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ABSTRACT

When Roosevelt abandoned the gold standard in April 1933, he converted government debt from a tax-backed claim to gold to a claim to dollars, opening the door to unbacked fiscal expansion. Roosevelt followed a state-contingent fiscal rule that ran nominal-debt-financed primary deficits until the price level rose and economic activity recovered. Theory suggests that government spending multipliers can be substantially larger when fiscal expansions are unbacked than when they are tax-backed. VAR estimates using data on "emergency" unbacked spending and "ordinary" backed spending confirm this prediction and find that primary deficits made quantitatively important contributions to raising both the price level and real GNP after 1933. VAR evidence does not support the conventional monetary explanation that gold revaluation and gold inflows, which raised the monetary base, drove the recovery independently of fiscal actions.

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A data appendix is available at http://www.nber.org/data-appendix/w25629

Recovery of 1933*

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1 Introduction

Anyone who doubts that history repeats itself need only to reflect on American monetary-fiscal responses to the Great Depression starting in 1933 and the Covid pandemic beginning in 2020. Monetary reactions were dramatic. In 1933 Congress placed monetary authority in the hands of the executive branch. Franklin D. Roosevelt used that authority: abandoning the gold standard, revoking convertibility of dollars to gold, and reducing the gold content of the dollar. Two results followed. First, federal government debt, which had been a tax-backed claim to gold, transformed into a claim to dollars. Second, the monetary base was permitted to expand to accommodate economic activity, keeping nominal interest rates low and stable. In March 2020 the Federal Reserve swiftly dropped the federal funds rate to zero and promised to keep it there for the duration of the crisis. Over the next year the Fed bought $3.5 trillion in assets with new bank reserves. In both periods, monetary policy was poised to support fiscal expansion.

Fiscal policies were strikingly similar. Roosevelt distinguished between "emergency" and "ordinary" government expenditures, pledged to debt-finance emergency relief spending until recovery set in, and committed to balance the ordinary budget. From the CARES Act in March 2020, which passed with an unrecorded voice vote in the House of Representatives, through the remaining pandemic spending packages, Congress suspended its usual budget procedures that required offsets for new spending. In the course of a year, spending—much of it transfers to individuals and businesses—and bond sales rose $5 trillion, about 20 percent of GDP. During both Covid and the Depression the "emergency" modifier communicated

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temporary, state-contingent fiscal expansion that would not ultimately be financed by tax hikes or regular spending cuts. Both were *unbacked fiscal expansions*.[1]

A key difference between Covid and Depression policies lay in their goals. Rapid economic relief was a common objective, but Roosevelt explicitly sought to reflate an economy whose consumer prices had declined 25 percent since the 1920s. Potential inflationary consequences of unbacked Covid spending received little attention in the political discourse.

This paper analyses the recovery of 1933. We frame the policy problem—as Roosevelt posed it—as returning aggregate prices to their levels in the previous decade. This narrow framing of the problem does not preclude policies raising output and employment, but it allows us to focus on how expanding nominal government liabilities led to reflation, an aspect of the recovery that existing research neglects.

Roosevelt pursued *joint* monetary and fiscal policies. His first steps were monetary: reduce the gold content of the dollar, abandon the promise to convert dollars to gold, forbid private holding of monetary gold, and abrogate the gold clause on all current, past, and future contracts. The gold standard fettered fiscal policy. Government bonds were a claim to gold, which the government bought by passively raising taxes. Deflation and its attendant increase in the real value of government debt would have required fiscal austerity to validate the deflation. Leaving gold released the fetters: Roosevelt expanded government spending on relief and works programs, financed that spending with nominal bonds, and convinced people the economic crisis required a break from fiscal norms—bonds would not be fully backed by future taxes until the economy recovered.

Once Roosevelt shucked off the gold standard's straightjacket, he could exploit the nominal nature of government debt. If dollars are convertible to gold, even dollar-denominated government liabilities are effectively *real* obligations. Credibility of the gold standard rested on government standing ready to raise real taxes to acquire the requisite gold [Bordo and Kydland (1995)]. By ending convertibility, Roosevelt enlarged his policy options. He could continue the orthodox policy that new debt begets new taxes or depart from past policies to allow prices to revalue outstanding bonds. Early in his presidency, Roosevelt chose both, backing ordinary spending with taxes while allowing inflation to finance emergency expenditures.

Our thesis challenges the conventional wisdom that recovery had little to do with fiscal policy. Scholars from Brown (1956) to Romer (1992) to Fishback (2010) maintain that fiscal deficits during Roosevelt's first term were too small to close the gaping gap in output.[2] That view stems from a narrow conception of the fiscal transmission mechanism: government raises real spending, directly increasing real aggregate demand; higher real demand propagates through higher real expenditures and income, eventually to raise output by a multiple of the initial fiscal expansion. We call this mechanism "Keynesian hydraulics," Coddington's (1976) evocative label.

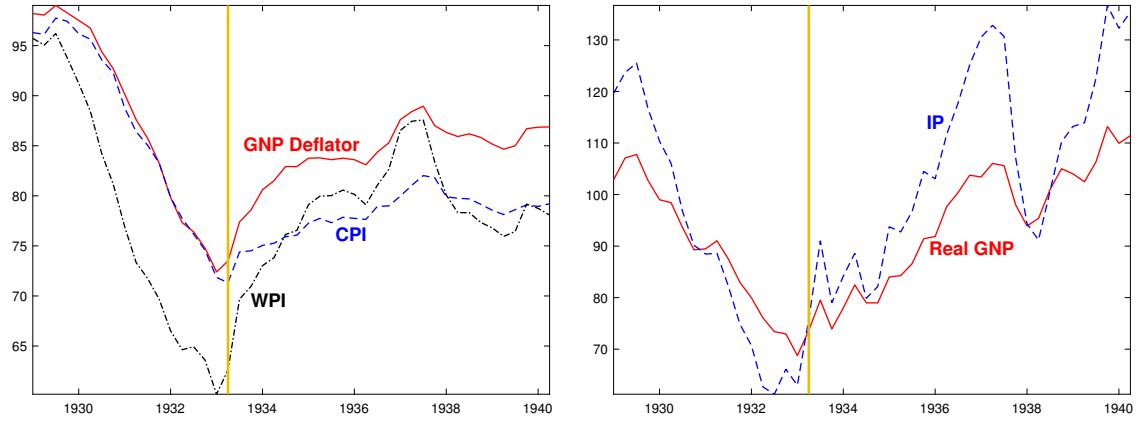
Nominal debt doubled before the end of Roosevelt's second term. Under Keynesian hydraulics, the resulting expansion in *nominal* demand provides no additional economic

[1]Unbacked fiscal expansion stems from work on the fiscal theory of the price level, including Leeper (1991), Sims (1994), Woodford (1995), Cochrane (1999, 2023), and Leeper and Leith (2017). Bianchi and Melosi (2019) model backed and unbacked fiscal shocks.

[2]See also Chandler (1971), Peppers (1973), Beard and McMillin (1991), Raynold, McMillin, and Beard (1991), Eichengreen (2000), Steindl (2004), and Hausman (2016).

stimulus. Brown (1956) and others explicitly exclude government borrowing from their analyses. Keynesian hydraulics implicitly assumes that higher taxes extinguish all wealth effects from higher nominal debt. That assumption forces debt to be fully backed, denying that the suspension of gold convertibility fundamentally altered the nature of government debt and the fiscal options available to policy makers after 1933. We broaden the perspective on fiscal transmission to include both Keynesian hydraulics and potential wealth effects from government debt growth. When nominal government debt expands without raising expected taxes, private-sector wealth and aggregate demand increase to amplify the fiscal impacts. Evidence supports the expanded view of fiscal transmission: emergency spending is more stimulative than regular spending.

Unbacked fiscal expansion worked. Jalil and Rua (2017) and Payne, Szőke, Hall, and Sargent (2022) present evidence that in the second quarter of 1933 inflation expectations picked up rapidly. Vertical lines in figure 1 mark departure from gold. Price levels and output reversed their declines and rose steadily until the 1937 recession.



(a) Price levels (b) Output

Figure 1: Panel (a): three measures of the price level. Panel (b): two measures of output. All series use 1926 base year. Vertical lines mark when the United States abandoned the gold standard. Sources: Balke and Gordon (1986), Federal Reserve Board, BEA and BLS from NBER Macrohistory Database.

1.1 The Policy Problem

When Roosevelt was sworn in as president in March 1933, the economy had been declining for over three years. Relative to the third quarter of 1929, real GNP was 36 percent lower while current-dollar GNP was 57 percent smaller; industrial production had fallen by half; unemployment had increased 22 percentage points; bank deposits and the money supply had contracted about 30 percent; and government debt had grown from 16 percent to over 40 percent of output. Although his first acts salvaged a banking system left reeling by three consecutive crises, Roosevelt's focus never strayed far from the macroeconomic facts.

Figure 2 encapsulates the policy problem. FDR felt that the key to economic recovery lay in returning overall prices to their 1920s levels, to achieve "... the kind of a dollar which

a generation hence will have the same purchasing power and debt-paying power as the dollar we hope to attain in the near future" [Roosevelt (1933c)]. Persistent declines in overall prices in the early 1930s bankrupted the farmers and homeowners who had incurred nominal debts at elevated 1920s price levels. But the 1920s price level was 60 percent above the long-run average to which it had to revert to maintain gold convertibility at the parity that prevailed over the previous century.

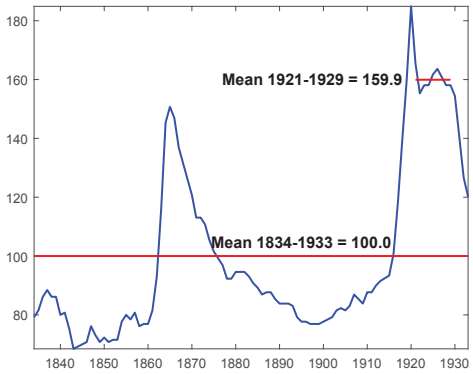


Figure 2: Consumer price index since the 1834 Coinage Act set the price of one ounce of gold at $20.67. Rescaled to make mean from 1834–1933=100. Sample includes periods when convertibility was suspended. Source: Officer and Williamson (2018) and authors' calculations.

Roosevelt's objective to return the price level permanently to that high level was inconsistent with remaining on the gold standard at the historical conversion rate. FDR pursued a triple-barreled approach to the problem. The executive branch—with Congressional approval—took control of monetary policy from a Federal Reserve that by all accounts had been "inept" since the depression started.[3] The second barrel ran "emergency" fiscal deficits financed by new issuances of nominal Treasury bonds. Emergency spending served two purposes. It provided much-needed relief through an array of relief and works programs. But the modifier "emergency" also communicated the temporary nature of a fiscal program tied directly to the country's economic emergency. At the same time, Roosevelt balanced the "ordinary" budget, underscoring that in normal times fiscal policy will revert to conventional tax-backed financing.

Roosevelt coupled his monetary and fiscal plans to a third barrel designed to persuade people the unprecedented policies were credible and essential to recovery. The administration adopted a political strategy that pitched economic recovery as the antidote for domestic unrest and foreign fascism. Roosevelt made recovery *the* priority; higher, for example, than maintaining the last century's fiscal orthodoxy. The president found innovative ways to persuade people that the stakes of recovery were unprecedentedly high. On the domestic front, he feared "agrarian revolution" and "amorphous resentment" of economic institutions [Blum (1959, p. 72), Leuchtenburg (1963)]. Internationally, Roosevelt conjured images of European fascism as the inevitable consequence of continued depression. In advisor Warren's words, Roosevelt faced "a choice between a rise in price or a rise in dictators" [quoted in

[3]Friedman and Schwartz (1963, p. 407) characterize their adjective "inept" for monetary policy as a "plain description of fact." Wicker (1965) and Meltzer (2003) arrive at similar assessments.

Rauchway (2014, p. 4)]. The president framed economic recovery as "a war for the survival of democracy" [Roosevelt (1936a)].[4]

Wicker (1971) argues that Roosevelt's fiscal programs lacked a well-articulated mechanism, though the aim to raise the price level was clear. Unbacked fiscal expansion provides that missing mechanism.

1.2 What We Do

The paper places FDR's policy actions in the political and intellectual context of the times. That context drives the narrative. We establish theoretical results that frame the issues and help to interpret the history and the data. Unbacked fiscal expansion permanently raises the price level, but is infeasible under the classical gold standard. Theory expresses the total effect of fiscal expansion as the sum of Keynesian hydraulics and wealth effects from government debt. This implies that unbacked—emergency—government expenditures have generally larger impacts than tax-backed—ordinary—fiscal expansion.

VAR evidence supports the theory: emergency expenditures have substantially larger impacts on the price level and output than do ordinary expenditures. In an expanded system of variables, higher primary deficits persistently raise prices, output, the gold stock, base money, and nominal government debt. A $1 surprise increase in the primary deficit rises real GNP between $3.5 and $4.5 after a year.

We re-examine Friedman and Schwartz's (1963) narrative that largely exogenous gold inflows and accommodating expansion of the monetary base led the recovery.[5] They point to positive comovements in monetary gold, base money, the price level, and output as evidence supporting their narrative. Identified gold supply shocks have weak predictive value for money and none for prices and output. In a search across structural VAR identifications, we find that Friedman and Schwartz's comovements are very likely to be associated with higher primary deficits, a fiscal response that is inconsistent with money-led recovery.

Informal evidence corroborates the VAR results. Ex-ante and ex-post real returns on the government bond portfolio were substantially lower after leaving the gold standard than before, even though nominal returns were comparable. Surprise real returns averaged −0.76 percent from April 1933 to June 1940. Over that period surprise revaluations of debt were both large and frequently negative. Finally, the debt-GNP ratio rose from 16.4 percent in 1929Q4 to 42.3 percent when Roosevelt took office. Although nominal debt doubled over the next seven years, the ratio averaged only 41.6 percent. Nominal economic growth stabilized debt.

The next section lays out the theoretical framework that explains why Roosevelt's desire to reflate drove him to abandon gold and turn to fiscal policy. The paper then describes the monetary-fiscal policy context of the 1930s, which the theory aims to capture. Section 4 recounts fiscal facts and reports a measure of fiscal impulse—the ratio of the primary surplus

[4]Other authorities also communicated the high stakes. In February 1933, Marriner Eccles, then a private banker, testified to the Senate Finance Committee that without federal government intervention, "we can only expect to sink deeper in our dilemma and distress, with possible revolution, with social disintegration, with the world in ruins, the network of its financial obligations in shreds, with the very basis of law and order shattered" [Eccles (1933, p. 705)].

