, the timing of some changes in reserve requirements and open market operations were geared toward ensuring that the banking system had sufficient reserves to absorb the securities sold by the Treasury. On a few occasions the Fed purchased securities to ensure that a funding operation did not fail. For example, the Fed purchased a significant amount of newly issued one-year Treasury certificates after

a sharp increase in interest rates risked the failure of a Treasury offering in July 1958 (see Garbade, 2012).

However, the Federal Reserve also took a number of steps to ensure its monetary policy independence. For example, in the early 1950s, the Federal Reserve adopted a policy of purchasing only Treasury bills (the so-called "bills only" policy) to avoid pressure to support the prices of long-term government securities (Humpage, 2014). Moreover, Meulendyke (1998) reports that even though Fed officials saw interest rates as the primary channel by which monetary policy affects the economy, FOMC members thought it unwise to target a particular interest rate in order to break firmly from the pre-Accord regime of pegging rates at the behest of the Treasury.

In its *Annual Report for 1951*, the Fed claimed that the Accord had an immediate positive impact: "Withdrawal of Federal Reserve support of the Government securities market following the Treasury-Federal Reserve accord was an important factor in changing inflationary psychology. … As a result of this change in climate, expectations of further depreciation of the value of the dollar were widely revised [and] search for various hedges against inflation was moderated…. Foreign appraisal of prospects for the dollar also improved and this was a factor in the subsequent cessation of gold outflow from the United States." (ibid, p. 2). The subsequent absence of foreign pressures is again consistent with our results in Table 6 showing that gold flows had little impact on free reserves during 1952-59.

The Accord enabled the Fed to redirect open market policy away from full-time support of the government securities market toward controlling inflation and limiting fluctuations in economic activity. Nonetheless, changes in reserve requirements and credit regulation remained components of the Fed's policy throughout the 1950s. The Fed also considered changing how it set reserve requirements and continued to seek Congressional approval to extend reserve requirements to nonmember banks.[23] The Fed was unable to persuade Congress, however, until 1980 when the Monetary Control Act subjected nonmember banks and other depository institutions to the reserve requirements imposed on Federal Reserve member banks.

The Fed's Operating Procedures

Following the Accord, the Fed adopted an operating framework that closely resembled the framework it had first used in the 1920s, which the Fed acknowledged in its *Annual Report for 1957* (p. 9).[24] That framework presumed that member banks are reluctant to borrow from the Fed, but when conditions force them to borrow, banks will respond by tightening credit in an effort to reduce their indebtedness to the Fed. Thus, when the Fed wanted to tighten policy, it would use open market operations to reduce the supply of nonborrowed reserves in the banking system, which initially would cause banks to borrow more from the Fed but subsequently reduce the supply of credit in an effort to repay their borrowing. For example, in 1952 "the Federal Reserve System followed a policy of restraining the pace of credit

[23] For example, at a meeting on March 6, 1951, the Board considered a plan that would relate reserve requirements directly to changes in the volume of private-sector loans and investments on the books of commercial banks. "Under the plan the Board would be authorized to require any bank whose loan assets rose … to hold a supplementary reserve requirement of up to a maximum of 50 percent of the increase in loan assets." The plan was intended to apply to both member and nonmember banks. (Minutes of the Board of Governors, March 6, 1951, p. 2)

[24] Meltzer (2009) refers to the policy framework developed in the 1920s as the "Riefler-Burgess" doctrine, after Fed officials Winfield Riefler and W. Randolph Burgess. During the 1950s, Riefler was a special assistant to the Board of Governors.

expansion by making it necessary for member banks to borrow in order to obtain reserves. This put them under pressure to restrict expansion of their loans and investments. Thus discount operations at the Reserve Banks again became an effective instrument of credit policy, … [which was a] realization of the purposes envisaged by the Treasury-Federal Reserve accord of March 1951." (*Annual Report for 1952*, p. 1)

Changes in reserve requirements remained a component of the Fed's policy strategy after the Accord. The Fed reduced requirements in 1954, primarily "to make sure that banks would be supplied with reserves in amounts sufficient to encourage them to seek uses for their funds and thus to foster credit and monetary expansion." (*Annual Report for 1954*, p. 8). However, the Fed partly sterilized the reduction in reserve requirements by engaging in offsetting open market sales in order "to absorb reserve funds not needed until the fall period of active currency and credit demand." (p. 7). Thus, open market operations were used to "fine tune" the impact of changes in reserve requirements on bank reserve positions.

