What Ended the Great Depression?

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This paper examines the role of aggregate-demand stimulus in ending the Great Depression. Plausible estimates of the effects of fiscal and monetary changes indicate that nearly all the observed recovery of the U.S. economy prior to 1942 was due to monetary expansion. A huge gold inflow in the mid- and late 1930s swelled the money stock and stimulated the economy by lowering real interest rates and encouraging investment spending and purchases of durable goods. That monetary developments were crucial to the recovery implies that self-correction played little role in the growth of real output between 1933 and 1942.

B etween 1933 and 1937 real GNP in the United States grew at an average rate of over 8 percent per year; between 1938 and 1941 it grew over 10 percent per year. These rates of growth are spectacular, even for an economy pulling out of a severe depression. Yet the recovery from the collapse of 1929 to 1933 has received little of the attention that economists have lavished on the Great Depression. Perhaps because the cataclysm of the early 1930s was so severe, modern economists have focused on the causes of the downturn and of the turning point in 1933. Once the end of the precipitous decline in output has been explained, there has been a tendency to let the story drop.[1] The eventual return to full employment is simply characterized as slow and incomplete until the outbreak of World War II.

In this article I examine in detail the source of the recovery from the Great Depression. I argue that the rapid rates of growth of real output in the mid- and late 1930s were largely due to conventional aggregate-demand stimulus, primarily in the form of monetary expansion. My calculations suggest that in the absence of these stimuli the economy

[1] Temin and Wigmore, "End of One Big Deflation," for example, provided a convincing explanation for the turning point in 1933 but did not analyze the process of recovery after 1934. A notable exception to this usual pattern is Bernstein, *Great Depression*, which analyzed the importance of structural changes throughout the recovery period.

would have remained depressed far longer and far more deeply than it actually did. This in turn suggests that any self-correcting response of the U.S. economy to low output was weak or nonexistent in the 1930s.

The possibility that aggregate-demand stimulus was the source of the recovery from the Depression has been considered and discounted by many studies. E. Cary Brown, for example, used a conventional Keynesian multiplier model and the concept of discretionary government spending to argue that fiscal policy was unimportant. His often-cited conclusion was that "fiscal policy . . . seems to have been an unsuccessful recovery device in the 'thirties—not because it did not work, but because it was not tried."[2] Milton Friedman and Anna Schwartz stressed that Federal Reserve policy was not the source of the recovery either: "In the period under consideration [1933–1941], the Federal Reserve System made essentially no attempt to alter the quantity of high-powered money."[3] While they were clearly aware that other developments led to a rise in the money supply during the mid-1930s, Friedman and Schwartz appear to have been more interested in the role that Federal Reserve inaction played in causing and prolonging the Great Depression than they were in quantifying the importance of monetary expansion in generating recovery.

The emphasis that these early studies placed on policy inaction and ineffectiveness may have led the authors of more recent studies to assume that conventional aggregate-demand stimulus could not have influenced the recovery from the Great Depression. Ben Bernanke and Martin Parkinson, for example, analyzed the apparent reversion of employment toward its trend level in the 1930s and were struck by the strength of the recovery. They believed, however, that "the New Deal is better characterized as having 'cleared the way' for a natural recovery . . . rather than as being the engine of recovery itself."[4] As a result, they argued that the trend reversion of the interwar economy is evidence of a strong self-corrective force. J. Bradford De Long and Lawrence Summers sounded a similar theme: "the substantial degree of mean reversion by 1941 is evidence that shocks to output are transitory." The only aggregate-demand stimulus that they thought might have contributed to the recovery was World War II, and they concluded that "it is hard to attribute any of the pre-1942 catch-up of the economy to the war."[5]

Despite this conventional wisdom, there is cause to believe that aggregate-demand developments, particularly monetary changes, were important in fostering the recovery from the Great Depression. That cause is the simple but often neglected fact that the money supply

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[2] Brown, "Fiscal Policy," pp. 863–66.
[3] Friedman and Schwartz, *Monetary History*, p. 511.
[4] Bernanke and Parkinson, "Unemployment, Inflation, and Wages," p. 212.
[5] De Long and Summers, "How Does Macroeconomic Policy?" p. 467.

(measured as M1) grew at an average rate of nearly 10 percent per year between 1933 and 1937, and at an even higher rate in the early 1940s. Such large and persistent rates of money growth were unprecedented in U.S. economic history. The simulations I present in this paper using policy multipliers based on the experiences of 1921 and 1938, as well as multipliers derived from macroeconometric models, suggest that these monetary changes were crucially important to the recovery. According to my calculations, real GNP would have been approximately 25 percent lower in 1937 and nearly 50 percent lower in 1942 than it actually was if the money supply had continued to grow at its historical average rate. Similar simulations for fiscal policy suggest that changes in the government budget surplus played little role in generating the recovery.

In addition to estimating the effects of the tremendous monetary expansion during the mid- and late 1930s, I also examine the source of this expansion and the transmission mechanism that operated between the monetary changes and the real economy. The increase in the money supply was primarily due to a gold inflow, which was in turn due to devaluation in 1933 and to capital flight from Europe because of political instability after 1934. My estimates of the ex ante real interest rate suggest that, coincident with this gold inflow, real interest rates fell precipitously in 1933 and remained low or negative throughout most of the second half of the 1930s. These low real interest rates are closely correlated with a strong rebound in interest-sensitive spending. Thus, it is plausible that expansionary monetary developments were working through a conventional interest-rate transmission mechanism.

THE STRENGTH OF THE RECOVERY

My concern in this article with finding the source of the high rates of real growth during the recovery from the Great Depression may seem strange to those accustomed to thinking of that recovery as slow. The conventional wisdom is that the U.S. economy remained depressed for all of the 1930s and only returned to full employment following the outbreak of World War II. The reconciliation of these two seemingly disparate views lies in the fact that the declines in real output in the early 1930s, and again in 1938, were so large that it took many years of unprecedented growth to undo them and return real output to normal levels.

For most of my analysis I examined annual estimates of real GNP from the U.S. Bureau of Economic Analysis.[6] Because this series begins at 1929, I extended it backward in time, when necessary, with my revised version of the Kendrick-Kuznets GNP series.[7] The percentage changes in real GNP shown in Figure 1 clearly demonstrate both the

[6] U.S. Bureau of Economic Analysis, *National Income and Product Accounts*, table 1.2, p. 6.
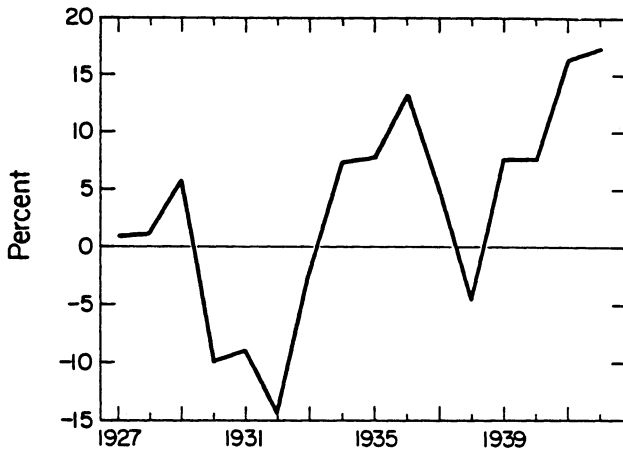[7] Romer, "World War I," table 5, p. 104.

severity of the collapse of real output between 1929 and 1933 and the strength of the subsequent recovery. Between 1929 and 1933, real GNP declined 35 percent; between 1933 and 1937, it rose 33 percent. In 1938 the economy suffered another 5 percent decrease in real GNP, but this was followed by an even more spectacular increase of 49 percent between 1938 and 1942. By almost any standard, the growth of real GNP in the four-year periods before and after 1938 was spectacular.

It is certainly the case, however, that despite this rapid growth, output remained substantially below normal until about 1942. A simple way to estimate trend output for the 1930s is to extrapolate the average annual growth rate of real GNP between 1923 and 1927 forward from 1927. The years 1923 through 1927 were chosen for estimating normal growth because they are the four most normal years of the 1920s; this period excludes the recession and recovery of the early 1920s and the boom in 1928 and 1929. This was also a period of price stability, suggesting that output was neither abnormally high nor abnormally low. The resulting figure for normal annual real GNP growth is 3.15 percent. Figure 2 shows the log value of actual real GNP and trend GNP based on this definition of normal growth. The graph shows that GNP was about 38 percent below its trend level in 1935 and 26 percent below it in 1937. Only in 1942 did GNP return to trend.