[5]See also Romer (1992), Bernanke (2004), and Steindl (2004).

to the market value of debt—that suggests fiscal policy *was* employed aggressively. VAR evidence appears in section 5. That section also reassesses Friedman and Schwartz's (1963) money-led recovery view. After the formal econometrics, the paper offers corroborating informal evidence. Section 7 embeds our narrative in the historical intellectual context and contrasts our explanation of recovery with existing literature, including Eggertsson's (2008) coordinated monetary-fiscal story of recovery. The paper ends with some lessons for today.

2 Why Unbacked Fiscal Expansion?

Contemporary supporters and critics understood that Roosevelt's price-level objective entailed a permanent increase in prices to 60 percent above their long-run average [Fisher (1934, ch. VI)]. But a permanent revaluation of the dollar price of gold required leaving the classical gold standard. We establish this and other insights about monetary and fiscal policy under a gold standard in a simple model.[6]

A representative household maximizes

$$E_t \sum_{T=t}^{\infty} \beta^{T-t} [U\left(C_T, M_T/P_T, G_T^p\right) - V(H_T)]$$

where $U\left(C, M/P, G^p\right)$ is increasing and concave, $V(H)$ is increasing and convex, and $0 < \beta < 1$. Households derive utility from consumption purchases, C_t, real money holdings M_t/P_t that facilitate transactions, and private holdings of gold, G_t^p. They supply labor, H_t, to produce goods.

Maximization is subject to the flow budget constraint

$$M_t + P_t^g G_t^p + B_t \leq W_t + w_t H_t + P_t^g G_{t-1}^p + \Pi_t - P_t T_t - P_t C_t \tag{1}$$

where P_t is the price level, P_t^g the dollar price of gold, w_t nominal wages, Π_t dividends from equity holdings in gold firms, and T_t lump-sum taxes net of transfers. End of period wealth satisfies $W_{t+1} \equiv M_t + A_{t+1}$. A_{t+1} is the nominal value of the household's bond portfolio. The price of the bond portfolio satisfies $B_t = E_t Q_{t,t+1} A_{t+1}$, where $Q_{t,t+1}$ is the stochastic discount factor pricing arbitrary financial claims in period $t+1$. Using these in (1) yields

$$P_t C_t + \frac{i_t}{1+i_t} M_t + E_t[Q_{t,t+1} W_{t+1}] \leq W_t + w_t H_t - P_t^g (G_t^p - G_{t-1}^p) + \Pi_t - P_t T_t$$

Result 1. *Under the gold standard with a fixed parity—the classical gold standard—monetary and fiscal policies cannot achieve any desired price level.*

Straightforward economic logic underlies this result. Private holdings of gold establish the goods value of gold—the aggregate price level. The Euler equations for private gold and consumption demand together imply that

$$\frac{P_t^g}{P_t} = E_t \sum_{T=t}^{\infty} \beta^{T-t} \frac{U_g(G_T^p)}{U_c(C_t)}. \tag{2}$$

[6] We build on Barro (1979) and Goodfriend (1988). Appendix A provides the complete model, calculations, and proofs for all the theoretical results in the paper.

When a classical gold standard fixes the dollar price of gold at $P_t^g = \bar{P}^g$, the marginal rate of substitution between gold and consumption uniquely determines the equilibrium price level.

Monetary policy must passively adjust to accommodate the price level consistent with the pegged price of gold, according to Keynes's "rules of the gold standard game" [McKinnon (1993)]. Fiscal policy must passively adjust primary surpluses to provide gold backing for outstanding government debt at that price level [Bordo and Kydland (1995)]. This establishes that monetary actions—leaving the classical gold standard and abandoning convertibility—were necessary to achieve Roosevelt's price-level objective.

Definition 2. *Unbacked fiscal expansion increases government expenditures on purchases or transfers, issues nominal bonds to cover the deficit, and persuades people that surpluses will not rise to finance the bonds.*

Our theory makes this definition precise and illustrates the price-level consequences of unbacked fiscal expansion. The transversality condition for optimal asset holdings and the flow budget constraint deliver the household's intertemporal constraint

$$W_t = E_t \sum_{T=t}^{\infty} Q_{t,T} \left[P_T C_T + P_T T_T + \frac{i_T}{1+i_T} M_T^s + P_T^g (G_T^p - G_{T-1}^p) - w_T H_T - \Pi_T \right] \quad (3)$$

where $Q_{t,T}$ comes from recursively applying the consumption Euler equation. The real value of asset holdings is the expected discounted value of spending less income.

We close the model with the following assumptions. Under a gold standard the government fixes the dollar price of gold at $P_t^g = \bar{P}^g$. The government's holdings of gold, G_t^m, back the money supply according to $\bar{P}^g G_t^m = \alpha M_t$ where the policy parameter satisfies $0 < \alpha < 1$. The central bank pegs the nominal interest rate, $i_t = \bar{i}$, to approximate Federal Reserve behavior after 1933. Government purchases are zero, so taxes less transfers equal the primary surplus, which obeys $S_t = \bar{S} + \varepsilon_t$, where $E_t \varepsilon_{t+j} = 0$ for $j > 0$. Absent shocks to technology, output is constant at $\bar{Y}$. Gold supply is exogenous and profits from the gold sector are $\Pi_t = \bar{P}^g (G_t - G_{t-1})$.

A rational expectations equilibrium is a set of state-contingent paths for endogenous variables that satisfy the conditions for household and firm optimality together with market-clearing conditions

$$\bar{Y} = C_t \quad (4)$$
$$M_t = M_t^s \quad (5)$$
$$A_{t+1} = A_{t+1}^s \quad (6)$$
$$G_t = G_t^m + G_t^p \quad (7)$$

at all dates and states, where M_t^s and A_t^s denote the supplies of government liabilities.

Substituting (4) and (5) into the first-order conditions for real money demand and private gold holdings and imposing policy behavior gives

$$\frac{U_m(M_t^s/P_t)}{U_c(\bar{Y})} = \frac{\bar{i}}{1+\bar{i}}$$
$$\frac{U_g(G_t - \alpha M_t^s/\bar{P}^g)}{U_c(\bar{Y})} = \frac{\bar{P}^g}{P_t} \frac{\bar{i}}{1+\bar{i}}$$

Real money balances and the relative price of gold emerge as

$$\frac{M_t^s}{P_t} = L^m(\bar{Y}, \bar{i}) \tag{8}$$

$$\frac{\bar{P}^g}{P_t} = L^g(\bar{Y}, \bar{i}, G_t) \tag{9}$$

where the functions L^m—the liquidity preference schedule—and L^g have obvious properties.

Applying policy rules, imposing goods- and bond-market clearing on (3), and evaluating expectations yields the equilibrium condition

$$\frac{M_{t-1} + (1+\bar{i})B_{t-1}}{P_t} = S_t + \frac{\beta}{1-\beta}\bar{S} + L^m(\bar{Y}, \bar{i}) \tag{10}$$

where $A_t = (1+\bar{i})B_{t-1}$ in the case of one-period risk-free debt. The real value of government liabilities equals the expected present value of seigniorage revenues plus primary surpluses. Lower S_t financed by newly issued B_t is an unbacked fiscal expansion. Higher transfers with no offsetting future taxes shifts resources from the government to households. This positive wealth effect induces households to attempt to raise their consumption paths. Higher demand for goods raises their price, P_t, which reduces the real value of the household's initial nominal assets, W_t/P_t. This negative wealth effect must be large enough to eliminate the excess demand for goods at time t, and make households happy to consume their endowments.

Corollary 3. *Unbacked fiscal expansion is infeasible under a classical gold standard.*

Unbacked fiscal expansion requires active fiscal behavior: the government does not use future surpluses to stabilize debt. Condition (10) uniquely determines the price level as a function of the expected present value of primary surpluses including seigniorage revenues—the right side—and outstanding nominal government liabilities. The optimality condition for gold holdings, (9), determines the price level as a function of the gold price, $\bar{P}^g$, and prevailing conditions in the gold market. These two price levels will generally be different unless gold supply and surpluses are perfectly correlated.

When the price level consistent with $\bar{P}^g$ is too low to satisfy (10), the real value of debt exceeds its real backing. Agents would over-accumulate government bonds, violating their optimality conditions. When the price level under the gold standard is too high, agents would refuse to buy bonds, and the government would violate its budget constraint. In either case, no equilibrium exists with valued government bonds.

The fiscal requirements of the gold standard highlight a practical difficulty Roosevelt faced. Deflation sharply increased the real value of government debt. To maintain convertibility, primary surpluses would have to increase accordingly. At a time when deflation created out-sized real returns to creditors on private loans, fiscal policy would have to transfer wealth from taxpayers to bond holders. For a politician who campaigned on helping the "forgotten man," the classical gold standard was politically untenable.

Result 4. *Unbacked fiscal expansion permanently raises the price level.*

A one-time unbacked fiscal expansion, $\varepsilon_t < 0$, raises P_t in equilibrium condition (10). To see that this increase is permanent, examine how nominal government liabilities at time t change. Both real money balances, $M_t/P_t = L^m(\bar{Y}, \bar{i})$, and real debt, $B_t/P_t = \frac{\beta}{1-\beta}\bar{S}$, remain unchanged because they do not depend on S_t and monetary policy pegs the interest rate. With the change in price level, ΔP_t, given by (10), both M_t and B_t expand in proportion to ΔP_t. In the absence of any further disturbances, nominal liabilities remain at those permanently higher levels, as does the price level.[7]

These theoretical points establish that an appropriately scaled unbacked fiscal expansion could, in principle, achieve Roosevelt's price-level objective and that ending convertibility of dollars for gold was a necessary first step. But why did Roosevelt turn to fiscal policy, rather than rely on further monetary solutions?

3 Policies in 1933

The state of monetary and fiscal policies in 1933 framed the policy options that Roosevelt could, and did, choose.

3.1 Monetary Policy

In the wake of the Federal Reserve's "inactivity" in the worst years of the depression, Congress feared that any recovery would be stymied by continued Fed inaction [Meltzer (2003, p. 459)]. The Thomas Amendment of May 1933 granted the executive unprecedented monetary powers, which included fixing the gold value of the dollar, issuing greenbacks, and ordering the Fed to buy Treasury securities. This action ensured the Fed could not act to thwart the stimulative impacts of fiscal expansion.

Enter Klüh and Stella (2018) who argue that the Gold Reserve Act of 1934 undermined the Fed's ability to reverse the stimulus through open-market operations. The Act gave to the Treasury legal title to all monetary gold. Treasury bought gold by issuing gold certificates, which could be held only by the Fed and were redeemable *in dollars* only at the Treasury's discretion. Treasury gold purchases raised the Fed's monetary liabilities—Treasury deposits at the Fed—without commensurate increases in liquid assets.[8] Klüh and Stella (2018, p. 4) observe that Fed officials "understood they could not win a war of attrition with the Treasury." The Treasury could undertake gold purchases to expand reserves without limit, secure in the knowledge that it was infeasible for the Fed to sterilize them.

Operational factors combined with institutional features of the Federal Reserve System in the early 1930s to reduce the Fed to "impotence," according to Eccles (1951). At the time, there was no single Federal Reserve policy: there were 13 policies—one for each regional Reserve Bank and the Board of Governors. Eccles emphasizes that Reserve Banks were

[7]Because the expansion in M_t depends on $L^m(\bar{Y}, \bar{i})$, rather than directly on the size of the deficit, this is not conventional money financing of deficits, as in Sargent and Wallace (1981). Instead, the money supply expands passively to clear the money market at the pegged nominal interest rate $\bar{i}$, with no change in seigniorage revenues.

[8]By the end of 1936, the Fed's total monetary liabilities were $10.89 billion, but only $2.43 billion of assets were liquid: over 80 percent of the Fed's assets were irredeemable gold certificates [Board of Governors of the Federal Reserve System (1937)]. Total monetary liabilities are Federal Reserve and Federal Reserve Bank notes outstanding plus bank reserves; total liquid assets are gold reserves plus U.S. Treasuries.

beholden to their directors, who acted in the private interests of bankers. Before accepting the nomination to chair the Federal Reserve Board, Eccles insisted on institutional reforms that consolidated decision-making power in Washington, D.C.[9]

While the Fed could not sterilize the Treasury's gold purchases, monetary policy also did little to advance Roosevelt's economic agenda. After only minor actions in 1933, the Fed conducted no continuous open-market operations from November 1933 to mid-1940 [Friedman and Schwartz (1963, p. 512)]. This inactivity occurred against a backdrop of current and former Fed officials publicly expressing concerns about the loss of Fed authority and the possibility of run-away inflation. After leaving his position as Fed Chairman on May 10, 1933, Eugene Meyer (1934) wrote that "...the mere fact that the Administration has assumed responsibility for defining our monetary policies and fixing our price goal, indicates a subordinate role for the Federal Reserve System." Adolph Miller, one of the original governors of the Federal Reserve System, who served until 1936, vociferously called for a return to gold, fearing the discretion that underlies a "managed currency," which he labeled "human nature money" [Miller (1936, p. 4)].

Banks were worried about the Federal Reserve's failure to fulfill its lender-of-last-resort function and opted to behave conservatively by expanding holdings of government bonds, rather than loans to the private sector. From March 1933 to June 1940, annual growth rates of narrow money far outstripped those of broad money: reserves (23.1 percent), base (12.8 percent), M1 (7.7 percent), and M2 (5.2 percent). This was a very different pattern from the 1920s when M2 averaged 3.2 percent annual growth and reserves averaged 2.8 percent.

A confluence of operational, institutional, credibility, and even personnel issues conspired to render the Fed in 1933 and 1934 incapable of delivering a monetary policy to combat depression.

3.2 Fiscal Policy

Fiscal policy was a different matter. Through it Roosevelt could achieve both political and economic objectives. Given his strong support in Congress, particularly from "inflationists" like Senators Thomas and Connally, fiscal policy was largely under the president's direct control.

Fiscal policy served political objectives. By providing immediate relief to the unemployed, farmers, and homeowners, federal expenditures tamped down domestic unrest. Direct relief was a visible indicator that the federal government had the common man's interests at heart, helping to re-establish confidence in policy institutions. Finally, economists and politicians alike understood that deflation had redistributed wealth from debtors to creditors. Reflation, and the fiscal actions underlying it, were deliberate efforts to reverse that redistribution. Roosevelt's attitudes toward redistribution shone through in a letter to Secretary of the Treasury Woodin: "I wish our banking and economist friends would realize the seriousness of the situation from the point of view of the debtor classes—i.e., 90 percent of the human beings in this country—and think less from the point of view of the 10 percent who constitute

[9]Eccles (1951, p. 170) described the Fed's decision process before the Banking Act of 1935: "...before a uniform decision could be reached...there had to be a complete meeting of the minds between the governors of the 12 Reserve banks and the 108 directors of those banks, plus the FRB in Washington. A more effective way of diffusing responsibility and encouraging inertia and indecision could not very well have been devised."

creditor classes" [Roosevelt (1933a)].

After taking the necessary monetary steps himself, Roosevelt leaned entirely on fiscal policy to achieve economic objectives, the topic of this paper.