The Fed reduced reserve requirements again in 1958 as part of an effort to stimulate the economy during a recession. The cut reduced required reserves by $1.5 billion. In addition, the Fed added $2 billion of reserves via open market purchases and cut Federal Reserve Bank discount rates by nearly 2 percentage points. (*Annual Report for 1958*, p. 3) The decrease in reserve requirements was seen as a valuable part of the Fed's strategy due to the publicity surrounding it. The announcement of a change in reserve requirement "receives wide attention and is public evidence of efforts of the Federal Reserve System to use its monetary tools to encourage business recovery. Open market operations, on the other hand, receive far less attention and are understood by relatively few persons." (Minutes of the Board of Governors, May 20, 1958).

For the first time since the Accord, international concerns reemerged in 1958. The Board's *Annual Report for 1958* noted that "Gold movements and the underlying developments in international trade and payments are … constantly under review in the determination of monetary policy." (p. 16) The *Report* noted further that during the first half of 1958, gold outflows drained some $1.5 billion of reserves from the banking system, thus running against the Fed's efforts to promote monetary expansion and counter the economic recession (p. 17). Significantly, the *Report* also drew attention to the Fed's own reserve requirement, noting that the "ratio of gold certificate reserves of the Federal Reserve Banks to their note and deposit liabilities dropped from 46.3 percent to 42.1 percent, but it remained well above the statutory minimum of 25 percent." (p. 17) The Fed's *Annual Report for 1959* also highlighted gold outflows as having had a large impact on bank reserves in that year. The report notes that the United States experienced net gold outflows of $1.1 billion in 1959, and that the deficit in the balance of payments was nearly $4 billion.

Section 4. Conclusion

The reemergence of balance of payments deficits and gold flows as policy concerns toward the end of the 1950s marked the end of an era in which the absence of significant external pressures allowed the Fed to direct monetary policy primarily toward controlling inflation and smoothing the business cycle. Unlike the 1930s, when gold inflows had a considerable impact on short-term rates and free reserves, and were viewed by the Fed as a serious inflation threat, throughout most of the 1950s, gold flows and other international considerations had almost no impact on domestic monetary conditions or policy. Similarly,

after the Fed-Treasury Accord, political pressures on the Fed diminished, although the Fed was careful to maintain an even keel policy during periods of Treasury funding operations.

Bordo and Eichengreen (2013) argue that concern about balance of payments deficits and gold outflows led the Fed to pursue a tighter monetary policy during the early 1960s than was warranted by domestic considerations alone. Further, as the decade continued, the Fed came under considerable political pressure to keep interest rates from rising despite increased government spending and rising inflation. Our findings suggest that the absence of such concerns and pressures in the 1950s enabled the Fed to be responsive to the domestic economy in that decade. Of course, a lack of external constraints and pressure does not guarantee a responsive policy, and that the Fed was responsive to inflation and the business cycle in the 1950s suggests a level of sophistication in the Fed's "lean against the wind" policies. Still, a lesson of the 1950s is that it requires both enlightened policymakers and a conducive environment to assure a successful outcome.

References

Bordo, Michael D. and Barry Eichengreen. "Bretton Woods and the Great Inflation." In Michael D. Bordo and Athanasios Orphanides, eds., *The Great Inflation: The Rebirth of Modern Central Banking*. Chicago: University of Chicago Press, 2013, pp. 449-96.

Bordo, Michael D. and Athanasios Orphanides, eds. *The Great Inflation: The Rebirth of Modern Central Banking*. Chicago: University of Chicago Press, 2013.

Brunner, Karl and Allan H. Meltzer. "The Fed's Attachment to the Free Reserves Concept." Subcommittee on Domestic Finance, Committee on Banking and Currency. Washington: United States House of Representatives. 88th Congress, 2nd Session, 1964.

Calomiris, Charles W., Mason, Joseph, and David C. Wheelock. "Did Doubling Reserve Requirements Cause the Recession of 1936-1938? A Microeconomic Approach." NBER working paper no. 16688, January 2011.

Calomiris, Charles W. and David C. Wheelock. "Was the Great Depression a Watershed for American Monetary Policy?" in Michael D. Bordo, Claudia Goldin, and Eugene N. White, eds., *The Defining Moment: The Great Depression and the American Economy in the Twentieth Century*. Chicago: University of Chicago Press, 1998, pp. 23-65.

Carlson, Mark. "Lessons from the Historical Use of Reserve Requirements in the United States to Promote Bank Liquidity." Working paper, 2014.

Carpenter, S.R. (1940). "Development of the Open Market Function of the Federal Reserve System," *Dissertation submitted at the Graduate School of Banking at Rutgers University*.

Clarida, Richard, Jordi Gali, and Mark Gertler. "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory." *Quarterly Journal of Economics*, 115(1), February 2000, pp.147-180.

Eichengreen, Barry and Peter M. Garber. "Before the Accord: U.S. Monetary-Financial Policy, 1945-51. In R. Glenn Hubbard, ed., *Financial Markets and Financial Crises*. Chicago: University of Chicago Press, 1991, pp. 175-205.