The behavior of unemployment during the recovery from the Great Depression is roughly consistent with the behavior of real GNP. Although many scholars have rightly emphasized that the unemployment rate was still nearly 10 percent as late as 1941, it had fallen quite
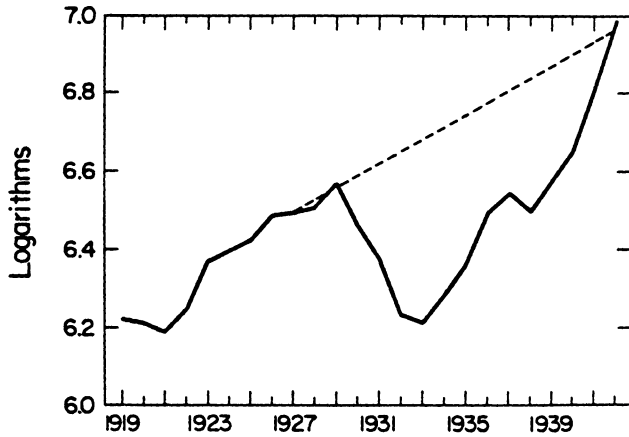
FIGURE 2

ACTUAL AND TREND REAL GROSS NATIONAL PRODUCT, 1919–1942

Note: Trend GNP, which is shown by the dashed line, is calculated by extrapolating the growth rate of real GNP between 1923 and 1927 forward from 1927. Therefore, this series does not start until 1927.
Source: The source for real GNP is the same as in Figure 1.

rapidly from its high of 25 percent in 1933.[8] It declined, for example, by more than three percentage points in both 1934 and 1936. That full employment was not reached again until 1942 is consistent with the fact that real output remained significantly below trend until that year.

THE EFFECTS OF AGGREGATE-DEMAND STIMULUS IN THE RECOVERY

To examine whether aggregate-demand stimulus can explain the high rates of real growth during the recovery phase of the Great Depression, I performed an illustrative calculation. Consider decomposing the deviation of output growth from normal into the effect of lagged deviations of monetary and fiscal changes from normal and the effect of all other factors that might influence real growth, so that

$$\text{output change}_t = \beta_m(\text{monetary change})_{t-1} + \beta_f(\text{fiscal change})_{t-1} + \epsilon_t \quad (1)$$

where β_m and β_f are the multipliers for monetary and fiscal policy and ϵ_t is a residual term that includes such things as supply shocks and changes in animal spirits. This residual term also includes any tendency that the economy might have to right itself following a recession. Using annual data, this decomposition is most likely to hold with a one-year

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[8] The unemployment statistics are from Lebergott, *Manpower*, table A–3, p. 512. Darby, "Three-and-a-Half Million," argued that the return of unemployment to its full employment level was significantly more rapid if one counts workers on public works jobs as employed. Margo, "Interwar Unemployment," concluded from an analysis of the 1940 census data that at least some of Darby's correction was warranted.

lag between policy changes and output changes because policy changes do not immediately affect real output.

Within this framework, if one measures β_m, β_f, output deviations, and policy changes, it is possible to calculate what the residual term must be in any given year. Since these yearly residual terms reflect all the factors affecting growth other than policy, they show how fast the economy would have grown (relative to normal) had monetary and fiscal changes not occurred. A comparison of the actual path of real output with what output would have been in the absence of policy changes provides a way of quantifying the importance of policy.

To apply this decomposition to the recovery phase of the Great Depression, I used as the measure of output change the deviation of the growth rate of real GNP from its average annual growth rate during the years 1923 through 1927. For the monetary policy variable I used the deviation of the annual (December to December) growth rate of M1 from its normal growth rate, where normal is again defined as the average annual growth rate between 1923 and 1927.[9] The average annual growth rate of M1 over this period was 2.88 percent. For the fiscal policy variable I used the annual change in the ratio of the real federal surplus to real GNP.[10] This measure of fiscal policy assumes that the normal change in the real federal surplus is zero.[11]

[9] The data on M1 are from Friedman and Schwartz, *Monetary History*, table A-1, column 7, pp. 704–34. An alternative measure of monetary policy that might be considered is the deviation of real money growth from normal. However, changes in nominal money are what shift the aggregate-demand function; changes in real money result from the interaction of aggregate-demand and aggregate-supply movements. Since the purpose of this paper is to isolate the effects of aggregate-demand stimulus, it is appropriate to use a measure of monetary policy that only reflects changes in demand.

[10] The surplus data are from the U.S. Department of the Treasury, *Statistical Appendix*, table 2, pp. 4–11, and are based on the administrative budget. Because these data are for fiscal years, I converted them to a calendar-year basis by averaging the observations for a given year and the subsequent year. The data were deflated using the implicit price deflator for GNP. The deflator series and the real GNP series for 1929 to 1942 are from the U.S. Bureau of Economic Analysis, *National Income and Product Accounts*; data for 1919 to 1928 are from Romer, "World War I." I used the administrative budget data instead of the NIPA surplus data because they are available on a consistent basis for the entire interwar era. While the two surplus series differ substantially in some years, the gross movements in the series are generally similar. I divided the surplus by GNP to scale the variable relative to the economy.

[11] In place of the actual surplus-to-GNP ratio, the full-employment surplus-to-GNP ratio could be used. I did not use this variable because it treats a decline in revenues caused by a decline in income as normal rather than as an activist policy. This is inappropriate for the prewar and interwar eras, when raising taxes in recessions was usually preferred to letting the budget slip seriously into deficit. However, the differences between the full-employment surplus and the actual surplus were so small even in the worst years of the Depression that the two measures yield similar results. Another possible measure of fiscal policy is the weighted surplus, which takes into account the fact that a surplus caused by changes in taxes and transfers will have a different impact than a surplus caused by a change in government purchases. Blinder and Solow, "Analytical Foundations," showed that the practical effects of such weighting are typically small and sensitive to model specification and the time horizon considered.

Estimates of the Policy Multipliers

Deriving the policy multipliers to use in the decomposition is a far more difficult task than measuring the deviation of monetary and fiscal policy from normal. One way of deriving the multipliers is to take estimates from a large postwar macroeconomic model. Another strategy is to simply posit reasonable values for these multipliers. In my later discussion of robustness, I show the results of both of these approaches. However, an alternative procedure that is more in the spirit of the exercise is to use historical evidence to identify certain years when the residual term in equation 1 was small and when the changes in monetary and fiscal policy were independent of movements in real output. If there were two such episodes, one can simply infer estimates of β_m and β_f from the decomposition itself.[12]

The recessions of 1921 and 1938 are arguably two such crucial episodes. In both cases there were large movements in real output that have been almost universally ascribed to monetary and fiscal policy decisions. Friedman and Schwartz, for example, stated that "in both cases, the subsequent decline in the money stock was associated with a severe economic decline."[13] This emphasis on monetary factors in 1921 and 1938 was echoed by W. Arthur Lewis and by Kenneth Roose.[14] Other authors assigned a much more important role to fiscal policy as the source of these two interwar downturns. Alvin Hansen, Arthur Smithies, Leonard Ayres, and Robert A. Gordon all attributed the recession of 1938 to the decline in government spending.[15] Gordon also argued that the decline in government spending after World War I and the increase in the discount rate were the two factors that helped to tip a vulnerable economy into a severe recession in 1920.[16]

Furthermore, most alternative explanations that have been advanced for these two recessions are easily disproved; there is little evidence that other factors (the ϵ_t in equation 1) were important in determining the behavior of real output in 1921 and 1938. For example, one explanation for the downturn in 1938 is that increases in wages due to increased unionization decreased output and investment; in short, that there was an adverse supply shock in 1937.[17] An adverse supply shock, however, should have been accompanied by rising prices. This did not occur: between 1937 and 1938 producer prices fell 9.4 percent. On the other hand, the policy hypotheses that stress a fall in aggregate demand are

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[12] This method of deriving rough estimates of the effects of policy is an example of the narrative approach described in Romer and Romer, "Does Monetary Policy Matter?"