Roosevelt walked a fine line on fiscal policy, maintaining seemingly contradictory positions. During the 1932 campaign for president, he harshly criticized Hoover's deficits and took a "Pittsburgh pledge" to balance the budget by reducing expenditures [Roosevelt (1932a)]. Just six months earlier he delivered his famous speech about "the forgotten man at the bottom of the economic pyramid" [Roosevelt (1932b)]. That speech characterized the depression as a "more grave emergency" than World War I and called on government to restore the purchasing power of farmers and rural communities and assistance to homeowners and farmers facing foreclosure.

Six days after taking office, Roosevelt sent to Congress a proposal to cut federal spending by nearly 14 percent of total expenditures. Cuts eliminated government agencies, reduced federal worker pay, and shrank veterans' benefits by half. When the Economy Act of 1933 was finally signed into law, spending cuts amounted to a little under seven percent of expenditures, but Roosevelt could point to the legislation to establish his bona fides as a "sound finance" man.

Just 20 days into his administration, Roosevelt created fresh fiscal nomenclature in a press conference. Asked when it might be possible to balance the budget, the president replied, "... it depends entirely on how you define the term, 'balance the budget' " [Roosevelt (1933b, p. 13)]. His reply spawned the distinction between "regular" and "emergency" expenditures, which became institutionalized in Treasury Reports.[10]

FDR was more comfortable with deficits by 1936. In the face of precipitous declines in tax receipts, he argued, "To balance our budget in 1933 or 1934 or 1935 would have been a crime against the American people" [Roosevelt (1936b)]. And in response to budget director Lewis W. Douglas's advice that the only way to project a balanced budget in 1936 was to cut spending, Roosevelt replied, "No, I do not want to taper off [spending programs] until the emergency is passed" [Rosen (2005, p. 85)]. On the other hand, he supported tax hikes in 1935 and 1937.

Why did FDR waffle so on fiscal policy? It is possible, as Stein (1996) suggests, that Roosevelt was tentative and uncertain about fiscal stimulus. But the waffling may have been deliberate. His distinction between "ordinary" and "emergency" government expenditures was central to communicating that unbacked fiscal expansion was state-contingent. Linking the state-contingent emergency expenditures tightly to the economic emergency—through both their timing and their labels—Roosevelt drove home their temporary nature. At the same time, by demonstrating fiscal responsibility with the ordinary budget, he could reassure his critics, particularly bankers, that once the crisis passes, he would balance the budget. That

[10]The reply continued: "What we are trying to do is to have the expenditures of the Government reduced, or, in other words, to have the normal regular Government operations balanced and not only balanced, but to have some left over to start paying the debt. On the other hand, is it fair to put into that part of the budget expenditures that relate to keeping human beings from starving in this emergency? I should say probably not... You cannot let people starve, but this starvation crisis is not an annually recurring charge. I think that is the easiest way of illustrating what we are trying to do in regard to balancing the budget. I think we will balance the budget as far as the ordinary running expenses of the Government go" [Roosevelt (1933b, pp. 13–14)].

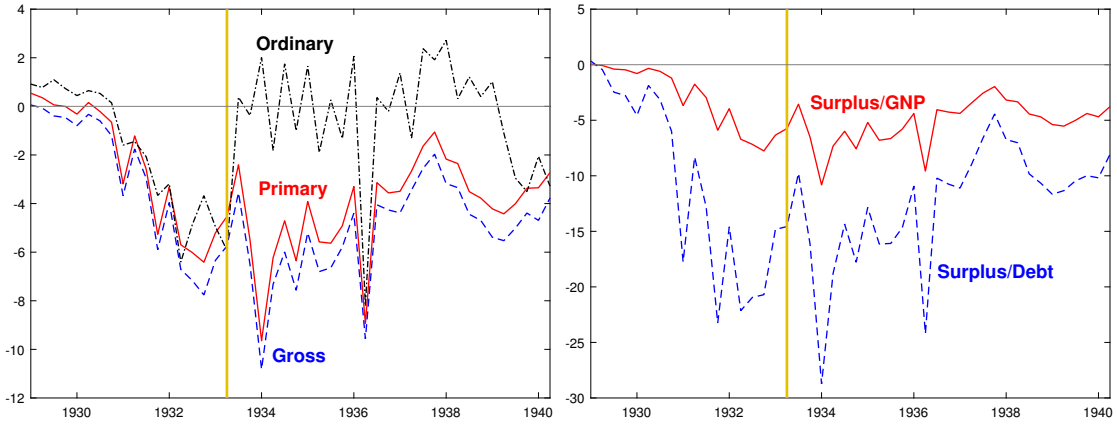
reassurance maintained the safe and secure reputation of treasuries, enabling the government in later years to borrow at favorable rates. Roosevelt's January 1936 budgetary address made this point explicit when he said, "...it is the deficit of today which is making possible the surplus of tomorrow" [Roosevelt (1936c)].

4 Empirical Facts and Theoretical Interpretations

This section contrasts fiscal variables during the gold standard (January 1920 to March 1933) to their behavior during the unbacked fiscal expansion (April 1933 to June 1940) and reports a measure of fiscal impulses that indicates fiscal actions were more aggressive than commonly believed. The section then employs the theoretical model to compare fiscal multipliers under Keynesian hydraulics and unbacked fiscal expansion.

4.1 Fiscal Indicators

4.1.1 Emergency Expenditures Figure 3a plots three measures of the federal budget surplus: gross, primary, and ordinary, defined as total receipts less "ordinary" expenditures. The difference between ordinary and primary surpluses is the emergency surplus. All three measures deteriorated sharply as economic activity contracted in the early 1930s. Falling surpluses stemmed from declining revenues due to lower corporate and income tax receipts and rising expenditures due to increased relief spending. Table 1 shows that deficits remained sizable through 1936, despite growing receipts from 1934 onward. With the exception of 1936, when large veterans' bonuses were paid out, Roosevelt could claim that he balanced the regular budget.



(a) Surpluses as a percent of GNP (b) Fiscal impulses

Figure 3: Panel (a): surpluses defined as total receipts less expenditures, ordinary or total; primary surplus is gross surplus less net interest payments. Panel (b): fiscal impulses defined as primary surplus as a percentage of GNP and primary surplus as a percentage of the market value of gross debt. Vertical line marks when the United States abandoned the gold standard. Sources: Federal Reserve Board (1943) from NBER Macrohistory Database, and Balke and Gordon (1986). See Appendix B for details on the data.

From 1934 to 1937, emergency expenditures ranged from one-third to over one-half of total federal expenditures as shown in table 1. Emergency expenditures, which consisted of relief and other spending due to the depression plus public works.

	1929	1930	1931	1932	1933	1934	1935	1936	1937
Total Receipts	4033	4178	3317	2121	2080	3116	3801	4116	5294
Total Expenditures (excluding debt retirements)	3299	3440	3780	4594	4681	6745	6802	8477	8001
Regular	3299	3440	3780	4594	4681	2741	3148	5186	5155
Emergency	0	0	0	0	0	4004	3655	3301	2847
Regular Deficit	−734	−738	463	2473	2601	−375	−653	1070	−139
Deficit	−734	−738	463	2473	2601	3629	3001	4361	2707

Table 1: Millions of current dollars. "Emergency" expenditures are variously labeled as "emergency organization expenditures," "major expenditures due to or affected by the depression," "recovery and relief," or "public works." Designations of types of spending as "regular" or "emergency" changed over time. A negative deficit is a surplus. Source: Department of the Treasury (various). Details about emergency expenditures appear in appendix B.1.

4.1.2 Measuring Fiscal Impulses

Unbacked fiscal expansion changes the relevant measure of fiscal impulse from the surplus-output ratio common to Keynesian hydraulics to the surplus-debt ratio. In expression (10), the ultimate impact on aggregate demand and the price level depends on total real backing—right side—relative to outstanding nominal liabilities—left side. A negative innovation in the ratio of the surplus to the market value of debt indicates that backing is currently low relative to outstanding debt: either future surpluses must rise or current debt is overvalued. In the latter case individuals shed debt in favor of goods and services, raising aggregate demand.

Keynesian hydraulics focuses narrowly on the size of deficits relative to the economy, leading to Brown's (1956, p. 863–866) oft-cited conclusion: "Fiscal policy, then, seems to have been an unsuccessful recovery device in the thirties—not because it did not work, but because it was not tried."

Figure 3b contrasts the two measures of fiscal impulse. Data to the right of the vertical line shows that once government debt expansion *could* be unbacked, deficits were very large relative to debt. Between April 1933 and June 1940, primary deficits averaged 5.2 percent of GNP, but 12.5 percent of debt, almost two-and-a-half times larger. By this alternative measure of fiscal impulse, fiscal policy *was* tried aggressively.

4.2 Keynesian Hydraulics vs. Unbacked Fiscal Expansion

In drawing a distinction between emergency and ordinary expenditures, Roosevelt not only introduced a politically beneficial accounting convention, he also made fiscal policy more powerful. Unbacked fiscal expansions generally have larger spending and tax multipliers than those that arise under Keynesian hydraulics.[11] Section 5 shows these predictions are borne out in the data.

Consider a simple model that approximates Roosevelt's budgetary arrangements. The budget identity is

$$b_{t-1} = \beta b_t + (T_t^o + T_t^e - F_t^o - F_t^e) - \beta\delta i_t + \delta\pi_t$$

[11] To make the exposition transparent, we log-linearize the model around its deterministic steady state and focus on a cashless equilibrium. Appendix A provides details. Extensions to models with long-duration debt and nominal rigidities in price setting yield similar results.

where T_t^o and F_t^o are ordinary lump-sum taxes and spending, and T_t^e and F_t^e their emergency counterparts. π_t is inflation, b_t a measure of real debt and $\delta \equiv b/y$ is the steady state debt-GDP ratio. Fiscal variables are in deviations from steady state relative to steady state output, while inflation and interest rates are log deviations from steady state. The ordinary budget is balanced each period, so that $T_t^o = F_t^o$. Emergency fiscal variables, (T_t^e, F_t^e), are exogenous and taken to be *i.i.d.* This reduces the budget identity to

$$b_{t-1} = \beta b_t + (T_t^e - F_t^e) - \beta\delta i_t + \delta\pi_t \tag{11}$$

Only the emergency primary surplus appears in the budget identity.

With flexible prices, a log-linear approximation to the consumption Euler equation yields the Fisher equation

$$i_t = r_t^n + E_t\pi_{t+1} \tag{12}$$

where

$$r_t^n \equiv \frac{1}{\sigma + \omega^{-1}} F_t = \frac{1}{\sigma + \omega^{-1}}(F_t^o + F_t^e) \tag{13}$$

is the exogenously given natural real rate of interest. Parameters $\sigma > 0$ and $\omega^{-1} > 0$ denote the intertemporal elasticity of substitution and Frisch elasticity of labor supply. Higher government purchases always raise the natural rate of interest. Ordinary and emergency purchases have identical impacts on r^n. The model is closed with an interest rate rule in log-linear form

$$i_t = \phi\pi_t \tag{14}$$

where the parameter satisfies $0 \leq \phi < 1$, making monetary policy passive and consistent with the historical narrative.

Result 5. *Government spending and transfer impacts from unbacked fiscal expansions typically exceed those from Keynesian hydraulics alone.*

Use (13) and (14) in (11) and (12) and solve for equilibrium inflation

$$\pi_t = \underbrace{\frac{\beta}{\sigma + \omega^{-1}}(F_t^o + F_t^e)}_{\text{Keynesian hydraulics}} + \underbrace{\frac{\beta}{\delta}(F_t^e - T_t^e) + \frac{1}{\delta}b_{t-1}}_{\text{wealth effects}} \tag{15}$$

Inflation depends on all fiscal variables, with the exception of ordinary taxes. We call the first term Keynesian hydraulics to emphasize the fact that government expenditures are claims on the real resources of the economy. Rising public claims require higher real interest rates to deliver equilibrium crowding out of private spending. The second and third terms are the wealth effects from an unbacked fiscal expansion. The second term is the impact effect of a rise in spending and transfers; and the third term the wealth effects from nominal debt issuance which does not herald future tax increases.[12] Consistent with the earlier discussion on measuring fiscal impulses, these wealth effects are scaled by the inverse of the steady-state debt to GDP ratio.[13] At low debt levels, the inflationary impact of a given deficit can be

[12] When monetary policy is active, $\phi > 1$ and fiscal policy is passive equilibrium inflation is $\pi_t = r_t^n/\phi$. Inflation is independent of taxes and transfers, and depends on government spending only through the effect on the real interest rate. A passive fiscal policy would adjust taxes in response to debt, $T_t = \gamma b_{t-1}$, with $\gamma > 1 - \beta$ ensuring stable debt. Then debt evolves as $b_t = \beta^{-1}(1-\gamma)b_{t-1} + \beta^{-1}\left[(\sigma + \omega^{-1}) + \delta\left(\frac{\beta\phi - 1}{\phi}\right)\right] r_t^n$. Higher spending raises r_t^n, but real debt converges to steady state with no impacts on future inflation.

[13] If the approximation scaled debt instead by steady state surpluses, δ would be the surplus-debt ratio.

large.

Using the policy rule and the solution for inflation in (11) yields debt dynamics

$$b_t = \underbrace{-\frac{\delta(1-\beta\phi)}{\sigma+\omega^{-1}}(F_t^o + F_t^e)}_{\text{Keynesian hydraulics}} + \underbrace{\beta\phi(F_t^e - T_t^e) + \phi b_{t-1}}_{\text{wealth effects}} \tag{16}$$

once again decomposed into Keynesian hydraulics and wealth effects. The smaller the debt-GDP ratio the smaller are Keynesian hydraulics—movements in real interest rates matter less when the quantity of outstanding debt is small. Monetary policy's response to inflation has multiple effects. Monetary policy determines the persistence of real debt, which is stationary under passive monetary policy, and more aggressive responses to inflation amplify the impacts of deficits on real debt and future inflation.

From these expressions we compute impulse response functions to evaluate the relative magnitudes of Keynesian hydraulics and wealth effects from nominal debt. Start with the response of inflation to a one percent of GDP reduction in taxes

$$-\frac{\partial \pi_{t+j}}{\partial T_t^e} = \frac{\beta}{\delta}\phi^j \geq 0$$

for $j \geq 0$. This is a pure wealth effect, with no impact on real interest rates. Households receive a transfer or reduction in taxes financed by an increase in nominal debt. The price level rises, consistent with **Result 4**. How much prices rise depends on preferences, policy, and the steady-state level of debt. Low average levels of debt can deliver large changes in the price level. For a given increase in the deficit, lower levels of outstanding debt require a larger revaluation effect: inflation rises more in 1933 when debt was 40 percent of output than in 2020 when gross debt was 128 percent.[14]

The dynamic effects of emergency and ordinary government spending on inflation satisfy

$$\frac{\partial \pi_{t+j}}{\partial F_t^e} - \frac{\partial \pi_{t+j}}{\partial F_t^o} = -\frac{\partial \pi_{t+j}}{\partial T_t^e} \geq 0$$

for all $j \geq 0$. Total effects of emergency spending are the sum of the effect from ordinary spending—Keynesian hydraulics—and an effect equivalent to a reduction in taxes—a pure wealth effect. Because wealth effects are always non-negative, emergency spending generally has larger impacts on the price level than ordinary spending.