Federal Open Market Committee (1948). *Minutes of the Executive Committee of the Federal Open Market Committee,* September 8, 1948.

Friedman, Milton and Anna J. Schwartz. A Monetary History of the United States, 1867-1960. Princeton: Princeton University Press, 1963.

Garbade, Kenneth (2012). *Birth of a Market*, Cambridge, MA: MIT Press.

Hanes, Christopher. "The Liquidity Trap and U.S. Interest Rates in the 1930s." *Journal of Money, Credit, and Banking.* 38(1), February 2006, pp. 163-194.

Humpage, Owen (2014) "Independent within—not of—Government: The Emergency of the Federal Reserve as a Modern Central Bank," *Federal Reserve Bank of Cleveland Working Paper* 14-02.

Meltzer, Allan H. *A History of the Federal Reserve Volume 1, 1913-1951*. Chicago: University of Chicago Press, 2003.

Meltzer, Allan H. *A History of the Federal Reserve Volume 2, Book 1, 1951-1969*. Chicago: University of Chicago Press, 2009.

Meulendyke, Ann-Marie (1998). *U.S. Monetary Policy and Financial Markets*, New York: Federal Reserve Bank of New York.

Romer, Christina D. "What Ended the Great Depression?" *Journal of Economic History* 52 (4), December 1992, pp. 757-84.

Romer, Christina D. and David H. Romer. "Choosing the Federal Reserve Chair: Lessons from History." *Journal of Economic Perspectives*, Winter 2004.

Romer, Christina D. and David H. Romer. "A Rehabilitation of Monetary Policy in the 1950's." *American Economic Review Papers and Proceedings* 92(2), May 2002, pp. 121-27.

Sproul, Allan (1951). "Changing Concepts of Central Banking," in *Money, Trade, and Economic Growth*, New York: MacMillan Company.

Velde, Francois R. "The Recession of 1937—A Cautionary Tale." Federal Reserve Bank of Chicago *Economic Perspectives*, 4th quarter 2009, pp. 16-37.

Wallich, Henry and Peter Keir, "The Role of Operating Guides in U.S. Monetary Policy: A Historical Review," *Federal Reserve Bulletin*, September 1979, pp. 679-691.

Walker, Charles (1954). "Federal Reserve Policy and the Structure of Interest Rates on Government Securities," *Quarterly Journal of Economics*, 68(1), February, pp. 19-42.

Wicker, Elmus (1969). "The World War II Policy of Fixing A Pattern of Interest Rates," *Journal of Finance*, 24(3), pp. 447-458.

Table 1: Federal Reserve Member Bank Reserve Requirements, 1913-59

(Percent of Deposits)

	Net Demand Deposits			Time Deposits (all bank classes)
Effective Date[1]	Central Reserve City banks	Reserve City banks	Country banks	
1913—Dec. 23	18	15	12	5
1917—June 21	13	10	7	3
1936—Aug. 16	19.5	15	10.5	4.5
1937—Mar. 1	22.75	17.5	12.25	5.25
1937—May 1	26	20	14	6
1938—Apr. 16	22.75	17.5	12	5
1941—Nov. 1	26	20	14	6
1942—Aug. 20	24	20	14	6
1942—Sept. 14	22	20	14	6
1942—Oct. 3	20	20	14	6
1948—Feb. 27	22	20	14	6
1948—June 11	24	20	14	6
1948—Sept. 24, 16	26	22	16	7.5
1949—May 5, 1	24	21	15	7
1949—June 30, July 1	24	20	14	6
1949—Aug. 1	24	20	13	6
1949—Aug. 11, 16	23.5	19.5	12	5
1949—Aug. 18	23	19	12	5
1949—Aug. 25	22.5	18.5	12	5
1949—Sept. 1	22	18	12	5
1951—Jan. 11, 16	23	19	13	6
1951—Jan. 25, Feb. 1	24	20	14	6
1953—July 9, 1	22	19	13	6
1954—June 24, 16	21	19	13	5
1954—July 29, Aug. 1	20	18	12	5
1958—Feb. 27, Mar. 1	19.5	17.5	11.5	5
1958—Mar. 20, Apr. 1	19	17	11	5
1958—Apr. 17	18.5	17	11	5
1958—Apr. 24	18	16.5	11	5

[1] When two dates are listed, the first applies to the change at central reserve city or reserve city banks and the second applies to country banks.

Source: *Banking and Monetary Statistics, 1941-70*, Table 10.4

Table 2

Changes in Reserve Requirements and Macroeconomic Conditions

	Using the period 1935-1959
Predicted output gap	19.4*** (5.7)
Predicted rate of inflation	.54*** (.18)
Constant1	-1.7 (.5)
Constant2	4.3 (.9)
Observations	78
LR χ^2	43.2
Pseudo R^2	.35

Notes: Standard errors are in parentheses. The symbol *** denotes statistical significance at the 1 percent level. That there are two constants is a result of using an ordered logit with three outcomes. The first constant indicates the log-odds of having the lowest outcome rather than the two higher outcomes while the second constant indicates the log-odds of having one of the two lowest outcomes rather than the highest outcome.