[13] Friedman and Schwartz, *Monetary History*, p. 678.

[14] Lewis, *Economic Survey*, pp. 19–20; and Roose, *Economics of Recession*, p. 239.

[15] Hansen, *Full Recovery*; Smithies, "American Economy"; Ayres, *Turning Points*; and Gordon, *Economic Instability*.

[16] Gordon, *Economic Instability*, p. 20.

[17] See, for example, Roose, *Economics of Recession*, p. 239.

consistent with the observed fall in prices. The monetary explanation is also consistent with the fact that interest rates rose sharply in early 1937 and interest-sensitive spending such as construction expenditures plummeted in late 1937.

The main alternative explanation advanced for the recession of 1921 is that the tremendous pent-up demand for consumer goods that developed during and after World War I was satisfied by 1920 and firms faced a dramatic decline in sales.[18] The problem with this story is that real consumer expenditures rose 4.8 percent between 1919 and 1920 and 6.2 percent between 1920 and 1921.[19] Any spending story also conflicts with the fact that interest rates rose substantially in 1920.

One partial explanation for the behavior of real output in 1921 that is hard to dismiss is the occurrence of a positive supply shock. In a previous article I argued that the recovery of agricultural production in Europe caused prices of agricultural goods in the United States to plummet in 1920.[20] This, in turn, stimulated the production of industries that used agricultural commodities as inputs. The presence of a favorable supply shock in this episode implies that the ϵ_t in equation 1 for 1921 could be positive. In the discussion of robustness that follows the simple calculation of the multiplier, I show that even the inclusion of a substantial positive residual in 1921 does not change the qualitative results.

The nature of the policy changes in the years preceding the recessions of 1921 and 1938 indicates that these changes were independent of movements in the real economy: the money supply and the government surplus changed in 1920 and 1937 because of active policy decisions, not because of endogenous responses of money growth or government spending to a fall in real output. Most obviously, in 1920 it was the end of World War I that led to an enormous drop in real government spending. The magnitude of this change can be seen in the fact that the surplus-to-GNP ratio rose from −8.3 percent in 1919 to 0.5 percent in 1920.

Monetary policy changes in this episode were also quite pronounced and largely independent. According to Friedman and Schwartz, the Federal Reserve in 1919 became concerned about the lingering inflation from World War I and the postwar boom.[21] In response, the Federal Reserve raised the discount rate three-quarters of a percentage point in December. The diaries and papers of members of the Board of Governors of the Federal Reserve System that Friedman and Schwartz analyzed suggest that the Federal Reserve did not understand the lags with which monetary policy affected the economy. As a result, when the

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[18] See, for example, Lewis, *Economic Survey*, p. 19.
[19] The consumption data are from Kendrick, *Productivity Trends*, table A-IIa, p. 294.
[20] Romer, "World War I."
[21] Friedman and Schwartz, *Monetary History*, pp. 221–39.

economy failed to respond immediately to the increase in interest rates, the Federal Reserve raised the discount rate another 1 1/4 percentage points in January 1920 and an additional percentage point in June 1920. Because these large increases in interest rates appear to be mainly the result of Federal Reserve inexperience, they represent independent monetary developments rather than conscious responses to the current state of the real economy.

In 1937 the tightening of fiscal policy was less dramatic, but still quite severe. In 1936 a large bonus had been paid to veterans of World War I. In 1937, not only was there no payment of this kind, but social security taxes also were collected for the first time. This increase in revenues was clearly unrelated to developments in the real economy; it reflected a conscious decision to permanently raise taxes to finance a pension system. The result of these two changes was that the surplus-to-GNP ratio rose from -4.4 percent in 1936 to -2.2 percent in 1937.

Monetary changes in 1937 were less straightforward than those in 1920, but still largely independent. Friedman and Schwartz viewed the main monetary shock as the doubling of reserve requirements in three steps between July 1936 and May 1937.[22] The Federal Reserve raised reserve requirements because it was concerned about the high level of excess reserves in 1936 and wanted to turn them into required reserves. According to Friedman and Schwartz, this action greatly decreased the money supply because banks wanted to hold excess reserves. As a result, they decreased lending so that reserves were still higher than the new required levels.[23] Friedman and Schwartz viewed the resulting change in the money supply as independent because the Federal Reserve was not responding to the real economy: it inadvertently contracted the money supply because it misunderstood the motivation of bankers.[24]

The independence of policy movements in 1920 and 1937 and the absence of additional causes of the recessions of 1921 and 1938 suggest that these two episodes can be used to estimate multipliers for monetary and fiscal policy. To do this calculation, I merely substituted the relevant data for 1921 and 1938 into equation 1 and then solved the two equation system for β_f and β_m. Table 1 shows the calculation.

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[22] Ibid., pp. 543–45.

[23] The fact that interest rates rose substantially in 1937 adds credence to the view that lending fell because banks restricted loans and not because the demand for loans declined.

[24] In addition to the change in reserve requirements, the Treasury in 1936 began sterilizing the gold inflow. This resulted in a substantial slowing in the growth rate, though not an actual decline, of the stock of high-powered money. This switch to sterilization appears to be part of the same policy mistake that led to the increase in reserve requirements. According to Chandler, *America's Greatest Depression*, pp. 177–181, the Treasury undertook the sterilization at the behest of the Federal Reserve, which feared that an unsterilized gold inflow would exacerbate the excess reserves problem. Chandler cited as evidence that the Treasury did not mean to affect the money supply the fact that they were greatly concerned by the resulting rise in interest rates in 1937.

TABLE 1
CALCULATION OF THE POLICY MULTIPLIERS

Substituting data into equation 1 and setting ε_t equal to zero yields:

1921: $-0.0554 = \beta_m\,(-0.0424) + \beta_f\,(0.0878)$
1938: $-0.0772 = \beta_m\,(-0.0877) + \beta_f\,(0.0218)$

Solving two equations for two unknowns yields:

$$\beta_m = \frac{(-0.0554)(0.0218) - (0.0878)(-0.0772)}{(-0.0424)(0.0218) - (-0.0877)(0.0878)} = 0.823$$

$$\beta_f = \frac{-0.0772 - \beta_m(-0.0877)}{0.0218} = -0.233$$

Note: The intermediate calculations presented differ slightly from the final multipliers because of rounding.
Source: See the text.

Using this approach, the estimated multiplier for monetary policy is 0.823 and the estimated multiplier for fiscal policy is -0.233. The signs of the two multipliers are what would be expected. β_f is negative because the fiscal policy variable is based on the federal surplus; an increase in the fiscal policy measure is contractionary. The magnitude of the monetary policy multiplier is quite reasonable. It implies that a growth rate of M1 that is one percentage point lower than normal results in real output growth that is 0.82 percentage points lower than normal. As I describe in more detail later, this result is consistent with the effects of monetary factors found in large macromodels. The magnitude of the fiscal policy multiplier is quite small. It implies that a rise in the surplus-to-GNP ratio of one percentage point lowers the growth rate of real output relative to normal by 0.23 percentage points. The reason for this small multiplier is the fact that the deviation of real output growth from normal was slightly smaller in 1921 than in 1938, but the fiscal policy shock was nearly four times as large in 1920 as in 1937. Consequently, it would be very difficult to attribute most of the declines in output in 1921 and 1938 to fiscal policy.