Result 6. *An increase in emergency transfers always increases the long-run price level. By contrast, an increase in ordinary government spending always decreases the long-run price level. Finally, an increase in emergency government spending will increase the long-run price level if*

$$\delta < \frac{\beta}{1-\beta}\left(\sigma + \omega^{-1}\right).$$

If this condition is satisfied, the magnitude of the price level rise is decreasing in δ.

[14] Consider a 1 percent of GDP debt-financed fiscal expansion that is unbacked. When the debt-output ratio is 40 percent, nominal GDP must ultimately rise by 2.5 percent, but when debt is at 128 percent nominal spending rises only 0.8 percent (holding real discount rates fixed).

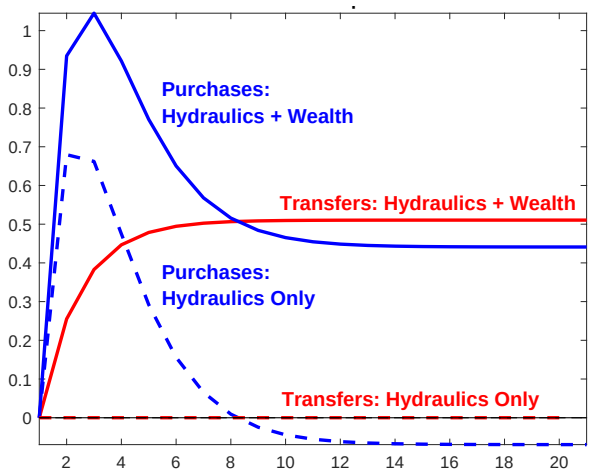


Figure 4: Keynesian hydraulics and wealth effects. Impulse responses of the price level to persistent spending and transfer shocks with an autoregressive coefficient of 0.5, long-term debt averaging a duration of 6 years, δ is 40 percent of annual output, and monetary policy responsivenesss, $\phi = 0.5$.

This restriction will be satisfied for any plausible values of preference parameters. Emergency government spending and transfers both serve reflation. Figure 4 displays a numerical example, allowing for persistent emergency spending and transfers shocks and long-term debt. The inclusion of long-term debt spreads the inflationary consequences over time. The figure decomposes the effects of shocks into Keynesian hydraulics and wealth effects. For both spending and transfers, wealth effects explain the entire increase in the long-run price level. In the short run, the Keynesian hydraulics of emergency expenditures generate a hump-shaped profile for the price level, ultimately reducing the price level below its initial value. For transfers, Keynesian hydraulics are absent because they have no effects on real interest rates, only a pure wealth effect that generates a growing price level that eventually plateaus.

5 Structural VAR Analysis

This section conducts formal econometric analysis of fiscal and monetary impacts over the period of unbacked fiscal expansions to address two questions:

1. What, if any, evidence supports the view that unbacked fiscal expansion contributed to economic recovery?

2. Do data lend support to the monetary view of recovery: unsterilized gold inflows raised the monetary base, the price level, and real GNP? Originally due to Friedman and Schwartz (1963), money-led recovery is now the conventional view [Romer (1992), Bernanke (2004), Steindl (2004)].

5.1 VAR Methods[15]

If y_t is a $k \times 1$ vector of time series, the economic structure is

$$A_0 y_t = A_+(L) y_{t-1} + \varepsilon_t \tag{17}$$

where $E\varepsilon_t\varepsilon_t' = I$ and ε_t is uncorrelated with y_s for $s < t$. The ε_t's are economically interpretable exogenous disturbances. The reduced-form is

$$y_t = B(L) y_{t-1} + u_t$$

where, assuming that A_0 is invertible, $B(L) = A_0^{-1}A_+(L)$, $u_t = A_0^{-1}\varepsilon_t$, and $Eu_tu_t' = A_0^{-1}(A_0^{-1})' = \Sigma$. Identification comes down to imposing sufficient restrictions on the VAR coefficients to uniquely determine A_0.

5.2 Data and Identification

All VARs use monthly data from April 1933 to June 1940 and some combination of the following variables: the commercial paper rate, i, (NSA), the monetary base, M, (NSA), federal primary surplus, S, (SA), ordinary federal expenditures, F^o, (SA), emergency federal expenditures, F^e, (SA), federal tax receipts, T, (SA), the market value of nominal gross federal government debt, B, (NSA), the monetary gold stock, G^m, (NSA), monthly interpolated GNP deflator, P, (SA, 100 = 1926), monthly interpolated real GNP, Y, (SA), and the nominal monthly holding period return on the government's bond portfolio, i^B, (NSA).[16]

VAR estimates employ the Sims and Zha (1998) prior, which allows for unit roots and cointegration, and probability bands are computed as in Sims and Zha (1999). All variables except the primary surplus and interest rates are logged; interest rates are divided by 100 to put them in percentage units. We include six lags and a constant.[17]

5.3 Ordinary vs. Emergency Spending

Theory in section 4.2 predicts that higher emergency spending, whose debt issuance is not backed by taxes, is more expansionary that ordinary tax-backed spending. A five-variable

[15] See Leeper, Sims, and Zha (1996), Christiano, Eichenbaum, and Evans (1999), Canova (2007), or Kilian and Lütkepohl (2017) for detailed surveys.

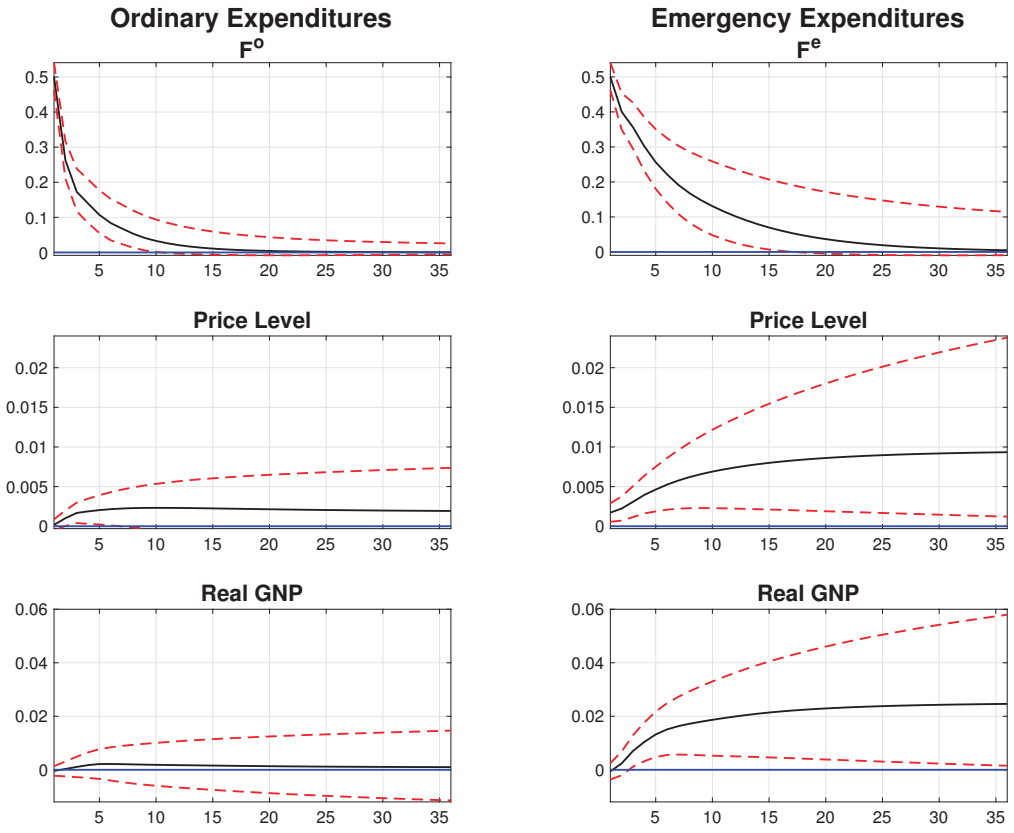
[16] Primary surpluses, expenditures, and receipts were seasonally adjusted using the X-11 procedure in RATS. The deflator and real GNP were interpolated from Balke and Gordon's (1986) quarterly series using the Chow and Lin (1971) algorithm. Monthly series used to interpolate the deflator included M2, the consumer price index, the wholesale price index, the long-term yield on Treasury bonds (NBER Macrohistory Database, m13033a), and index composite wages (NBER Macrohistory Database, m08061c); series used to interpolate real GNP included industrial production, composite index of six roughly coincident series (NBER Macrohistory Database, m16003a); index of factory employment, total durable goods (NBER Macrohistory Database, m08146a), and production worker employment, manufacturing (NBER Macrohistory Database, m08010b). Appendices B.2 and B.3 describe fiscal data in detail and compare our series to three widely used sources—NBER Macrohistory Database, Firestone (1960), and Romer (1992). The holding period return is based on Hall, Payne, Sargent, and Szőke (2021) and provided by George Hall.

[17] In Sims and Zha's (1998) notation, the hyperparameters for the prior are set as $\mu_1 = 0.6, \mu_2 = 0.3, \mu_3 = 1.0, \mu_4 = 1.75, \mu_5 = 2.0, \mu_6 = 2.0$. The prior was chosen based on the model's marginal data density. See figure C.1 in Appendix C for the model's unconditional forecasts under this prior.

VAR with ordinary and emergency expenditures, tax receipts, the price level, and real GNP addresses that prediction.[18] A recursive ordering with expenditures first follows Blanchard and Perotti (2002).

Figure 5 reports impacts of the two types of federal spending—ordinary in the left column and emergency in the right column—on the price level and real GNP. Shocks are normalized to have the same initial size. Higher ordinary spending raises the price level somewhat, with the 68 percent probability bands only slightly positive for about six months after the shock. Real GNP hardly moves.

Emergency spending has significantly larger effects. Prices are higher over the three-year horizon the figure reports, with over 68 percent probability that the response is positive at three years. The modal response to emergency spending is five times larger than to ordinary spending. These differences extend to real GNP, which with high probability remains positive over the horizon. Modal output responses are many times larger for emergency spending.



(a) Responses to ordinary expenditures (b) Responses to emergency expenditures

Figure 5: Responses to unanticipated increases in expenditures. VAR is recursive in the order $(F^o/B, F^e/B, T/B, P, Y)$, where the three fiscal variables are scaled by the market value of debt. Solid lines are modes and dashed lines are 68 percentile probability bands based on 500,000 draws from the posterior distribution of all the VAR parameters. Appendix C reports the full set of impulse response functions [figure C.2].

The importance of emergency spending relative to ordinary shows up in variance decom-

[18] The fiscal variables are scaled by the market value of federal debt.

positions at 36 months, which table 2 reports. Emergency spending accounts for nearly 30 percent of forecast error variance in prices and output; ordinary spending accounts for little.

	% of P	% of Y
$\boldsymbol{F^o}$	5.5	0.4
$\boldsymbol{F^e}$	27.7	29.1

Table 2: Percentage of forecast errors in the price level, P, and real GNP, Y, at 36 months accounted for by ordinary spending, $\boldsymbol{F^o}$, and emergency spending, $\boldsymbol{F^e}$. Appendix C reports the full set of variance decompositions [table C.1]

The evidence that emergency government expenditures have larger macroeconomic effects than ordinary expenditures is consistent with the predictions of theory. In the theory the distinction between the two spending types lies in their financing: ordinary spending is tax-financed, while emergency spending is unbacked by tax changes.

5.4 Larger Systems

Results that contrast the impacts of ordinary and emergency spending are suggestive, but obtained from a small system in which we cannot examine the joint behavior of monetary, gold, and fiscal policies. We extend the analysis to a seven-variable VAR that includes the monetary base, a short-term nominal interest rate, the primary surplus, the monetary gold stock, the nominal market value of debt, the price level, and real GNP.

We use this system to estimate the impacts of an exogenous decrease in the primary surplus and an exogenous increase in the gold supply. The latter sheds some initial light on the monetary explanation for recovery.

5.4.1 Identification The identification aims to be consistent with actual policy behavior in the post-gold standard period of the 1930s. We impose zero restrictions only on A_0, the contemporaneous interactions among innovations in variables, leaving lags unrestricted.

Money Supply: The supply of monetary base, M^s, depends on the short-term nominal interest rate, i, and the monetary gold stock, G^m. The decision about whether or not to sterilize gold inflows lay with the Treasury during this period, but in the case when inflows were not sterilized, there was a direct impact of G^m on M^s.[19] We also allow the Federal Reserve to adjust supply to influence interest rates to yield the money supply rule

$$a_1 M_t^s = a_2 i_t + a_3 G_t^m + \varepsilon_t^{MP}$$

Money Demand: The demand for base money is a derived demand. Demand for nominal money balances, M^d, depends on the short-term nominal interest rate, the price level, P, and real income, Y

$$a_4 M_t^d = a_5 P_t + a_6 i_t + a_7 Y_t + \varepsilon_t^{MD}$$

Fiscal Policy: Fiscal policy chooses the real primary surplus, S. Revenues are procyclical and an unindexed tax code makes revenues depend on the price level. Surpluses react to

[19] See Appendix D for the details of sterilization under either the Federal Reserve or the Treasury.

the price level and real economic activity. We also permit a contemporaneous response of surpluses to the nominal market value of debt, B. This leads to the fiscal rule

$$a_8 S_t = a_9 B_t + a_{10} P_t + a_{11} Y_t + \varepsilon_t^{FP}$$

Government Debt: Government debt is the nominal market value of gross federal debt. Because bond prices react immediately to all shocks in the economy, B is an "information variable," in Leeper, Sims, and Zha's (1996) terminology. The debt equation is

$$a_{12} B_t = a_{13} i_t + a_{14} M_t + a_{15} S_t + a_{16} G_t^m + a_{17} P_t + a_{18} Y_t + \varepsilon_t^B$$

Gold: With the passage of the Gold Reserve Act in January 1934, the Treasury bought all gold supplied at the price chosen by the Treasury and the President, which was \$34.00 an ounce. This made the demand for gold perfectly elastic at that price. The supply of gold to the U.S. was driven by both exogenous political conditions in Europe and endogenous factors within the United States. We model the supply of monetary gold as a function of the nominal interest rate and goods-market conditions:

$$a_{19} G_t^m = a_{20} i_t + a_{21} P_t + a_{22} Y_t + \varepsilon_t^{GS}$$

With perfectly elastic demand, ε_t^{GS} is a gold supply shock and G_t^m is the equilibrium monetary gold stock.