Table 3
Net free reserves and forecasted economic indicators in different time periods

	Period 1 1935q1 to 1941q3	Period 2 1947q1 to 1951q4	Period 3 1952q1 to 1959q3
Predicted output gap	-1214.5 (1970.5)	-1166.6 (1220.1)	-3735.7* (2055.0)
Predicated rate of inflation	25.9 (51.8)	16.1 (14.1)	-260.8** (114.9)
Constant	3502.3 (1644.2)	452.8 (105.4)	339.7** (157.2)
Observations	26	20	30
F-statistic	0	1.28	12.3
Adjusted R^2	-	0.03	.43

Notes: Standard errors are in parentheses. The symbols ***, **, and * denote statistical significance at the 1 percent, 5, percent, and 10 percent levels respectively. The regressions control for serial correlation.

Table 4
Commercial paper rate and forecasted economic indicators in different time periods

	Period 1 1935q1 to 1941q3	Period 2 1947q1 to 1951q4	Period 3 1952q1 to 1959q3
Predicted output gap	-.05 (.25)	2.56 (1.29)	5.7** (2.02)
Predicated rate of inflation	-.004 (.006)	-.002 (.010)	.22 (.15)
Constant	.73*** (.10)	1.63*** (.38)	2.52*** (.42)
Observations	26	20	30
F-statistic	10.1	0	4.49
Adjusted R^2	.41	-	.19

Notes: Standard errors are in parentheses. The symbols ***, **, and * denote statistical significance at the 1 percent, 5, percent, and 10 percent levels respectively. The regressions control for serial correlation.

Table 5
Level of net free reserves and monetary policy instruments for different time periods

	Period 1 1935m1 to 1941m9	Period 2 1947m1 to 1951m12	Period 3 1952m1 to 1959m9
Holdings of US Government securities	.27 (2.10)	-.02* (.01)	.12** (.05)
Reserve requirements	-90.6 (102.0)	-42.1*** (14.9)	17.5 (57.8)
Discount rate	-1222.7 (1600.9)	-52.9 (68.0)	-278.3*** (103.1)
Constant	6033.0 (5801.6)	1920.3 (271.9)	-2584.6 (1909.2)
Observations	81	60	93
F-statistic	.19	8.5	3.8
Adjusted R^2	.0	.28	.08

Notes: Standard errors are in parentheses. The symbols ***, **, and * denote statistical significance at the 1 percent, 5, percent, and 10 percent levels respectively. The regressions control for serial correlation.

Table 6
Level of net free reserves and monetary policy instruments including the gold stock for different time periods

	Period 1 1935Q1 to 1941Q3	Period 2 1947Q1 to 1951Q4	Period 3 1952Q1 to 1959Q3
Holdings of US government securities	4.84*** (1.25)	0.01 (0.03)	0.16** (0.06)
Reserve requirements	-317.3*** (40.1)	-70.0** (27.9)	-45.8 (75.3)
Discount rate	-515.1 (891.3)	-51.8 (68.7)	-262.0** (103.3)
Gold stock	0.54*** (0.05)	0.04 (0.04)	0.18 (0.15)
Constant	-9765.3 (4284.3)	939.6 (871.5)	-6256.3 (3653.1)
Observations	81	60	93
F-statistic	69.2	6.7	3.3
Adjusted R^2	.77	.28	.09

Notes: Standard errors are in parentheses. The symbols ***, **, and * denote statistical significance at the 1 percent, 5, percent, and 10 percent levels respectively. The regressions control for serial correlation.