Simulations

Armed with these multipliers, it is possible to calculate the likely effects of monetary and fiscal developments during the mid- and late 1930s. As I have set up the analysis, the multiplier times the policy measure lagged one year shows the effect of policy on the deviation of output growth from normal in a given year. If one subtracts this effect of unusual policy from the actual growth rate of real output, one is left with estimates of what the growth rate of output would have been under
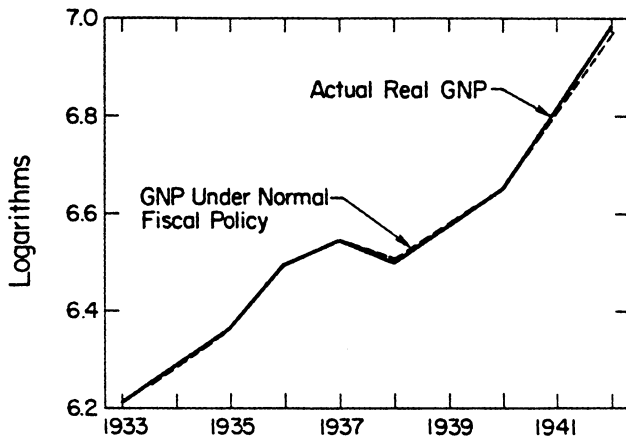
FIGURE 3

ACTUAL OUTPUT AND OUTPUT UNDER NORMAL FISCAL POLICY, 1933–1942

Note: The dashed line shows the path of the log-value of real GNP under the assumption that fiscal policy was at its normal level throughout the mid- and late 1930s; the solid line shows the path of actual real GNP.
Sources: The calculation of output under normal fiscal policy is described in the text. The source for real GNP is the same as in Figure 1.

normal policy. Accumulating these growth rates of real output under normal policy and then adding them to the level of output in a base year yields a series of the levels of output under normal policy.

The difference between the path of actual output and the path of output under normal policy shows how much slower the recovery would have been in the absence of expansionary policy. In calculating the path of real output under normal policy I used 1933 as the base year. This path shows what output would have been under normal policy after 1933, without taking into account the fact that the Depression was probably caused to a large extent by serious policy mistakes. This procedure is appropriate because the purpose of this article is not to argue that policy did not contribute to the downturn of the early 1930s, but rather that policy was central to the recovery in the mid- and late 1930s. In calculating the effects of unusual policy, I did the analysis separately for monetary and fiscal policy. In one experiment I asked what output would have been if fiscal policy had been normal but monetary policy had followed its actual historical path. In a second, I held monetary policy to its normal level and let fiscal policy follow its actual path.

Figure 3 shows the experiment for fiscal policy. The great similarity of actual real GNP and GNP under normal fiscal policy indicates that unusual fiscal policy contributed almost nothing to the recovery from the Great Depression. Only in 1942 is there a noticeable difference between actual and hypothetical output, and even in this year the difference is small.
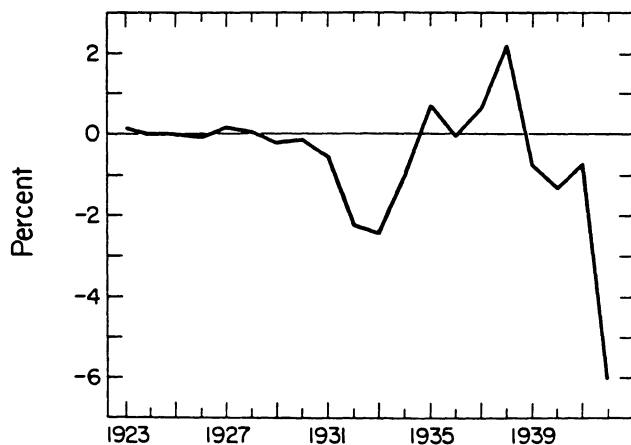
FIGURE 4

CHANGES IN SURPLUS-TO-GROSS NATIONAL PRODUCT RATIO, 1923–1942

Note: The changes are shown lagged one year because this is the form in which they enter my calculation.
Sources: The surplus data are from the U.S. Department of the Treasury, *Statistical Appendix*, table 2, pp. 4–11. The text describes adjustments that I made to the base data. The source for real GNP is the same as in Figure 1.

The small estimated effect of fiscal policy stems in part from the fact that the multiplier based on 1921 and 1938 is small, but it is more fundamentally due to the fact that the deviations of fiscal policy from normal were not large during the 1930s. This fact can be seen in Figure 4, which shows the change in the surplus-to-GNP ratio (lagged one year). The change in this ratio in the mid-1930s was typically less than one percentage point and was actually positive in some years, indicating that fiscal policy was sometimes contractionary during the recovery. Even in 1941, the first year of a substantial wartime increase in spending, the surplus-to-GNP ratio only fell by six percentage points.

Figure 5 shows the experiment for monetary policy.[25] This time the paths for actual GNP and GNP under normal monetary policy are tremendously different. The difference in the two paths indicates that had the money growth rate been held to its usual level in the mid-1930s, real GNP in 1937 would have been nearly 25 percent lower than it actually was. By 1942 the difference between GNP under normal and actual monetary policy grows to nearly 50 percent. These calculations suggest that monetary developments were crucial to the recovery. If money growth had been held to its normal level, the U.S. economy in

[25] McCallum, "Could a Monetary Base Rule?" also used a simulation approach to analyze the effects of monetary factors in the 1930s. McCallum's focus, however, was on whether a monetary base rule could have prevented the Great Depression, rather than on whether actual money growth fueled the recovery.
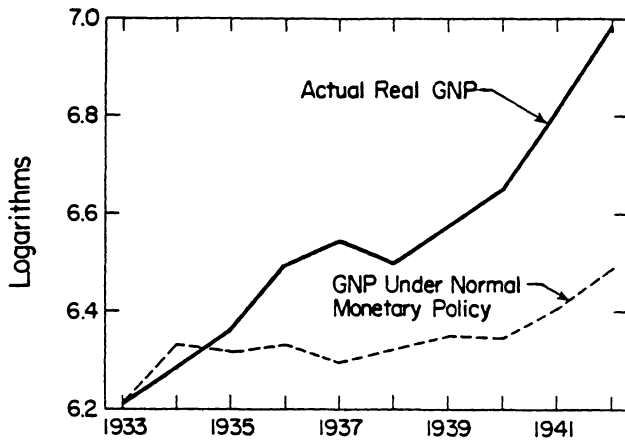
FIGURE 5

ACTUAL OUTPUT AND OUTPUT UNDER NORMAL MONETARY POLICY, 1933–1942

Note: The dashed line shows the path of real GNP under the assumption that the money growth rate was held to its normal pre–Depression level throughout the mid- and late 1930s; the solid line shows the path of actual real GNP.
Sources: The calculation of output under normal monetary policy is described in the text. The source for real GNP is the same as in Figure 1.

1942 would have been 50 percent below its pre-Depression trend path, rather than back to its normal level.[26]

The source of this large estimated effect of monetary developments is not hard to find. As I point out in greater detail in the following discussion, the monetary policy multiplier estimated from 1921 and 1938 is not implausibly large: it is roughly of the magnitude found in postwar macromodels. The large estimated effects of monetary developments are due to the extraordinarily high rates of money growth in the mid- and late 1930s. The monetary policy variable (lagged one year) is graphed in Figure 6. As can be seen, the deviations of the money growth rate from normal were enormous in the mid- and late 1930s. For most years these deviations were over 10 percent. It is not at all surprising, therefore, to find that had this deviation from normal been held at zero, the recovery from the Depression would have been dramatically slower.

Robustness

The results of these simulations are quite robust. Monetary policy was so expansionary during the recovery, and fiscal policy so non-expansionary, that changing the multipliers substantially would not make monetary policy unimportant and fiscal policy crucial. For exam-

[26] One could start the simulations in 1929 to estimate the role of monetary developments in causing the Depression. While this procedure is not strictly correct, because some of the monetary developments in the early 1930s were clearly endogenous, the results confirm the conventional wisdom: monetary forces had little effect during the onset of the Great Depression in 1929 and 1930, but were the crucial cause of the deepening of the Depression in 1931 and 1932.
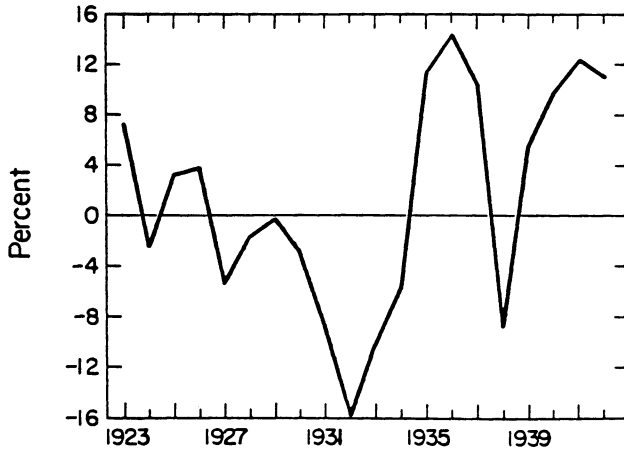
ple, assuming that there was a substantial positive supply shock in 1921 decreases the monetary policy multiplier and increases the fiscal policy multiplier.[27] Even with an extreme change, however, such as cutting the monetary policy multiplier in half and quadrupling the fiscal policy multiplier, real GNP in 1942 would have been roughly 25 percent lower than it actually was had monetary policy been held to its normal level during the mid- and late 1930s. This result still suggests that the aggregate-demand stimulus of monetary policy was crucial to the recovery. In the case of fiscal policy, quadrupling the multiplier leads to the conclusion that real GNP would have been 6 percent lower in 1942 than it actually was had the change in the surplus-to-GNP ratio been held to zero. This increases the apparent role of fiscal policy, but not dramatically.