Goods Market: The remaining variables—P and Y—are treated as inertial variables that are predetermined and obey a recursive ordering. We do not distinguish between the two "goods market shocks"

$$a_{23} P_t = a_{24} Y_t + \varepsilon_t^P \tag{18}$$

$$a_{25} Y_t = \varepsilon_t^Y \tag{19}$$

Predeterminedness of goods market variables is a restriction: it says that the price level and output do not respond to non-goods-market shocks within the month, an assumption that Romer (1992) employs with annual data. We relax this assumption in section 5.5.

With 28 distinct moments in the covariance matrix of innovations and 25 freely estimated parameters, the system is overidentified. If data strongly reject the overidentifying restrictions, the estimated exogenous disturbances may not be mutually uncorrelated, muddling the economic interpretations of the shocks.[20]

5.4.2 Primary Surplus Impacts Figure 6 reports the dynamic impacts of a surprise decrease in the real primary surplus during the unbacked fiscal expansion period. The one standard deviation initial shock raises the primary deficit by \$0.21 billion, which is about half of the average annualized monthly deficit in the sample. Because the deficit decays rapidly, the total increase over the three-year forecast horizon is only \$0.51 billion. This is a relatively small and transitory fiscal impulse. Higher deficits do not bring forth higher future surpluses, lending support to the interpretation that fiscal expansion is unbacked.

[20] Appendix C reports the estimated coefficients [table C.2] and that the exogenous shocks in this model are mutually uncorrelated [table C.3].

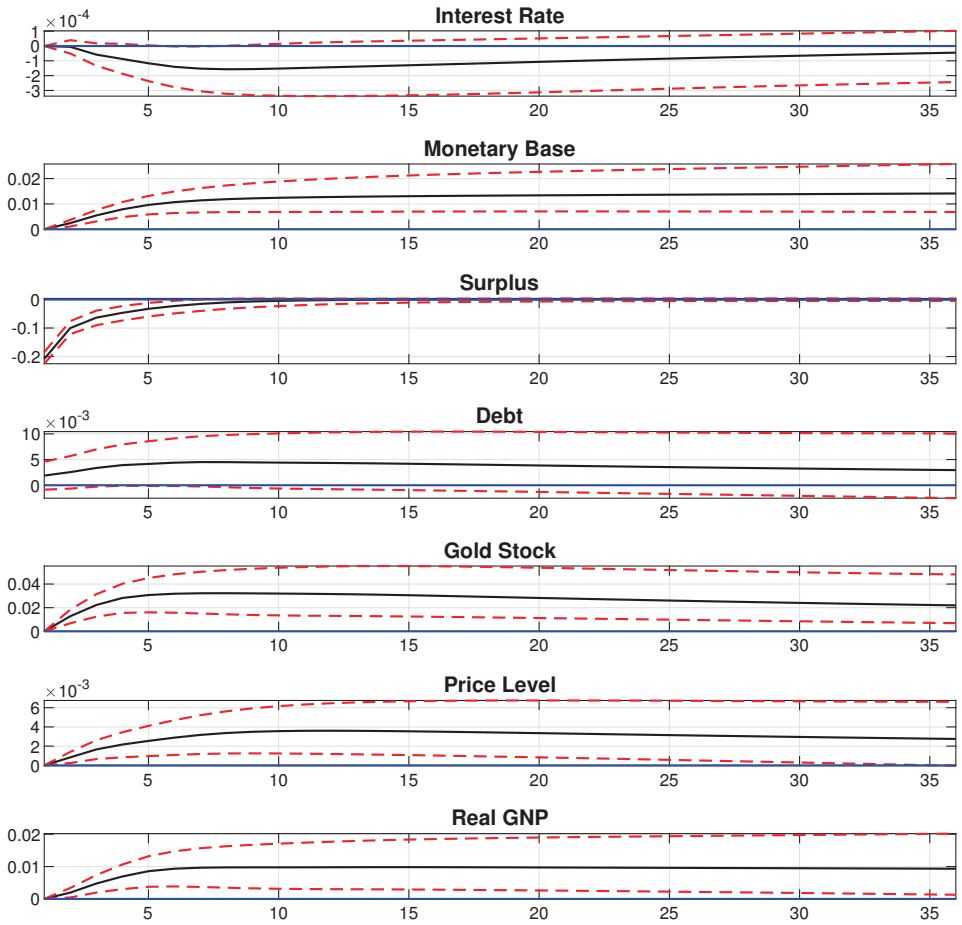


Figure 6: Responses to an unanticipated decrease in the primary surplus in the unbacked fiscal expansion period (April 1933 to June 1940). Solid lines are modes and dashed lines are 68 percentile probability bands based on 500,000 draws from the posterior distribution of all the VAR parameters. Appendix C reports the full set of impulse response functions [figure C.3].

Deficits produce expansionary impacts. Prices and output, which the identification prevents from rising contemporaneously, steadily increase and significantly so. Monetary policy makes no effort to offset the inflationary consequences of the fiscal expansion, suggesting the Fed behaves passively. Nominal interest rates fall slightly in the short run. The lower nominal rates, together with higher expected inflation, drive *ex-ante* real rates lower. Lower real rates induce households and firms to shift demand for goods into the present.

New nominal bonds finance the higher deficits. Debt jumps on impact and remains elevated. Economic recovery encourages gold to flow into the United States. By choosing not to sterilize gold inflows, the Treasury allows the monetary base to expand to accommodate rising demand for money from increased economic activity. Figure 7 shows that despite the rise in nominal debt, fiscal expansion raises nominal GNP sufficiently to reduce the debt-GNP ratio, consistent with beliefs that higher surpluses will not follow the initial deficits.

Looking down the panels in figure 6 reveals the positive comovements among gold, the monetary base, the price level, and real GNP that underlie the conventional monetary narrative of the recovery. But the responses create a problem for this narrative. How does one

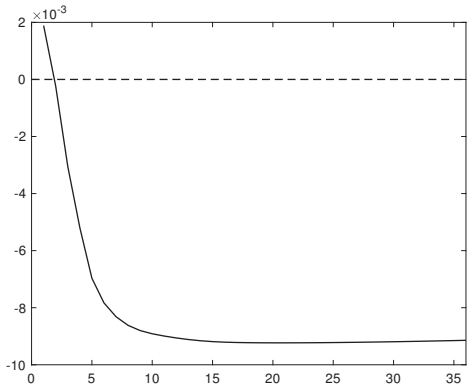


Figure 7: Modal response of debt-GNP ratio to an unanticipated decrease in the primary surplus in the unbacked fiscal expansion period (April 1933 to June 1940), computed from figure 6.

reconcile monetary-induced economic recovery with the sharp short-run declines in primary surpluses and the persistent increase in nominal government debt? Existing literature does not address this question, primarily because the fiscal dimensions have not been integrated into the monetary interpretations. We return to this topic in section 5.5.

5.4.3 Output Multipliers VAR estimates imply sizable output multipliers from increases in primary deficits. Figure 8 reports multipliers k periods after an increase in the deficit at time t, calculated as $\Delta Y_{t+k}/\Delta S_t$, as in Blanchard and Perotti (2002), from the system that underlies figure 6. In the VAR, real GNP is in logs, while the surplus is in real dollars, so we scale the impulse response by the mean of real GNP. Because GNP grew over the sample period, we compute the multipliers using two different measures of the mean—the full sample period and the first year of the sample.

Output multipliers are large and persistent. Taking the average of output over the full sample—top panel—the multiplier peaks at 4.5 after a year and remains close to that level. Credible sets expand over the forecast horizon, but remain above zero over the three-year horizon in the figure. The peak multiplier falls to 3.6 when the mean of real GNP is based on the first year of the sample. Multipliers are not appreciably different under the recursive orderings (dashed lines).[21]

5.5 Reassessing the Money-Led Recovery Evidence

Analysis of recovery is neither complete nor persuasive without a thorough examination of the conventional view of recovery that Friedman and Schwartz (1963), Romer (1992), Bernanke (2004), and Steindl (2004) describe.[22] The initial revaluation of gold, together

[21] Appendix C reports results for a recursively ordered eight-variable VAR that splits the primary surplus into expenditures net of interest payments and tax receipts [figure C.4]. Spending multipliers are comparable to those in figure 8, though less precisely estimated; tax multipliers are highly uncertain [figures C.5 and C.6].

[22] Friedman and Schwartz (1963, p. 499) give this narrative a different twist than Romer by writing that "...the rise in the money stock [from 1933 to 1937] was produced not by the monetary authorities but by gold inflow. Though accidental gold inflows served the same economic function as compliant monetary authorities would have, it occurred despite rather than because of the actions of unions, business organizations, and

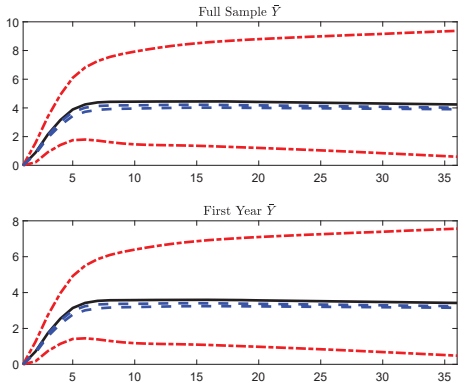


Figure 8: Output multipliers from a \$1 increase in the primary deficit, calculated as $\Delta Y_{t+k}/\Delta S_t$ at horizon k. Solid line is posterior mode from the identified model underlying figure 6, dotted-dashed lines are 68 percent credible sets for that model, and dashed lines are posterior modes from alternative recursive orderings. Top panel uses the mean of real GNP over the full sample, April 1933 to June 1940; bottom panel uses the mean over the first year of the sample.

with the steady inflows of gold largely due to political uncertainty in Europe, were permitted by the Treasury to steadily increase the monetary base. Expansion in both high-powered and broad money measures stimulated real activity and raised prices. At the same time, enhanced confidence in banks after the early 1930s crises reduced cash hoarding and raised the income velocity of money to reinforce the expansionary effects of the growth in the base. Steindl (2004, p. 9) concludes that existing literature offers "incontrovertible" evidence that "strongly supports the view that the recovery was principally due to the growing money stock. . . ."

Steindl (2004, pp. 40-41) provides an explicit description. He writes that Friedman and Schwartz's reasoning that base money rose because of gold inflows

> "...isolates a historical state in which the behavior of the money stock was effectively exogenous, providing a type of natural experiment. The movements of the money stock could not be attributed to the Federal Reserve increasing bank reserves by accommodating increased demand for loans owing to an improving economy; the observed increases in the quantity of money were 'in no way a consequence of the contemporaneous business expansion' [Friedman and Schwartz (1963, p. 544)]. Rather they were due to the expansion of the base owing to the increasing stock of gold."

5.5.1 Importance of Identified Shocks Evidence from the identified VAR in section 5.4 is not sympathetic to Steindl's "natural experiment." Table 3 reports percentages of 36-month forecast error variances in the monetary base, the nominal interest rate, the gold stock, and the primary surplus due to the four identified shocks—monetary policy (MP), money demand (MD), fiscal policy (FP), and gold supply (GS), along with the remaining three shocks (Rest).

government in pushing up prices." Romer attributes much of the growth in base money to the Treasury's choice not to sterilize the inflows.

	% of M	% of i	% of G^m	% of S
MP	18.9	79.9	2.5	0.5
MD	29.8	7.2	0.4	1.1
FP	39.1	5.2	26.9	92.1
GS	2.4	1.0	59.3	0.4
Rest	9.8	6.7	10.9	5.9

Table 3: Percentage of forecast errors in the monetary base, M, nominal interest rate, i, monetary gold stock, G^m, and real primary surplus, S at 36 months accounted for by shocks to monetary policy, **MP**, money demand, **MD**, fiscal policy, **FP**, gold supply, **GS**, and the three remaining shocks, **Rest**.

Gold supply shocks account for only 2.4 percent of fluctuations in base money, sharply at odds with Steindl's contention. Fiscal policy disturbances are by far the most important source of base movements, followed by shocks to money demand. This pattern is the obverse of the money-led view; it is consistent with the monetary base being supplied elastically to target a short-term nominal interest rate, 80 percent of whose fluctuations are attributable to monetary policy behavior [table C.4 in appendix C].

Turning to gold stock variation, supply disturbances do explain 60 percent of that variation. But fiscal policy shocks account for 27 percent. No other shock matters. While gold flows contain a sizable "exogenous" component as the monetary view maintains, the gold stock also responds endogenously to fiscal policy, as figure 6 shows. Among those endogenous factors were the relative strength of the recovery, American willingness to buy unlimited quantities of gold at a high price, increased sale of American merchandise abroad as the dollar depreciated, the inflow of capital to the United States, and foreign-owned capital sent to the United States to build up dollar balances or to purchase American securities [Paris (1938)].

The only policy variable that appears largely exogenous is primary surpluses. Fiscal shocks explain 92 percent of surplus error variance. Because the identification permits surpluses to respond both contemporaneously and with lags to all the disturbances, this finding supports ascribing to fiscal policy a causal role.

5.5.2 Gold Supply Shocks Variance decompositions find that 60 percent of gold stock fluctuations are driven by gold supply shocks. Do those shocks—which are the genesis of Friedman and Schwartz's monetary narrative—generate the comovements that underlie the money-led recovery view?

From early 1933 until December 1936, the Treasury opted not to sterilize gold inflows, which permitted the monetary base to expand along with the gold stock. We use figure 9 to ask if gold supply shocks move base money strongly and persistently. They are an important source of gold-stock fluctuations, but little else. Positive innovations in gold supply are followed by a higher monetary base, although not significantly higher; if anything, higher monetary gold leads to lower prices and real GNP. The prime candidate for the monetary narrative shock in this VAR does not deliver the required comovements in macro variables.

Only disturbances to the primary surplus generate the full set of comovements in assets, the price level, and real GNP that align with existing monetary explanations of the recovery. Figure 6's responses to a shock that raises the primary deficit are fully consistent with what

the theory predicts for the consequences of an unbacked fiscal expansion.