Figure 1: Inflation and Changes in Required Reserve Ratios, 1935-59

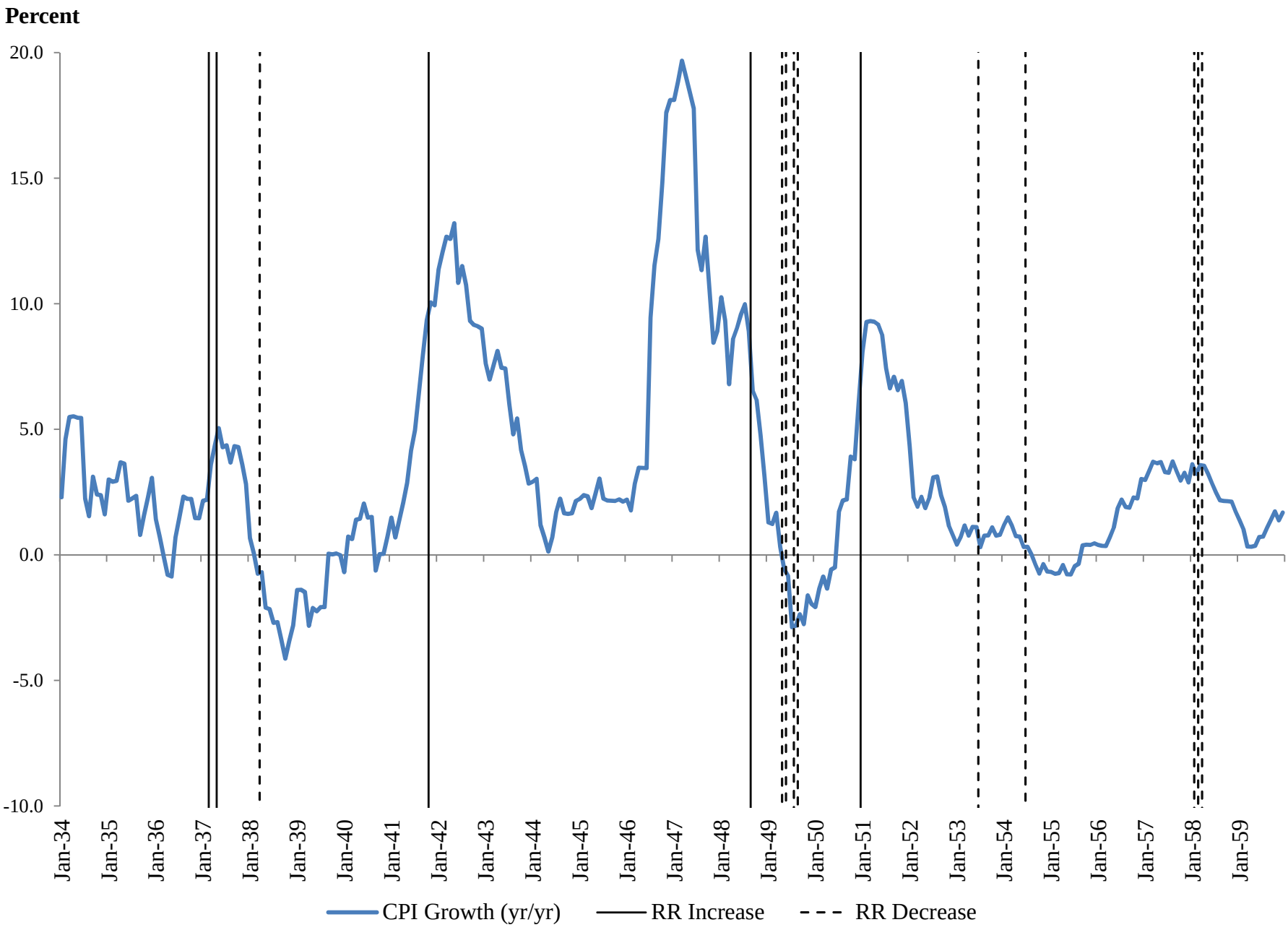

Figure 2: Output Gap and Changes in Required Reserve Ratios, 1934-59