Another way to evaluate the robustness of the calculations is to use policy multipliers derived from the estimation of a postwar macro-model. The Massachusetts Institute of Technology–University of Pennsylvania–Social Science Research Council (MPS) model is the main

[27] The assumption that ϵ_t in equation 1 is large and positive can be included in the calculation shown in Table 1 by simply subtracting the residual from the change in output in 1921. This reflects the fact that in the absence of the supply shock, the effect of the monetary and fiscal contraction would have been larger. An increase in the effective contraction of GNP in 1921 would decrease the estimate of β_m and increase the estimate of β_f. For example, if ϵ_t in 1921 were 0.0554, then the change in real GNP less the supply shock would be -0.1108, double the actual change in real GNP. Redoing the calculation with this change results in a monetary policy multiplier of 0.644 and a fiscal policy multiplier of -0.951.

forecasting model currently used by the Federal Reserve Board. In this model, the short-run multiplier for monetary policy is 1.2, slightly larger than the multiplier derived from the 1921 and 1938 episodes; the multiplier for fiscal policy is -2.13, roughly ten times larger than that derived from the 1921 and 1938 episodes.[28]

Using the multipliers from the MPS model in place of those derived from my calculation increases the apparent importance of monetary policy—real GNP in 1942 would have been roughly 70 percent lower than it actually was had monetary policy been held to its normal course—and increases the role for fiscal policy—real GNP in 1942 would have been 14 percent lower than it actually was had fiscal policy been held to its normal level. Essentially all of this effect of fiscal policy, however, comes from the last year of the simulation; real GNP in 1941 would have been only 1 percent lower than it actually was if fiscal policy had been held to its normal level. Thus, using policy multipliers derived from a much different procedure than I used in my illustrative calculation leads to the same conclusion that monetary policy was crucial to the recovery from the Great Depression and fiscal policy was of little importance.[29]

One characteristic of most multipliers derived from large macromodels is that the effects of aggregate-demand policy on the level of real output are forced to become zero in the long run. This is certainly the case in the MPS model in which the long-run behavior of the economy is assumed to follow the predictions of a Solow growth model. In my simulations, both with my own multipliers and with those from the MPS model, I only considered the short-run multipliers and did not require that the positive effects of an expansionary aggregate-demand shock on the level of real output be eventually undone. I did this because the

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[28] These multipliers are reported in the U.S. Board of Governors of the Federal Reserve System, "Structure and Uses of the MPS Quarterly Econometric Model," tables 1 and 2. The monetary policy shock used in the MPS simulation is a permanent increase in the level of M1 of 1 percent over the projected baseline. This is equivalent to the shock I considered in my simulations, which is a one-time deviation in the growth rate of M1 from its normal growth rate. I used the MPS multiplier derived from the full-model response (case 3 of table 2). The fiscal shock used in the MPS simulation is a permanent increase in the purchases of the federal government by 1 percent of real GNP over the baseline projection. This differs from the shock I considered, which is a change in the surplus-to-GNP ratio, because tax revenues will rise in response to the induced increase in GNP. To make the MPS multiplier consistent with my measure of fiscal policy, I assumed the marginal tax rate to be 0.3 and then calculated the change in the surplus-to-GNP ratio that corresponded to a 1 percent increase in federal purchases. The MPS multiplier that I adjusted in this way is based on the full-model response, with M1 fixed (case 4 of table 1).

[29] Weinstein, "Some Macroeconomic Impacts," performed a similar calculation for monetary policy using multipliers derived from the Hickman-Cohen model and found a large potential effect of the monetary expansion in 1934 and 1935. However, he emphasized that the National Industrial Recovery Act acted as a negative supply shock and counteracted the monetary expansion. While the NIRA may indeed have stunted the recovery somewhat, it does not follow from this that monetary policy was unimportant to the recovery. In the absence of the monetary expansion, the supply shock could have led to continued decline rather than to the rapid growth of real output that actually occurred.

constraint that the long-run effects of policy are zero is simply imposed a priori in most models; available evidence indicates that the real effects of policy shifts are in fact highly persistent.[30]

Provided that we do not assume that the positive effects of expansionary policy are quickly reversed (that is, within a year or two), allowing for negative feedback effects from a policy stimulus would not substantially diminish the role of policy in generating the high real growth rates observed in the mid- and late 1930s. This is true for two reasons: in the first few years of the expansion there would have been no negative feedback effects from previous policy expansions, and there were progressively larger monetary growth rates toward the end of the recovery. Furthermore, there is no support for the view that the effects of policy shifts are counteracted rapidly. In the MPS model, for example, the effects of both fiscal and monetary shocks do not start to be counteracted substantially until twelve quarters after the shocks. Thus, even under the assumption that policy does not matter in the long run, we would still find that policy was important for the eight to ten years that encompassed the recovery phase of the Great Depression.

THE SOURCE OF THE MONETARY EXPANSION

That economic developments would have been very different in the mid- and late 1930s had money growth been held to its normal level is evident from the calculations above. But to go further and argue that aggregate-demand stimulus actually caused the recovery, it must be shown that the rapid rates of monetary growth were due to policy actions and historical accidents, and were not the result of higher output bringing forth money creation. This is easy to do.

The main way that the money supply might grow endogenously is through demand-induced changes in the money multiplier. If, in response to a boom, banks raise the deposit-to-reserve ratio and customers accept a higher deposit-to-currency ratio, a given supply of high-powered money can support a larger stock of M1. Neither of these changes, however, occurred during the recovery from the Great Depression. The deposit-to-reserve ratio fell steadily in the mid- and late 1930s, from 8.86 in January 1933 to 4.67 in December 1942. The deposit-to-currency ratio rose initially in the recovery as the banking system regained credibility, but remained fairly constant from 1935 until 1941, and then fell sharply in late 1941 and 1942.[31]

Since the behavior of both these ratios suggests that the money multiplier fell during the recovery from the Great Depression, the observed rise in M1 must have been due to even larger increases in the stock of high-powered money during this period. This increase in the

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[30] See, for example, Romer and Romer, "Does Monetary Policy Matter?"

[31] The data are from Friedman and Schwartz, *Monetary History*, table B-3, pp. 799–808.

stock of high-powered money was also not endogenous. There is no evidence that the Federal Reserve increased the stock of high-powered money to accommodate the higher transactions demand for money caused by increased output. Instead, the Federal Reserve maintained a policy of caution throughout the recovery and even stopped increasing Federal Reserve credit to meet seasonal demands in the mid- and late 1930s.[32]

The source of the huge increases in the U.S. money supply during the recovery was a tremendous gold inflow that began in 1933. Friedman and Schwartz stated that the "rapid rate [of growth of the money stock] in the three successive years from June 1933 to June 1936 . . . was a consequence of the gold inflow produced by the revaluation of gold plus the flight of capital to the United States. It was in no way a consequence of the contemporaneous business expansion."[33] The monetary gold stock nearly doubled between December 1933 and July 1934 and then increased at an average annual rate of nearly 15 percent between December 1934 and December 1941.[34] Arthur Bloomfield agrees with Friedman and Schwartz that "the devaluation of the dollar, for technical reasons, was . . . the direct cause of much of the heavy net gold imports of $758 million in February–March, 1934."[35] Thus, the initial gold inflow was the result of an active policy decision on the part of the Roosevelt administration.