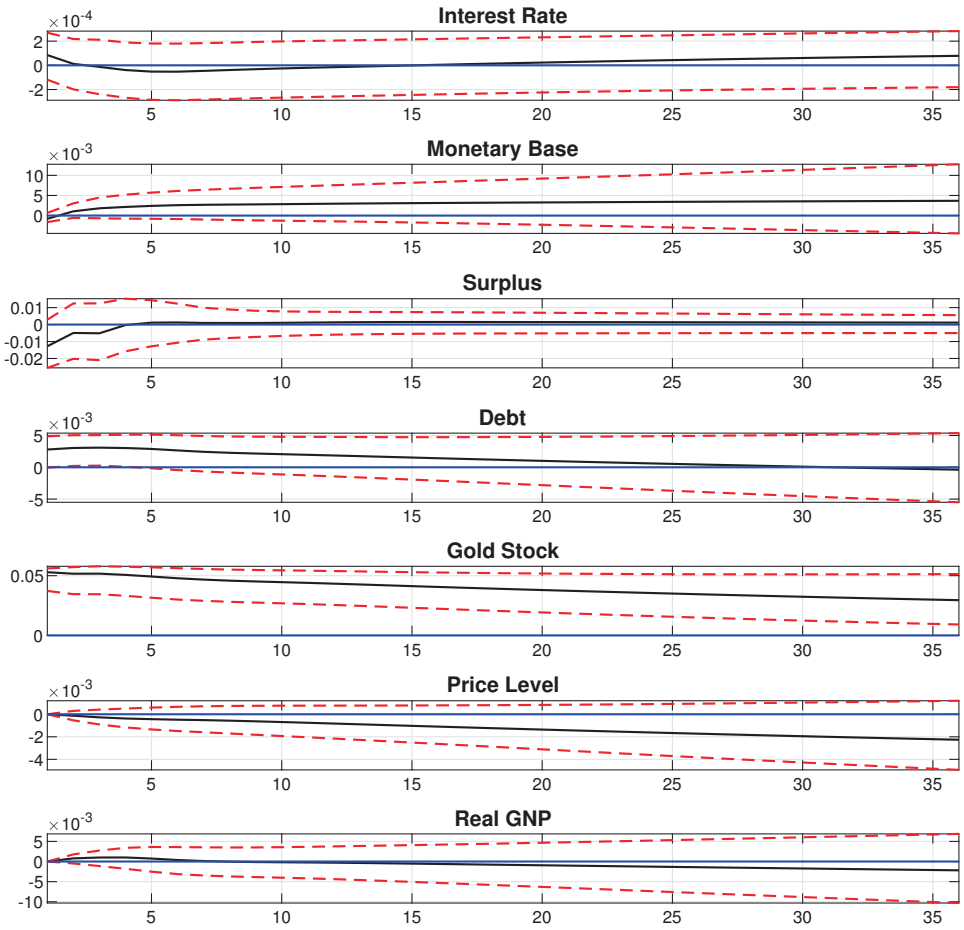


Figure 9: Responses to an unanticipated increase in the supply of gold in the unbacked fiscal expansion period (April 1933 to June 1940). Solid lines are modes and dashed lines are 68 percentile probability bands based on 500,000 draws from the posterior distribution of all the VAR parameters.

5.5.3 Sign Restrictions Figure 9 suggests that a positive shock to the supply of gold does not generate expansionary paths for the price level and real GNP. But that finding and the variance decompositions in section 5.5.1 are conditional on the particular identification of exogenous gold supply shocks. A skeptic may argue this is not compelling evidence against a gold-induced recovery.

To address skeptics, we reframe the empirical question to be

> What implications do shocks that generate persistent positive comovements among gold, base money, the price level, and real GNP carry for the paths of primary surpluses?

To answer this question, we adopt sign restrictions on impulse response functions to identify the set of structural shocks that produce the positive comovements that Friedman and Schwartz associate with economic recovery.[23] We impose that G^m, M, P, and Y must

[23]See Faust (1998), Canova and De Nicolo (2002), Uhlig (2005).

rise or fall in unison over the three-year horizon for which response functions are computed. We add smoothness criteria. Let $R_{i,j}$ be the response of variable i in period j. Smoothness takes the form $|R_{i,3}| > |R_{i,2}| > |R_{i,1}|$ for variables $i = G^m, M, P, Y$ to rule out shocks that generate erratic responses over the first quarter.

Another way to word the question we address with sign restrictions is: are there shocks that generate Friedman and Schwartz's comovements but *are not* associated with a lower path for primary surpluses? An affirmative answer leads to believing that both fiscal expansion and gold inflows played important roles in the recovery.

Denote the moving average representation of the structural model by

$$y_t = C(L)\varepsilon_t$$

Because the structural errors, the ε_t's, are orthogonal, the impulse responses to a given shock in any identification is the $(k \times 1)$ vector of lag polynomials, $C(L)\alpha$, for some α that satisfies $\alpha'\alpha = 1$. Each candidate α implies a different version of A_0 in the structure (17). We seek the set of α's that satisfy the positive comovement and smoothness restrictions. We take each α_i in that set to represent an identification that is consistent with the comovements that underlie the monetary recovery explanation.

After fixing the coefficients $(A_0, A_+(L))$ at their estimated posterior modes, we adopt Rubio-Ramírez, Waggoner and Zha's (2010) algorithm to our problem:

1. Take many draws of the elements of the vector α_i from $\alpha_i \sim N(0,1)$ for $\alpha_i'\alpha_i = 1$.

2. Compute the impulse responses from

$$y_t^{(i)} = [C(L)\alpha_i][\alpha_i'\varepsilon_t]$$

3. If the four variables (G^m, M, P, Y) in $y_t^{(i)}$ satisfy the restrictions, retain the full set of impulse response functions.

4. Discard any α_i draw that fails to satisfy the restrictions.

Figure 10 plots the impulse responses to the shocks that generate positive comovements among (G^m, M, P, Y). The system replaces the commercial paper rate, i, with the monthly holding period return on the bond portfolio, i^B. Responses of the remaining variables, (i^B, S, B), are unrestricted. Solid lines are medians of the marginal distributions at each impulse response horizon; dashed lines are 68 percentile bands and dashed-dotted lines are 90 percentile bands, reflecting the dispersion of those marginal distributions. The lines—connected across horizons—do not reflect a particular α_i draw, any more than the previous impulse response lines reflect a particular draw from the posterior distribution of the VAR parameters.[24]

Interpretation of figure 10 is different. Earlier figures hold fixed the identification—the ε_t's—while figure 10 summarizes uncertainty *about* the identification—the $\alpha_i'\varepsilon_t$'s. Among the three unrestricted variables, primary surpluses exhibit the clearest pattern across identifications. Ninety-five percent of the identifications produce declining surpluses that are

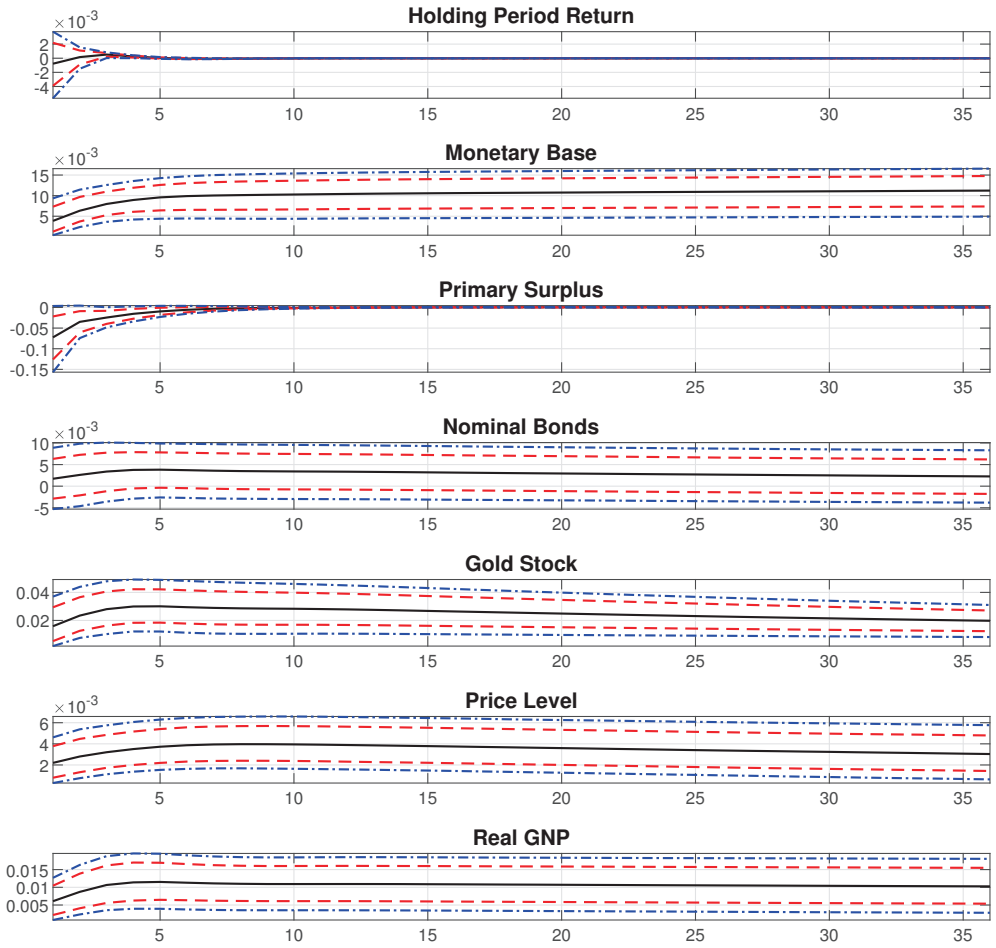


Figure 10: Marginal distributions of responses to the shocks that satisfy Friedman and Schwartz's recovery comovements. Median (solid), 68 percentile (dashed), 90 percentile (dashed-dotted), based on 10,000 draws.

sharp and short-lived. Over longer horizons, about 80 percent of the identifications generate higher nominal government debt.

An alternative summary of the surplus responses, which conforms closely with theory, is the present value of primary surpluses, which we compute as

$$PV(s_0) = \sum_{j=0}^{T} (i_j^B - \pi_j + s_j)$$

where date 0 is the date of the shock, T is 35 months. The impulse responses are i_j^B, the monthly holding period return j months after the shock, $\pi_j = p_j - p_{j-1}$, monthly inflation in logs, and s_j, the primary surplus. $i_j^B - \pi_j$ is the ex-post real return on the bond portfolio in period j, which we take to be the rate at which surpluses are discounted.

Figure 11 plots the distribution of present values of primary surpluses associated with α_i draws that deliver positive comovements in gold, base money, the price level, and output. Only 10 percent of the draws yield positive present values of surpluses, which is implausibly

[24] Uhlig (2017) makes this point in a comment on Fry and Pagan's (2011) critique of sign restrictions.

low for the monetary explanation of recovery. If exogenous increases in the gold stock and subsequent increases in the monetary base underlay expansions in the price level and real economic activity, one would expect surpluses to rise: an unindexed tax code together with rising incomes would raise revenues; even with no reduction in spending, primary surpluses should rise through the recovery. Instead, figure 11 reports the preponderance of draws produce negative present values of surpluses, with the distribution heavily skewed toward deficits. The mean and median of the present values are -0.16, higher in absolute value than the maximum positive value of 0.13. Based on this evidence, it seems unlikely that gold, base money, the price level, and real GNP covary positively when primary surpluses rise.

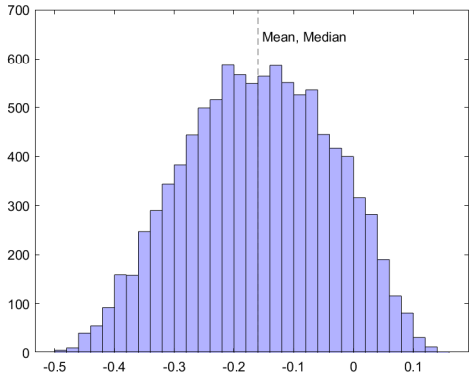


Figure 11: Distribution of the present value of primary surpluses associated with shocks that satisfy Friedman and Schwartz's recovery comovements. Based on 10,000 draws of α_i's.

Taken together, the sign-restrictions analyses lend little support to the money-led view. The fiscal responses are difficult to reconcile with a recovery triggered by gold inflows and monetary expansion. Such a recovery would tend, as table 1 reports, to raise revenues with higher nominal income, increasing surpluses.

5.6 Summary of VAR Evidence

VAR evidence leads to the following conclusions:

1. Emergency government expenditures have larger and more significant dynamic impacts on the price level and real GNP than ordinary expenditures, as theory predicts.

2. Lower primary surpluses persistently raise prices, output, the monetary gold stock, base money, and government debt, while they reduce the debt-GNP ratio, consistent with unbacked fiscal expansion.

3. A \$1 increase in the primary deficit raises real GNP between \$3.50 and \$4.50 after a year.

4. Multivariate analysis finds little support for the conventional monetary explanation that gold inflows raised the monetary base, prices, and output. Gold supply shocks have weak predictive value for the base and none for prices and output.

5. A search across structural identifications that generate positive comovements in gold, money, prices, and output finds that with high probability those comovements are associated with sharply lower surpluses; if fiscal variables were responding passively to economic recovery, surpluses should have increased.

These results do not deny that expansion in the gold stock and money played roles in the recovery. But the roles were decidedly supporting, rather than leading.

6 Economic Outturns and Corroborating Evidence

This section presents a variety of facts about the state of the U.S. economy in the 1930s. It also offers some evidence that corroborates the interpretation that unbacked fiscal expansion spurred recovery. Data are quarterly.

6.1 Interest Rates and Prices

Figure 12 plots the level of the GNP deflator along with two interest rates—the commercial paper rate and the New York Fed's discount rate. Although during the gold standard interest rates generally followed the decline in the price level, there are also several distinct deviations when rates rose sharply despite a flat or declining price level. In October 1931, for example, concerns about gold outflows induced most Federal Reserve banks to raise their discount rates after Britain left the gold standard, even though overall prices were in free fall.

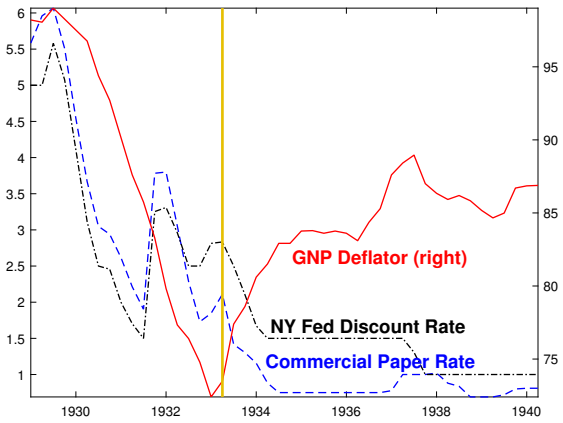


Figure 12: Price level and interest rates. The GNP deflator (1926 = 100) is the solid line (right scale), the commercial paper rate is the dashed line, and the New York Fed discount rate is the dotted-dashed line. The vertical line marks when the United States abandoned the gold standard. Sources: Federal Reserve Board (1943).

After the abandonment of the gold standard in April 1933, the Federal Reserve pegged the discount rate, changing it infrequently. Meltzer (2003, p. 413) notes that the Federal Reserve made few changes to its market portfolio and discount rates from 1933 to 1941. If anything, rates moved against the price level: the Fed was not adjusting policy to combat higher prices; instead, it was permitting price-level rises to devalue outstanding government bonds.[25]

[25] Appendix E reports additional macroeconomic variables.