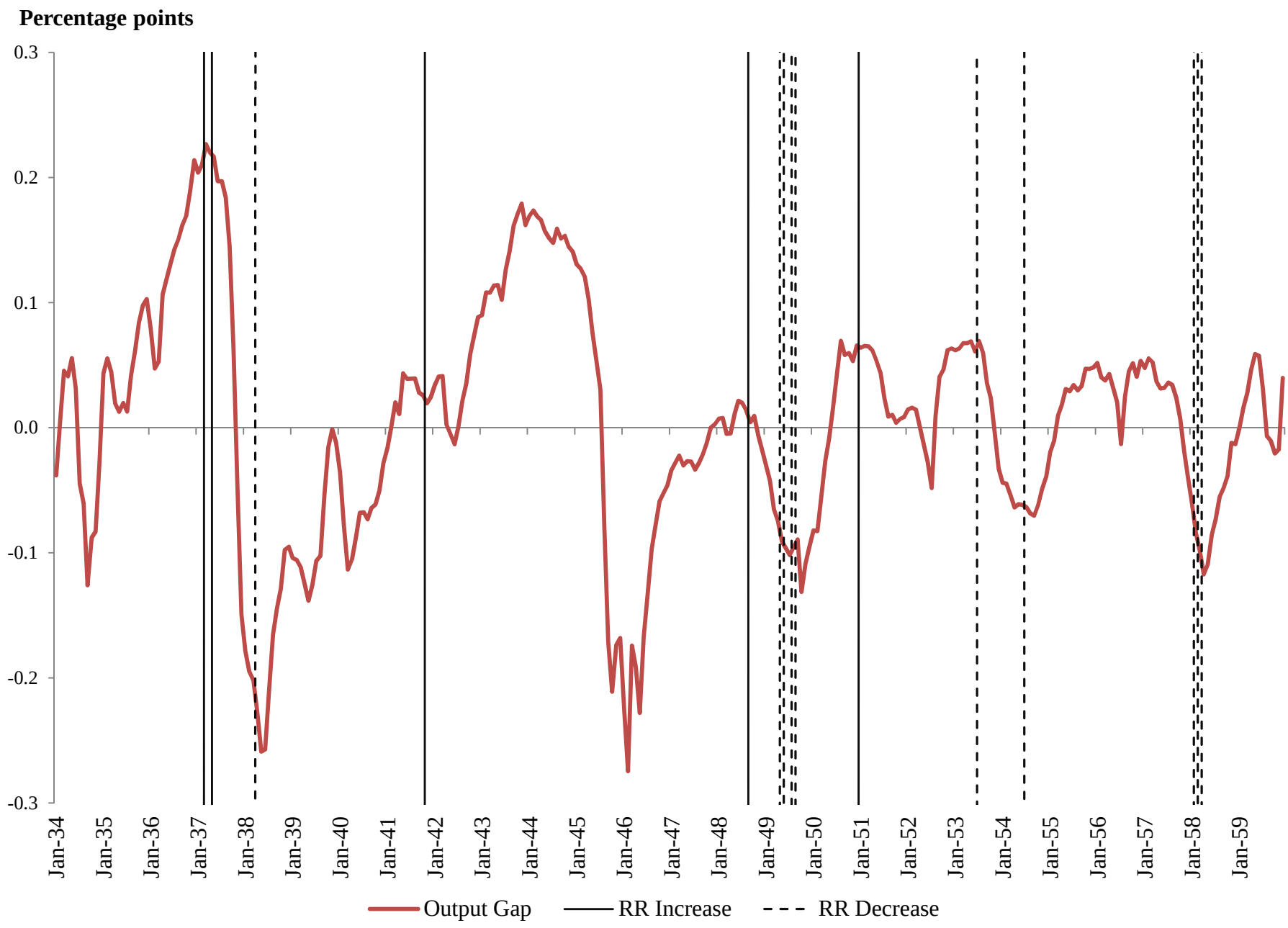

Figure 3: Monetary Gold Stock, Bank Reserves and Changes in Required Reserve Ratios, 1934-41