Both these studies, however, attributed most of the continuing increases in the U.S. monetary gold stock throughout the later 1930s to political developments in Europe. Bloomfield pointed out that the continued gold inflow was caused primarily by huge net imports of foreign capital into the United States; the United States ran persistent and large capital account surpluses in the mid- and late 1930s.[36] He then argued that "probably the most important single cause of the massive movement of funds to the United States in 1934–39 as a whole was the rapid deterioration in the international political situation. The growing threat of a European war created fears of seizure or destruction of wealth by the enemy, imposition of exchange restrictions, oppressive war taxation. . . . Huge volumes of funds were consequently transferred in panic to the United States from Western European countries likely to be involved in such a conflict."[37] Friedman and Schwartz were more succinct when they concluded: "Munich and the outbreak of war in Europe were the main factors determining the U.S. money stock in

[32] Ibid., pp. 511–14.

[33] Ibid., p. 544.

[34] The data are from Chandler, *America's Greatest Depression*, p. 162.

[35] Bloomfield, *Capital Imports*, p. 142.

[36] According to Bloomfield, *Capital Imports*, p. 269, the United States also ran a small current account surplus in every year except 1936.

[37] Ibid., pp. 24–25.

those years [1938–1941], as Hitler and the gold miners had been in 1934 to 1936.''[38]

Finally, the Roosevelt Administration's decisions to devalue and not to sterilize the gold inflow were clearly not endogenous. Barrie Wigmore showed that Roosevelt spoke favorably of devaluation in January 1933.[39] Since this was many months before recovery commenced, Roosevelt could not have been responding to real growth. Indeed, G. Griffith Johnson's analysis of the Roosevelt administration's gold policy suggested that, if anything, the Treasury was trying to counteract the Depression through easy money, rather than trying to accommodate the recovery.[40] Johnson and Wigmore also showed that Roosevelt's desire to encourage a gold inflow was not based on a conventional view of the monetary transmission mechanism, but rather on the view that devaluation would directly raise prices and reflation would directly stimulate recovery.[41]

The fact that the continuing gold inflow of the mid-1930s was not sterilized appears to be partly the result of technical problems with the sterilization process. The Gold Reserve Act of 1934 set up a stabilization fund and made explicit the role of the Treasury in intervening in the foreign exchange market. However, because the stabilization fund was endowed only with gold, it was technically able only to counteract a gold outflow, not a gold inflow.[42] As a result, sterilization would have required an active decision to change the new operating procedures. Such a decision was not made because Roosevelt believed that an unsterilized gold inflow would stimulate the economy through reflation.

The devaluation and the absence of sterilization thus appear to have been the result of active policy decisions and a lack of understanding about the process of exchange market intervention. To the degree that active policy was involved, it was clearly aimed at encouraging recovery, not simply at responding to a recovery that was already under way. Combined with the fact that political instability caused much of the gold inflow in the late 1930s, these findings indicate that the increase in the money supply in the recovery phase of the Great Depression was not endogenous. Since the simulation results showed that the large deviations of money growth rates from normal account for much of the recovery of real output between 1933 and 1937 and between 1938 and 1942, it is possible to conclude that independent monetary developments account for the bulk of the recovery from the Great Depression in the United States.

[38] Friedman and Schwartz, *Monetary History*, p. 545.
[39] Wigmore, "Was the Bank Holiday of 1933?" p. 743.
[40] Johnson, *Treasury and Monetary Policy*, pp. 9–28.
[41] Johnson, *Treasury and Monetary Policy*, pp. 14–16; and Wigmore, "Was the Bank Holiday of 1933?" p. 743.
[42] Johnson, *Treasury and Monetary Policy*, pp. 92–114.

THE TRANSMISSION MECHANISM

The argument that monetary developments were the source of the recovery can be made more plausible by identifying the transmission mechanism. It is generally assumed that the usual way an increase in the money supply stimulates the economy is through a decline in interest rates. An increase in the money stock lowers nominal interest rates; with fixed or increasing expected inflation, this decline in nominal rates implies a decline in real interest rates. A fall in real interest rates stimulates purchases of plant and equipment and durable consumer goods by lowering the cost of borrowing and by reducing the opportunity cost of spending.

For this mechanism to have been operating in the mid- and late 1930s, the rapid money growth could not have been immediately and fully offset by increases in wages and prices. If wages and prices increased as rapidly or more rapidly than the money supply, real balances would not have increased and there would have been no pressure on nominal interest rates. The real money supply did in fact rise at a very rapid rate during the second half of the 1930s: M1 deflated by the wholesale price index increased by 27 percent between December 1933 and December 1936 and by 56 percent between December 1937 and December 1942.[43] This suggests that prices and wages did not fully adjust to the rapid rates of money growth. The fact that nominal interest rates fell during the recovery is consistent with this increase in real balances. The commercial paper rate, for example, fell from an average value of 2.73 in 1932 to 0.75 in 1936.[44]

For the interest-rate transmission mechanism to have been operating in the mid- and late 1930s, it would also have to have been the case that the rapid money growth rates generated expectations of inflation. By 1933 nominal interest rates were already so low that there was little scope for a monetary expansion to lower nominal rates further. Therefore, the main way that the monetary expansion could stimulate the economy was by generating expectations of inflation and thus causing a reduction in real interest rates. Such expectations of inflation are not inconsistent with the existence of the wage and price inertia. Indeed, a very plausible explanation is that the rapid money growth rates did not immediately increase wages and prices by an equivalent amount because of internal labor markets, government regulations, or managerial

[43] To calculate real money I subtracted the logarithm of the producer price index (PPI) from the logarithm of M1. The data on the PPI are from the U.S. Bureau of Labor Statistics, *Historical Data*. Because M1 is only available seasonally adjusted, I also seasonally adjusted the PPI by regressing it on monthly dummy variables and a trend.

[44] The commercial paper rate data are from the U.S. Board of Governors of the Federal Reserve System, *Banking and Monetary Statistics*, 1943, pp. 448–51, and 1976, p. 674. They cover four- to six-month prime commercial paper and are not seasonally adjusted.
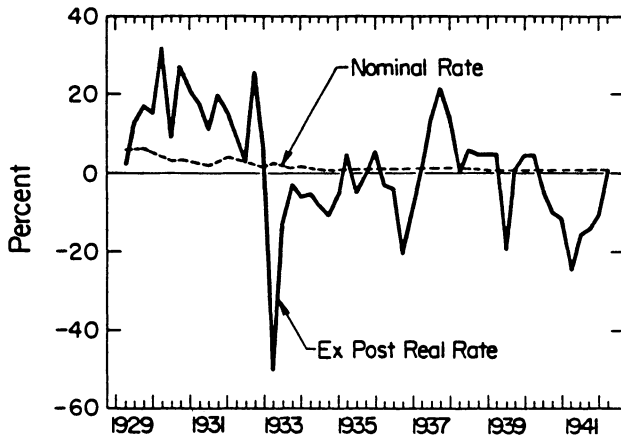
FIGURE 7

NOMINAL AND EX POST REAL COMMERCIAL PAPER RATES, 1929–1942

Note: The data are quarterly observations.
Sources: The commercial paper rate data are from the U.S. Board of Governors of the Federal Reserve System, *Banking and Monetary Statistics*, 1943, pp. 448–51, and 1976, p. 674. The calculation of the ex post real rate is described in the text.

inertia.[45] However, consumers and investors realized that prices would have to rise eventually and therefore expected inflation over the not-too-distant horizon.

Regression estimates of the ex ante real interest rate suggest that this condition is met in the recovery phase of the Great Depression. Frederic Mishkin showed using the Fisher identity that the difference between the ex ante real rate that we want to know and the ex post real rate that we observe is unanticipated inflation.[46] Under the assumption of rational expectations, the expectation of unanticipated inflation using information available at the time the forecast is made is zero. Therefore, if one regresses the ex post real rate on current and lagged information, the fitted values provide estimates of the ex ante real rate.