6.2 Government Debt

If FDR had intended to engineer an unbacked fiscal expansion, growth in government liabilities suggests he was successful. Nominal gross debt doubled during his first seven years in office. By comparison, seven fiscal years after the financial crisis in 2008, U.S. gross federal debt had increased only by a factor of 1.8.

Figure 13 makes a key point about unbacked fiscal expansion. From April 1933 to June 1940 the value of nominal debt doubled (dashed line). The debt-GNP ratio, measured at market value, rose sharply from 15 percent in 1930 to 42 percent at the time gold was abandoned (solid line). Then it hovered around 40 percent for the next six years, until the recession and Roosevelt's abandonment of unbacked fiscal expansion policy raised the debt-GNP ratio. Before leaving the gold standard, bond holders expected debt would be fully backed, so its value rose. Once debt became only a claim to dollars, expectations shifted to the view that on the margin new debt issuances would not bring forth higher primary surpluses. Despite the rise in nominal debt, the value of debt remained stable during unbacked fiscal expansions.

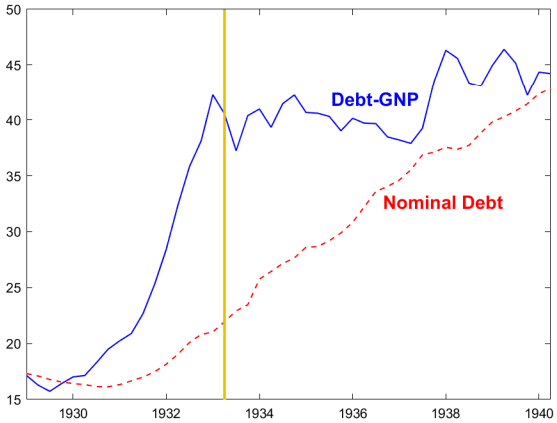


Figure 13: Market value of gross debt as percentage of nominal GNP (solid line) and par value of gross debt in billions of dollars (dashed line); vertical axis measures both percentage and billions of dollars. Vertical line marks when the United States abandoned the gold standard. Sources: Authors' calculations, Balke and Gordon (1986).

6.2.1 Returns on Treasury Bond Portfolio

Revaluation effects on the government's bond portfolio are a central feature of unbacked fiscal expansion. This section reports nominal and real—ex-post and surprise—returns on the bond portfolio, contrasting returns under the gold standard to those after leaving gold.[26] Several patterns emerge from returns data in table 4. First, nominal returns are comparable across the gold standard and unbacked fiscal expansion period. Second, ex-post real returns are substantially higher in the gold standard period than in the later period (average annual real returns of 7.86 percent versus 1.20 percent). Finally, on average, surprises in real returns are strongly positive in the early period (4.81 percent), but negative during the unbacked fiscal expansions (−0.76

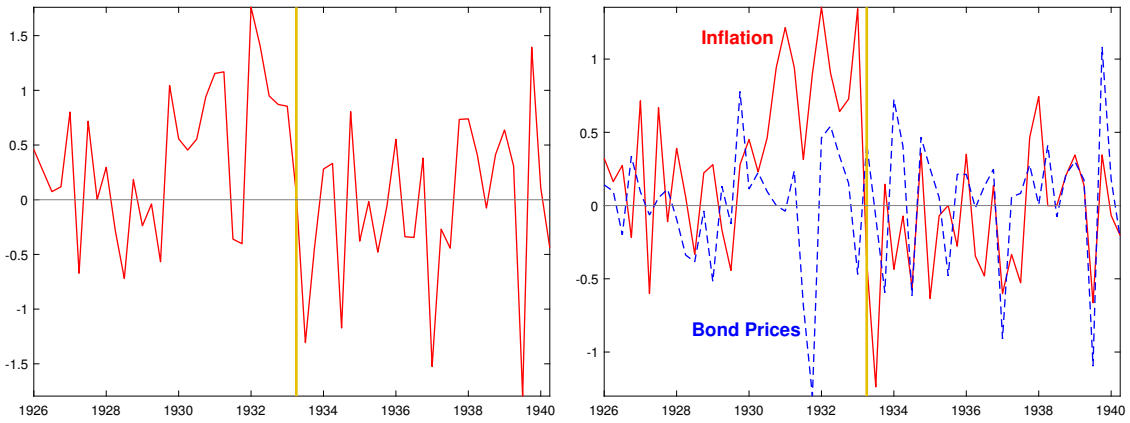
[26]Data availability limits the gold standard period to run from January 1926 to March 1933. Appendix F describes the underlying calculations.

percent). These patterns are fully consistent with surprise inflation devaluing government debt during Roosevelt's administration.

	Gold Standard		**Unbacked Fiscal Expansion**	
	Monthly	*Annual*	*Monthly*	*Annual*
Nominal	0.24	2.91	0.23	2.72
Ex-Post Real	0.66	7.86	0.10	1.20
Surprise Real	0.40	4.81	−0.06	−0.76

Table 4: Returns on government bond portfolio at monthly and annual rates. Return data start in 1926, so "gold standard" is January 1926 to March 1933.

Surprise real returns on government debt are quantitatively important. After leaving the gold standard, surprise revaluations are both large and frequently negative, as figure 14a shows. With debt at 40 percent of GNP, the revaluations are several percentage points of output, a substantial fraction of primary deficits.[27]



(a) Surprises in real returns (b) Decomposition of surprises

Figure 14: Panel (a): surprises in real returns on bond portfolio as percentage of market value of outstanding debt. Panel(b): decomposition of surprises in real returns on bond portfolio into components due to unanticipated inflation (solid line) and unanticipated bond prices (dashed line). See appendix F for details. Vertical line marks when the United States abandoned the gold standard. Source: Hall, Payne, Sargent, and Szőke (2021), CRSP, and authors' calculations.

The decomposition of surprise real returns, graphed in figure 14b, confirms that before leaving the gold standard, high realized real returns were driven by low inflation (solid line). The negative spike due to bond prices in 1931Q4 was created by the Fed's efforts to defend the gold parity by sharply raising discount rates (dashed line). In the period of unbacked fiscal expansions, again with the exception of the jump in early 1938, surprise devaluations of debt from inflation dominate the surprise real returns.

The last informal piece of empirical evidence about the unbacked fiscal expansion appears in figure 15, which plots the relative price of the bond portfolio. This relative price

[27]Sims (2013) computes surprise capital gains and losses on U.S. government bonds since World War II to find revaluation effects are the same order of magnitude as annual fluctuations in primary surpluses.

is computed as the real market value of debt over the nominal par value of debt to yield the goods-price of government bonds. Bonds became increasingly costly in terms of goods throughout the gold standard period, reaching a peak in 1933Q1. With the departure from gold came a steady devaluation of the bond portfolio, bottoming out in the middle of 1937 when the recession began. This cheapening of bonds is consistent with bondholders substituting out of debt and into buying goods and services: an increase in aggregate demand triggered by unbacked fiscal expansion.

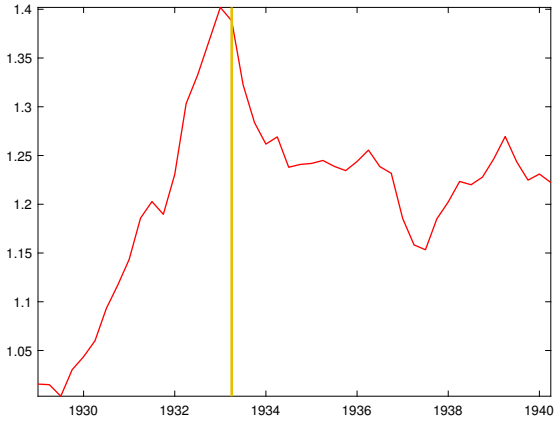


Figure 15: Relative price of the bond portfolio is the ratio of the real market value to the nominal par value of debt. Vertical line marks when the United States abandoned the gold standard. Source: Authors' calculations.

7 Political and Intellectual Context

Roosevelt's decision to leave the gold standard and reflate arose against a backdrop of growing political and intellectual consensus that higher retail and wholesale prices were critical to recovery of wages, employment, investment, and consumption. The banking crisis of February–March 1933 heightened expectations of a dollar devaluation as political pressure mounted against maintaining gold convertibility at the existing parity.[28] Gold reserves came close to their statutory minimums, particularly at the New York Fed. To avoid further strain on the beleaguered financial sector, Senator Elmer Thomas advocated issuing unbacked currency to raise the price level and Senator Tom Connally proposed reducing the gold content of the dollar by one-third. Financial and political forces were aligning against the gold standard.

Keynes (1924) was foundational to Roosevelt's desire to raise and stabilize the price level. He explained that large swings in the price level can produce capricious distributional effects and destroy wealth, leading him to advocate targeting and smoothing the price level [p. 38]. Keynes also distinguished seigniorage as a source of revenues from revaluations of nominal government liabilities as a means of reducing debt burden. The latter played a central role in the reflation.

Opposition to the gold standard came from a camp of economists who agitated for reflation. Irving Fisher's (1932; 1933b) debt-deflation theory argued that when the private sector

[28] See Eichengreen (1992), especially chapter 11.

is over-indebted, a falling price level triggers a sequence of events that drives the economy into depression. Viewing nominal income through the equation of exchange, Fisher advocated government policies designed to raise the money supply and velocity. Fisher carried on extensive correspondence with the president and met with him several times to discuss his economic proposals. In an April 30, 1933 letter to Roosevelt, Fisher (1933a) expressed joy over "...the reflation legislation," referring to the Agricultural Adjustment Act, which included the Thomas Amendment giving the president unprecedented powers to reflate.

Keynes (1933) wrote an open letter to Roosevelt, published in the *New York Times*, calling for the U.S. government "...to create additional current incomes through the expenditures of borrowed or printed money." Keynes emphasizes "governmental loan expenditure" as "the only sure means of obtaining quickly a rising output at rising prices," echoing his 1924 *Tract*. Keynes prescribed unbacked fiscal expansion: nominal-liability-financed deficits with a promise not to raise taxes to pay off the debt.

While the consensus favoring reflation was strong, Roosevelt received diverse advice on how to achieve it. There were false starts, such as the National Industrial Recovery Act of 1933, which in addition to being ruled to contain unconstitutional features, likely slowed recovery [Cole and Ohanian (2004)]. But his "try anything" macroeconomic approach contained the essential ingredients for an unbacked fiscal expansion: suspension of the gold standard, a commitment to run debt-financed emergency deficits until specified parts of the state of the economy improved, and a policy decision not to sterilize gold inflows, which permitted the monetary base to grow without further increases in government indebtedness for monetary reasons.

Our argument that the *joint* monetary-fiscal mix underlies recovery contrasts with existing explanations, which frequently attribute diminished roles to both monetary and fiscal policy. Some studies argue that the combination of dollar devaluation, the departure from the gold standard, regime change, expansion of the monetary base, and rising inflation expectations account for the recovery. Our unbacked fiscal expansion interpretation broadly agrees with many of these arguments, but links them to the monetary and fiscal policies of the 1930s.

Another distinction concerns the view that monetary policy made no substantive contribution to the recovery. Friedman and Schwartz (1963), for example, conclude the immediate recovery "owed nothing to monetary expansion" [p. 433]. Wicker (1965) attributes Fed inaction to a leadership vacuum and the Fed's incomplete understanding of how monetary policy affects the economy and the price level. Meltzer (2003, p. 273) flatly declares that "...in the middle and late thirties, just as in the early thirties, the Federal Reserve did next to nothing to foster recovery."

By ensuring short-term interest rates did not rise with inflation through the 1930s, the Fed permitted unbacked fiscal expansion to reflate the economy. If interest rates are pegged, monetary policy prevents the nominal debt expansion from raising debt service enough to put debt on an explosive path. In this manner, Federal Reserve policy fulfilled a critical role: by permitting higher price levels to bring the real market value of debt in line with the expected present value of the primary surpluses, the Fed stabilized debt. Monetary and fiscal policy are partners in successful unbacked fiscal expansion.

The economic consequences of the unbacked fiscal expansion that began in 1933 rationalize why concerns that expanding federal debt would threaten the U.S. government's

creditworthiness were not realized. Studenski and Krooss (1952, p.428) summarize a key feature of unbacked fiscal expansion: "...the New Deal administration itself believed that the public credit could not sustain continuous budgetary deficits and increases in the public debt. But in practice this also proved incorrect." Unbacked expansions raise prices and output to ensure that higher nominal debt does not transform into a higher debt-output ratio, as figure 13 shows.

The initial impetus for recovery came from dollar devaluation and departure from the gold standard, which signaled a change in policy regime that raised inflation expectations, according to the consensus view. We agree that these elements all contributed to the recovery, particularly in commodity prices, but argue they cannot account for the rapid pick up in the price level and output in isolation. Temin and Wigmore (1990) offer evidence that dollar devaluation in 1933 signaled that Roosevelt had abandoned the deflation associated with adherence to the gold standard and that the lower dollar directly increased aggregate demand and indirectly raised prices and production throughout the economy. Romer (1992), however, makes a forceful case that the dollar depreciation after April 1933 cannot account for the sustained increases in subsequent price levels. We agree with Romer and point out—as do Jalil and Rua (2017)—that both Britain and France experienced similar depreciations in their currencies after leaving gold, yet prices and output did not rise as they did in the United States. Our work complements Jalil and Rua's narrative evidence on the role of rising inflation expectations in the recovery of 1933. We ground those expectations in the prevailing monetary-fiscal policy mix.

Our narrative shares some elements with Eggertsson (2008), but the economic mechanisms differ in important ways. Eggertsson relies on new Keynesian mechanisms for escaping from the lower bound on the nominal interest rate, with expectations anchored on an eventual return to the conventional active monetary/passive fiscal policy mix. Eggertsson's story rests on coordinated monetary and fiscal policies that maximize household utility, allowing the time-consistent policy to generate the same mechanisms that Eggertsson and Woodford's (2003) optimal commitment policy delivers.

This interpretation faces difficulties. First, it requires substantial policy coordination. Eccles (1951) describes a highly decentralized Federal Reserve, both in its operations and in its objectives [see section 3.1 and Wicker (1966), Wheelock (1991), and Meltzer (2003)]. Federal Reserve officials frequently voiced concerns about the prospect of inflation, even during the deflationary years in the early 1930s [Meltzer (2003, p. 280)].[29] Second, Eggertsson's mechanism leans heavily on rational expectations at a time when the entire monetary system had no precedent. Unbacked fiscal expansion does not require rational expectations, as Eusepi and Preston (2012) and Sims (2016) show. In this important sense, our mechanism is less demanding than is Eggertsson's. Finally, Eggertsson's explanation does not trigger reflation—though it arrests deflation—and his model predicts a rising debt-output ratio, two predictions at odds with data.