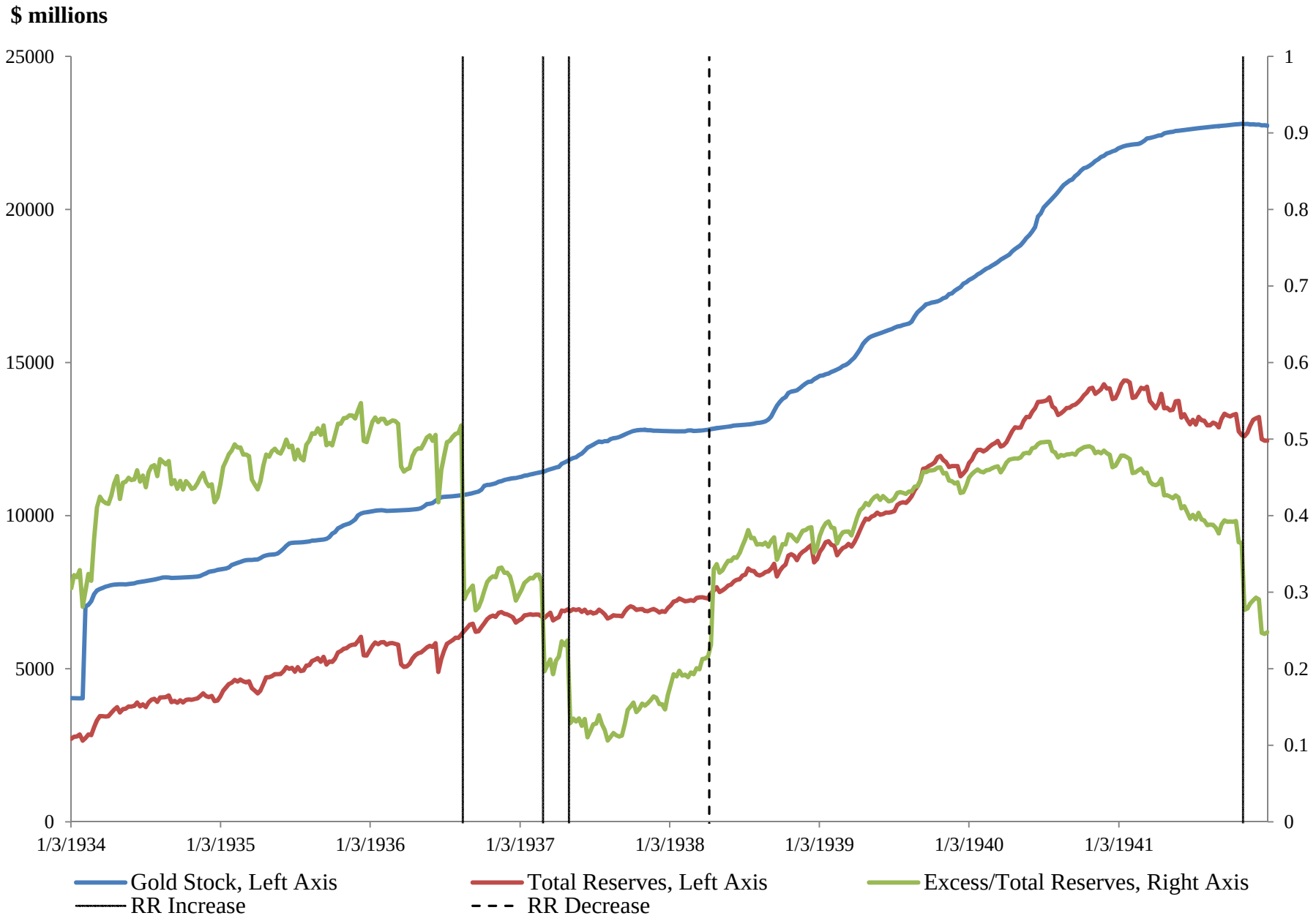

Figure 4: Government Security Yields and Changes in Required Reserve Ratios, 1934-59