To apply this procedure I first calculated ex post real rates by subtracting the change in the producer price index over the following quarter (at an annual rate) from the four-to-six month commercial paper rate.[47] These ex post real rates, along with the nominal commercial paper rate, are shown in Figure 7. I then regressed the ex post real rates on the current value and four quarterly lags of the monetary policy variable described in the multiplier calculations (but disaggregated to quarterly values), the percentage change in industrial production, inflation, and the level of the nominal commercial paper rate. To account for possible seasonal variation I also included a constant term

[45] O'Brien, "A Behavioral Explanation," provided one such explanation for wage rigidity during the 1930s.
[46] Mishkin, "The Real Interest Rate."
[47] In this calculation neither series was seasonally adjusted.

TABLE 2
REGRESSION USED TO ESTIMATE EX ANTE REAL INTEREST RATES

Explanatory Variable	Coefficient	T-Statistic
Monetary Policy Variable		
Lag 0	0.044	0.29
Lag 1	−0.463	−3.02
Lag 2	0.182	1.09
Lag 3	−0.196	−1.20
Lag 4	0.352	2.30
Nominal Commercial Paper Rate		
Lag 0	0.834	0.25
Lag 1	0.191	0.04
Lag 2	1.181	0.22
Lag 3	0.954	0.18
Lag 4	−1.079	−0.32
Inflation Rate		
Lag 0	−0.396	−2.54
Lag 1	0.129	0.81
Lag 2	−0.014	−0.09
Lag 3	0.111	0.72
Lag 4	−0.031	−0.21
Change in Industrial Production		
Lag 0	−0.026	−0.47
Lag 1	0.045	0.78
Lag 2	−0.120	−2.00
Lag 3	0.012	0.22
Lag 4	−0.036	−0.67
Quarterly Dummy Variables		
Quarter 2	1.497	0.27
Quarter 3	−6.961	−1.76
Quarter 4	5.271	0.97
Constant	−1.804	−0.44

Notes: The dependent variable is the quarterly ex post real interest rate. The sample period used in the estimation is 1923:1 to 1942:2. The R^2 of the regression is .52.
Source: See the text.

and three quarterly dummy variables. I ran this regression over the sample period 1923:1 to 1942:2.[48]

The results are shown in Table 2. The explanatory variables I included in the regression explain a substantial fraction of the total variation in the ex post real interest rate: the R^2 of the regression is .52. Of the individual explanatory variables, the one of most interest is the monetary policy variable. If the conventional transmission mechanism was operating, the monetary policy variable should be negatively correlated with the ex post real rate. As can be seen, this is clearly the case: the first lag of the monetary policy variable enters the regression with a coefficient of −0.463 and has a t-statistic of −3.02.

[48] The monetary policy variable was disaggregated by converting the quarterly growth rates of M1 during the recovery to annual rates and then subtracting off the average annual growth rate of M1 in the mid-1920s. The industrial production series is from the U.S. Board of Governors of the Federal Reserve System, *Industrial Production*, table A.11, p. 303.
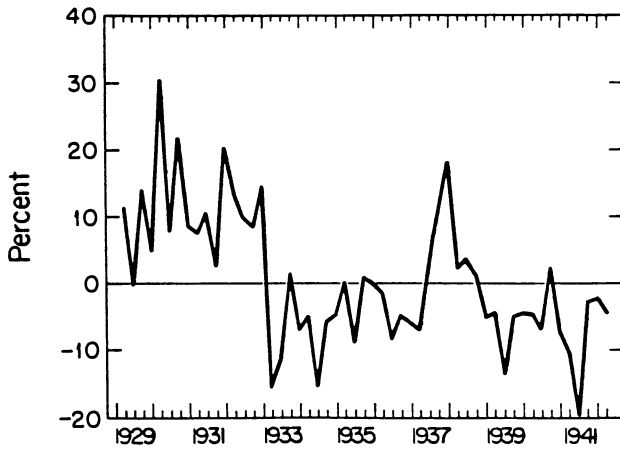
FIGURE 8

EX ANTE REAL COMMERCIAL PAPER RATES, 1929–1942

Note: The data are quarterly observations.
Source: The regression used to estimate ex ante real rates is given in Table 2 and described in the text.

The fitted values of the regression, which provide an estimate of the ex ante real rate, are graphed in Figure 8. These estimates suggest that ex ante real rates dropped precipitously at the start of the monetary expansion in 1933 and remained low or negative for the rest of the decade (except for the rise during the monetary contraction of 1937/ 38).[49] Indeed, the drop in real rates between the contractionary and expansionary phases of the Great Depression is remarkable: ex ante real rates fell from values often over 15 percent in the early 1930s to values typically between −5 and −10 percent in the mid-1930s and early 1940s. While one cannot be sure that actual ex ante real rates dropped the same amount as these estimates or that the drop was caused by monetary developments, the regression results certainly suggest that the expansionary monetary developments of the mid- and late 1930s did have a substantial impact on real interest rates.[50] Thus, this aspect of the conventional monetary transmission mechanism appears to have been operating in the recovery phase of the Great Depression.

For expansionary monetary developments to have stimulated the

[49] The estimates are strikingly robust to variations in the specification of the regression. I tried many variants of the basic regression, such as excluding contemporaneous values of the explanatory variables, extending the sample period to include 1921, and leaving out the seasonal dummy variables. None of these changes noticeably altered the estimates of the ex ante real rate.

[50] Some of the inflation in 1933 and 1934 could have been due to the NIRA, which encouraged collusion aimed at raising prices, rather than to monetary policy. However, the NIRA was declared unconstitutional in 1935 and its policies were ones that would tend to cause a one-time jump in the price level rather than continued inflation. Thus, though some of the initial fall in real interest rates could have been due to the NIRA, the continued negative real rates in the mid- and late 1930s must have been due to other causes.
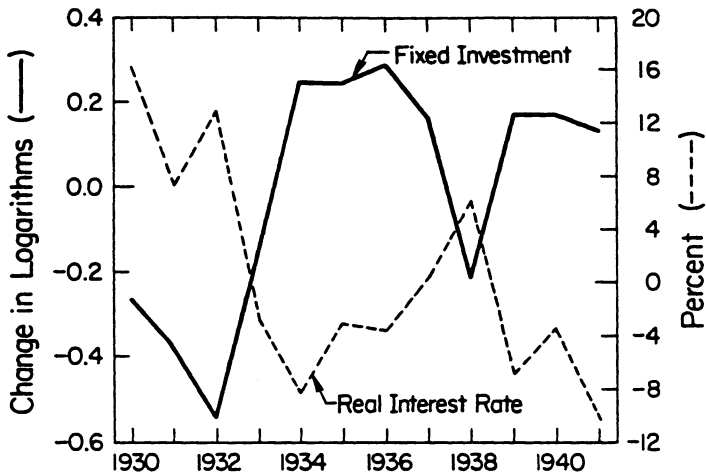
FIGURE 9

REAL FIXED INVESTMENT AND EX ANTE REAL RATES, 1930–1941

Sources: Data on real fixed investment are from the U.S. Bureau of Economic Analysis, *National Income and Product Accounts*, table 1.2, p. 6. The estimation of ex ante real rates is described in the text.

economy in the mid- and late 1930s, real interest rates not only had to fall, but investment and other types of interest-sensitive spending had to respond positively to this drop. Figure 9 shows the annual percentage changes in real total fixed investment and Figure 10 shows the changes
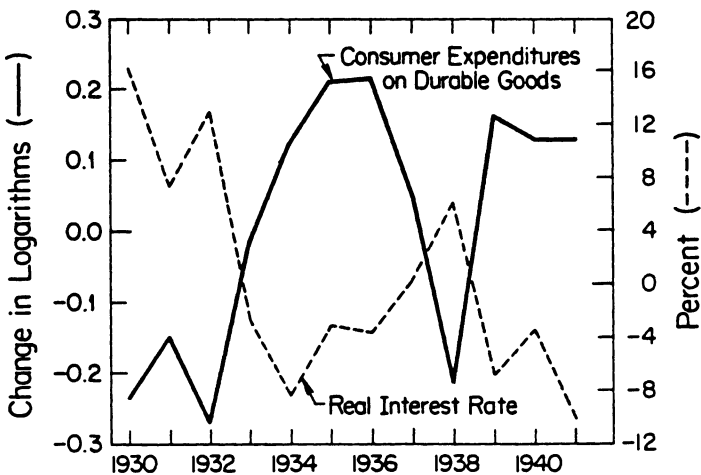

FIGURE 10

REAL CONSUMER EXPENDITURES ON DURABLE GOODS AND EX ANTE REAL RATES, 1930–1941

Sources: Data on real consumer expenditures on durable goods are from the U.S. Bureau of Economic Analysis, *National Income and Product Accounts*, table 1.2, p. 6. The estimation of ex ante real rates is described in the text.

TABLE 3
CORRELATION BETWEEN SPENDING AND REAL INTEREST RATES, 1934–1941

	Percentage Change in Real Fixed Investment	Percentage Change in Real Consumer Expenditures on Durable Goods
Ex Ante Real Rate		
Lag 0	−0.687	−0.746
Lag 1	−0.292	−0.238
Lag 2	−0.052	−0.030

Sources: The sources are the same as for Figures 9 and 10.

in real consumer expenditures on durable goods.[51] In both figures the annual averages of the estimates of the ex ante real interest rate are also shown. These graphs suggest that there was a very strong negative relationship between real interest rates and the percentage change in spending in the mid- and late 1930s. Fixed investment and the consumption of durable goods both turned upward soon after the plunge in real rates in 1933. Over the next four years, real rates remained negative and spending grew rapidly. In 1938 the recovery was interrupted, as real rates turned substantially positive and spending fell sharply. Starting in 1939 real rates fell again, and the rapid growth of spending resumed.

The relationship between spending and interest rates can be quantified by computing the correlations between the percentage change in fixed investment or consumer spending on durables and the level of the ex ante real rate. Table 3 shows these correlations estimated over the period 1934 to 1941. The table shows that there is a strong negative contemporaneous correlation between interest rates and the growth rates of investment and consumer spending on durable goods during the recovery phase of the Great Depression. There is also a moderately strong negative correlation between the percentage change in spending and interest rates lagged one year.

A negative relationship also exists between quarterly data on construction contracts and real interest rates. The contracts data show the floor space of new buildings for which contracts were drawn up during the quarter.[52] One might reasonably expect the volume of such contracts to respond quickly to movements in interest rates because they involved planned rather than actual expenditures. And indeed, over the period 1933:2 to 1942:2 the contemporaneous correlation between the

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[51] These data are from the U.S. Bureau of Economic Analysis, *National Income and Product Accounts*, table 1.2, p. 6.

[52] The Dodge construction contract series for residential, commercial, and industrial structures is available in Lipsey and Preston, *Source Book*, series A8, p. 73; series A17, pp. 95–96; and series A19, pp. 100–101. I used the version that shows the floor space of each type of building without seasonal adjustment. The data for 27 states was spliced onto data for 37 states in 1925. I seasonally adjusted the series by regressing the logarithm of contracts on a trend, a constant, and three quarterly dummy variables.

percentage change in construction contracts and the ex ante real rate is −0.4.[53] The low interest rates of the mid-1930s and the early 1940s correspond to periods of rapid increase in construction contracts.

These correlations cannot prove that the fall in interest rates caused the surge in investment, durable goods expenditures, and construction. They do, however, suggest that there is no obvious evidence that the conventional transmission mechanism for monetary developments failed to operate during the mid- and late 1930s. One piece of evidence that suggests a more causal link between the fall in interest rates and the recovery is the lag in the rebound of consumer expenditures on services compared with those on durables. Expenditures on durables increased between 1933 and 1934, but real consumer expenditures on services did not turn around until 1935. This suggests that it was not a surge of optimism that was pulling up all types of consumer expenditures in 1934, but rather some force, such as a fall in interest rates, that was operating primarily on durable goods.[54]

CONCLUSIONS

Monetary developments were a crucial source of the recovery of the U.S. economy from the Great Depression. Fiscal policy, in contrast, contributed almost nothing to the recovery before 1942. The very rapid growth of the money supply beginning in 1933 appears to have lowered real interest rates and stimulated investment spending just as a conventional model of the transmission mechanism would predict. The money supply grew rapidly in the mid- and late 1930s because of a huge unsterilized gold inflow to the United States. Although the later gold inflow was mainly due to political developments in Europe, the largest inflow occurred immediately following the revaluation of gold mandated by the Roosevelt administration in 1934. Thus, the gold inflow was due partly to historical accident and partly to policy. The decision to let the gold inflow swell the U.S. money supply was also, at least in part, an independent policy choice. The Roosevelt administration chose not to sterilize the gold inflow because it hoped that an increase in the monetary gold stock would stimulate the depressed economy.

[53] For this calculation, I seasonally adjusted the ex ante real interest rate series by regressing it on a constant and three quarterly dummy variables.

[54] The conventional monetary transmission mechanism need not have been the only way that expansionary monetary developments stimulated real growth during the mid- and late 1930s. Recent studies, such as Bernanke, "Nonmonetary Effects," have emphasized that debt-deflation could have been an important source of weakness in the banking sector, and that banking failures could have hurt real output by reducing the amount of credit intermediation. If this was indeed the case, then the inflation generated by the tremendous increase in the money supply starting in 1933 could have had a beneficial effect on the financial system. By reducing the real value of outstanding debts, the inflation may have strengthened the solvency of banks and businesses and hastened the recovery of the financial system.

   That monetary developments were very important, whereas fiscal
policy was of little consequence even as late as 1942, suggests an
interesting twist on the usual view that World War II caused, or at least
accelerated, the recovery from the Great Depression. Since the econ-
omy was essentially back to its trend level before the fiscal stimulus
started in earnest, it would be difficult to argue that the changes in
government spending caused by the war were a major factor in the
recovery. However, Bloomfield's and Friedman and Schwartz's analy-
ses suggested that the U.S. money supply rose dramatically after war
was declared in Europe because capital flight from countries involved in
the conflict swelled the U.S. gold inflow. In this way, the war may have
aided the recovery after 1938 by causing the U.S. money supply to grow
rapidly. Thus, World War II may indeed have helped to end the Great
Depression in the United States, but its expansionary benefits worked
initially through monetary developments rather than through fiscal
policy.
   The finding that monetary developments were crucial to the recovery
confirms or complements a number of analyses of the end of the Great
Depression. Most obviously, it supports Friedman and Schwartz's view
that monetary developments were very important during the 1930s. It
suggests, however, that Friedman and Schwartz's emphasis on the
inaction of the Federal Reserve after 1933 is somewhat misplaced. What
mattered is that the money supply grew rapidly; the fact that this rise
was orchestrated by the Treasury rather than the Federal Reserve is of
secondary importance. The finding that fiscal policy contributed little to
the recovery echoes Brown's finding that fiscal policy was not obviously
expansionary during the mid-1930s.
   My analysis also supports studies that emphasize the devaluation of
1933/34 as the engine of recovery. Peter Temin and Wigmore argued that
the devaluation signalled the end of a deflationary monetary regime and
that this change in regime was crucial to improving expectations.[55] In
this explanation it was the change in expectations that brought about the
turning point in the spring of 1933. My work bolsters Temin and
Wigmore's conclusion by showing that the deflationary regime was
indeed replaced by a very inflationary monetary policy. This may
explain why the regime shift was viewed as credible. More importantly,
it can explain why the initial recovery was followed by continued rapid
expansion. Without actual inflation and actual declines in real interest
rates, the recovery stimulated by a change in expectations would almost
surely have been short-lived. In the same way, this article also bolsters
the argument of Barry Eichengreen and Jeffrey Sachs that devaluation

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[55] Temin and Wigmore, "End of One Big Deflation." The importance of devaluation is also
discussed in Temin, *Lessons from the Great Depression*.

can stimulate recovery by allowing expansionary monetary policy.[56] It shows that in the case of the United States, devaluation was indeed followed by salutary increases in the money supply.

On the other hand, my findings appear to dispute studies that suggest that the recovery from the Great Depression was due to the self-corrective powers of the U.S. economy in the 1930s. I find that aggregate-demand stimulus was the main source of the recovery from the Great Depression. Thus, the Great Depression does not provide evidence that large shocks are rapidly undone by the forces of mean reversion. Rather, it suggests that large falls in aggregate demand are sometimes followed by large rises, the combination of which leaves the economy back on trend.

[56] Eichengreen and Sachs, "Exchange Rates."

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