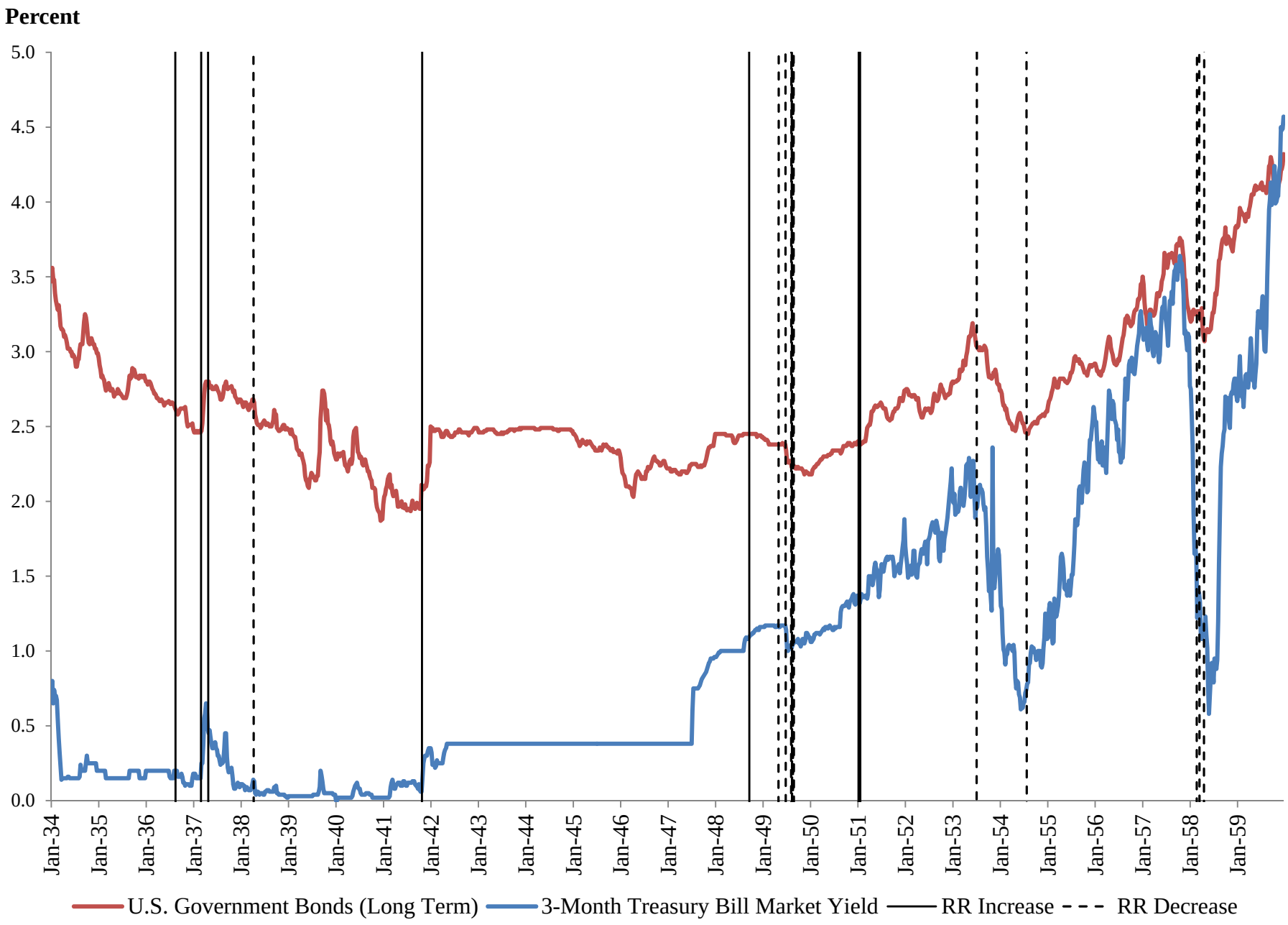
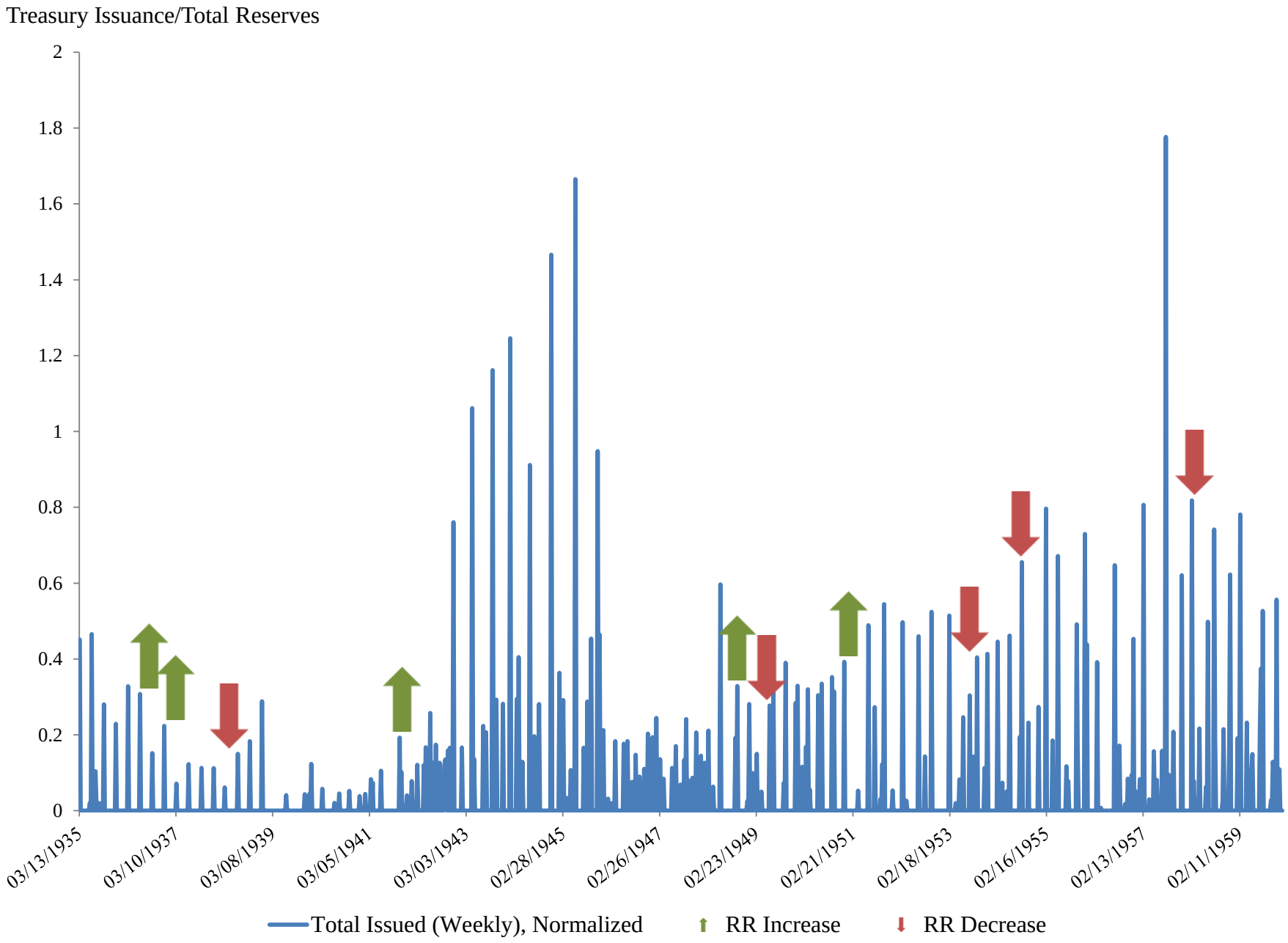
Figure 5: Treasury Issuance to Total Bank Reserves and Changes in Required Reserve Ratios, 1935-59