Our perspective elaborates Eichengreen's (2000) conclusion that "...the fundamental

[29]Some academic economists backed those voices. Eleanor Lansing Dulles (1933, p. V) wrote in November 1933 that the United States faced "serious dangers" from inflation: "Inflation takes many forms, Government debt is the most insidious...." Oliver Sprague, a Harvard professor, opposed leaving gold, warning that America was "in great danger of a great inflation such as Germany had" [Pearson, Meyers, and Gans (1957, p. 5616)].

change in policy making in the 1930s was not the Keynesian revolution, but the 'nominal revolution'—the abandonment of the gold standard for managed money." To reach our perspective, broaden "money" to "nominal government liabilities." Nothing compels policy makers to back expansions in nominal liabilities—base money or bonds—with higher taxes. When they don't, debt-financed fiscal expansion becomes a potent policy tool.

8 Lessons for Today

By and large, American fiscal policy has followed the Hamilton (1790) norm: government debt expansions are backed by real primary surpluses. Commodity money regimes offer no alternative other than outright default. But the norm has prevailed most of the time since Roosevelt left the gold standard to render government bonds merely claims to future dollars. Explicit departures from that norm occurred during the Covid pandemic and Roosevelt's efforts to pull the economy out of the Great Depression.

This paper combines historical facts with simple theory and both formal and informal empirical evidence to weave a fresh narrative about the recovery launched in 1933. Recovery was a joint monetary-fiscal phenomenon. The monetary step of abandoning the gold standard and revoking convertibility was necessary for Roosevelt to run debt-financed emergency deficits until recovery set in.

Roosevelt understood his policies were unprecedented and took pains to communicate to the public why unprecedented actions were essential not only to recovery, but to "survival of democracy." Those efforts helped to make unbacked emergency fiscal expansion believable.

In Roosevelt's case, his economic and political objectives aligned. The relief provided to farmers, homeowners, and unemployed workers, which unbacked government debt financed, also reflated the economy, as Roosevelt desired. Covid spending had similar effects, though higher inflation was not a stated goal of policy. That unbacked fiscal expansion is inflationary comes as no surprise to those familiar with the fiscal theory of the price level. In 2022 it seems to have caught policy makers and financial market participants off guard.

Roosevelt's successful, if incomplete, reflation carries lessons for policymakers today. First, fiscal expansions always have two effects: Keynesian hydraulics and wealth effects from government debt. Wealth effects may be large, depending on expectations of future fiscal actions. Analyses that neglect these may underpredict the stimulative impacts and misguide policy responses to the resulting inflation.

A second lesson from the Roosevelt policies is that fiscal stimulus and fiscal sustainability need not be in conflict. When the aim is to raise inflation and economic growth, higher nominal government debt—if people are convinced it does not portend higher future taxes—can achieve both the macroeconomic objectives and the goal of stabilizing debt. To engineer an unbacked fiscal expansion, governments must understand that rapid growth in *nominal* debt need not threaten fiscal sustainability, just as it didn't in 1930s America. On the other hand, to maintain the value of government debt, policy makers must assure—as with Roosevelt's balanced ordinary budget—that unbacked fiscal expansion is a temporary measure to address an immediate need.

Finally, sometimes policy makers speak as clearly about fiscal intentions as Roosevelt did.[30] But clarity is the exception in fiscal policy. Central bankers understand the importance

[30]Two examples. On February 23, 2009, six days after passage of his stimulus package, Barack Obama

of anchoring monetary expectations. Because fiscal expectations are equally important, fiscal actions could be more effective if coupled with communication about how those actions will be financed.

pledged "to cut the deficit... in half by the end of my first term in office." On March 15, 2022, following about $5 trillion in Covid relief spending, White House Press Secretary Jen Psaki urged lawmakers to approve additional support "provided on an emergency basis, not something where it would require offsets." Obama sought to follow Hamilton's norm; policy makers during Covid did not.

References

Balke, N., and R. J. Gordon (1986): "Appendix B: Historical Data," in *The American Business Cycle: Continuity and Change*, ed. by R. J. Gordon, pp. 781–850. University of Chicago Press, Chicago.

Barro, R. J. (1979): "Money and the Price Level Under the Gold Standard," *The Economic Journal*, 89(353), 13–33.

Beard, T. R., and W. D. McMillin (1991): "The Impact of Budget Deficits in the Interwar Period," *Journal of Macroeconomics*, 13(2), 239–266.

Bernanke, B. S. (2004): *Essays on the Great Depression*. Princeton University Press, Princeton, N.J.

Bianchi, F., and L. Melosi (2019): "The Dire Effects of the Lack of Monetary and Fiscal Coordination," *Journal of Monetary Economics*, 104, 1–22.

Blanchard, O. J., and R. Perotti (2002): "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *Quarterly Journal of Economics*, 117(4), 1329–1368.

Blum, J. M. (1959): *From the Morgenthau Diaries: Years of Crisis, 1928–1938*. Houghton Mifflin Company, Boston.

Board of Governors of the Federal Reserve System (1937): "23rd Annual Report," Washington, D.C.

Bordo, M. D., and F. E. Kydland (1995): "The Gold Standard As a Rule: An Essay in Exploration," *Explorations in Economic History*, 32(4), 423–464.

Brown, E. C. (1956): "Fiscal Policy in the 'Thirties: A Reappraisal," *American Economic Review*, 46(5), 857–879.

Canova, F. (2007): *Methods for Applied Macroeconomic Research*. Princeton University Press, Princeton,NJ.

Canova, F., and G. De Nicolo (2002): "Monetary Disturbances Matter for Output for Business Fluctuations in the G-7," *Journal of Monetary Economics*, 49(6), 1131–1159, Federal Reserve Board, International Finance Discussion Paper, No. 661.

Chandler, L. V. (1971): *American Monetary Policy, 1928–1941*. Harper & Row, Publishers, New York.

Chow, G. C., and A. Lin (1971): "Best Linear Unbiased Interpolation, Distribution, and Extrapolation of Time Series by Related Series," *Review of Economics and Statistics*, 53(4), 372–375.

Christiano, L. J., M. Eichenbaum, and C. L. Evans (1999): "Monetary Policy Shocks: What Have We Learned and to What End?," in *Handbook of Macroeconomics*, ed. by J. B. Taylor, and M. Woodford, vol. 1A, pp. 65–148. Elsevier Science, Amsterdam.

Cochrane, J. H. (1999): "A Frictionless View of U.S. Inflation," in *NBER Macroeconomics Annual 1998*, ed. by B. S. Bernanke, and J. J. Rotemberg, vol. 13, pp. 323–421. MIT Press, Cambridge, MA.

——— (2023): *The Fiscal Theory of the Price Level*. Princeton University Press, Princeton, N.J.

Coddington, A. (1976): "Keynesian Economics: The Search for First Principles," *Journal of Economic Literature*, 14(4), 1258–1273.

Cole, H. L., and L. E. Ohanian (2004): "New Deal Policies and the Persistence of the Great Depression: A General Equilibrium Analysis," *Journal of Political Economy*, 112(4), 779–816.

Department of the Treasury (various): "Annual Report of the Secretary of the Treasury on the State of Finances," Washington, D.C., various fiscal years.

Dulles, E. L. (1933): *The Dollar, the Franc, and Inflation*. The Macmillan Company, New York.

Eccles, M. (1933): "Investigation of Economic Problems," Hearings Before the Senate Finance Committee, U.S. Congress, February 13–28.

Eccles, M. S. (1951): *Beckoning Froniters*. Alfred A. Knopf, New York.

Eggertsson, G., and M. Woodford (2003): "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity*, 2003(1), 139–211.

Eggertsson, G. B. (2008): "Great Expectations and the End of the Depression," *American Economic Review*, 98(4), 1476–1516.

Eichengreen, B. (1992): *Golden Fetters: The Gold Standard and the Great Depression, 1919-1939*. Oxford University Press, New York.

——— (2000): "Was There a Paradigm Shift in Economic Policy in the 1930s?," in *Storia dell'economia mondiale (A History of the World Economy), Volume 4: Between Expansion and Recession (1850-1930)*, ed. by V. Castronovo. Editori Laterza, Rome.

Eusepi, S., and B. Preston (2012): "Debt, Policy Uncertainty and Expectations Stabilization," *Journal of the European Economic Association*, 10(4), 860–886.

Faust, J. (1998): "The Robustness of Identified VAR Conclusions About Money," *Carnegie-Rochester Conference Series on Public Policy*, 49, 207–244.

Federal Reserve Board (1943): "Banking and Monetary Statistics, 1914–1941," Washington, D.C., September.

Firestone, J. M. (1960): *Federal Receipts and Expenditures during Business Cycles, 1879–1958*. Princeton University Press, Princeton, N.J.

Fishback, P. (2010): "US Monetary and Fiscal Policy in the 1930s," *Oxford Review of Economic Policy*, 26(3), 385–413.

Fisher, I. (1932): *Booms and Depressions*. Adelphi Company, New York.

——— (1933a): Letter from Fisher to Roosevelt, April 30.

——— (1933b): "The Debt-Deflation Theory of Great Depressions," *Econometrica*, 1(4), 337–357.

——— (1934): *After Reflation, What?* Adelphi Company, New York.

Friedman, M., and A. J. Schwartz (1963): *A Monetary History of the United States, 1867-1960*. Princeton University Press, Princeton, NJ.

Fry, R., and A. Pagan (2011): "Sign Restrictions in Structural Vector Autoregressions: A Critical Review," *Journal of Economic Literature*, 49(4), 938–960.

Goodfriend, M. (1988): "Central Banking Under the Gold Standard," in *Carnegie-Rochester Conference Series on Public Policy*, ed. by K. Brunner, and A. H. Meltzer, vol. 29, pp. 85–124. Amsterdam.

Hall, G. J., J. Payne, T. J. Sargent, and B. Szőke (2021): "U.S. Federal Debt 1776-1960: Quantities and Prices," Manuscript, August.

Hamilton, A. (1790): "*Report Relative to a Provision for the Support of Public Credit*," Presented to Congress, 9 January, https://founders.archives.gov/documents/Hamilton/01-06-02-0076-0002-0001.

Hausman, J. K. (2016): "Fiscal Policy and Economic Recovery: The Case of the 1936 Veterans' Bonus," *American Economic Review*, 106(4), 1100–1143.

Jalil, A. J., and G. Rua (2017): "Inflation Expectations in the U.S. in Fall 1933," in *Research in Economic History*, ed. by S. Wolcott, and C. Hanes, vol. 33, pp. 139–169. Emerald Group Publishing Limited.

Keynes, J. M. (1924): *A Tract on Monetary Reform*. Macmillan and Co., London.

——— (1933): "From Keynes to Roosevelt: Our Recovery Plan Assayed," *New York Times*, December 31.

Kilian, L., and H. Lütkepohl (2017): *Structural Vector Autoregressive Analysis*. Cambridge University Press, Cambridge.

Klüh, U., and P. Stella (2018): "Believing in Monetary Madness: How Roosevelt Changed Inflation Expectations," Manuscript, Stellar Consulting LLC.

Leeper, E. M. (1991): "Equilibria Under 'Active' and 'Passive' Monetary and Fiscal Policies," *Journal of Monetary Economics*, 27(1), 129–147.

Leeper, E. M., and C. Leith (2017): "Understanding Inflation as a Joint Monetary-Fiscal Phenomenon," in *Handbook of Macroeconomics*, ed. by J. B. Taylor, and H. Uhlig, vol. 2B, pp. 2305–2416. Elsevier Press, Amsterdam.

Leeper, E. M., C. A. Sims, and T. Zha (1996): "What Does Monetary Policy Do?," *Brookings Papers on Economic Activity*, 1996(2), 1–63.

Leuchtenburg, W. E. (1963): *Franklin D. Roosevelt and the New Deal: 1932–1940*. Harper & Row, New York.

McKinnon, R. I. (1993): "The Rules of the Game: International Money in Historical Perspective," *Journal of Economic Literature*, 31(1), 1–44.

Meltzer, A. H. (2003): *A History of the Federal Reserve, Volume I: 1913–1951*. University of Chicago Press, Chicago.

Meyer, E. (1934): "The Federal Reserve System," *The Washington Post*, February 17, p. 8.

Miller, A. C. (1936): "The Return to Gold," Address Before the Academy of Political Science, New York City, April 2.

Officer, L. H., and S. H. Williamson (2018): "The Annual Consumer Price Index for the United States, 1774–Present," MeasuringWorth, http://www.measuringworth.com/uscpi/.

Paris, J. D. (1938): *Monetary Policies of the United States, 1932–1938*. Columbia University Press, New York.

Payne, J., B. Szőke, G. Hall, and T. J. Sargent (2022): "Costs of Financing U.S. Federal Debt Under a Gold Standard: 1791-1933," Manuscript, July 30.

Pearson, F. A., W. I. Meyers, and A. R. Gans (1957): "Warren as Presidential Advisor," *Farm Economics*, 211(December), 5597–5676.

Peppers, L. C. (1973): "Full-Employment Surplus Analysis and Structural Change: The 1930s," *Explorations in Economic History*, 10(2), 197–210.

Rauchway, E. (2014): "Going Off Gold and the Basis for Bretton Woods," University of California, Berkeley, Economic History Seminar, March 31.

Raynold, P., W. D. McMillin, and T. R. Beard (1991): "The Impact of Federal Government Expenditures in the 1930s," *Southern Economic Journal*, 58(1), 15–28.

Romer, C. D. (1992): "What Ended the Great Depression?," *Journal of Economic History*, 52(4), 757–784.

Roosevelt, F. D. (1932a): "Campaign Address on the Federal Budget," Pittsburgh, PA, October 19.

——— (1932b): "Radio Address," Albany, NY, April 7.

——— (1933a): "Letter to Treasury Secretary Woodin," President's Official File 230, September 30.

——— (1933b): "Press Conference #6, March 24, 1933," http://www.fdrlibrary.marist.edu/_resources/images/pc/pc0184.pdf.

——— (1933c): "Wireless to the London Conference," July 3, 1933. Online by Gerhard Peters and John T. Woolley, The American Presidency Project. https://www.presidency.ucsb.edu/documents/wireless-the-london-conference.

——— (1936a): "Acceptance Speech for the Renomination for the Presidency," Philadelphia, PA, June 27. Online by Gerhard Peters and John T. Woolley, The American Presidency Project. https://www.presidency.ucsb.edu/documents/acceptance-speech-for-the-renomination-for-the-presidency-philadelphia-pa.

——— (1936b): "Address at Forbes Field," Pittsburgh, PA, October 1.

——— (1936c): "Annual Budget Message," President Roosevelt's Annual Budget Message delivered to Congress.

Rosen, E. A. (2005): *Roosevelt, the Great Depression, and the Economics of Recovery*. University of Virginia Press, Charlottesville, VA.

Rubio-Ramírez, J. F., D. F. Waggoner, and T. Zha (2010): "Structural Vector Autoregressions: Theory of Identification and Algorithms for Inference," *Review of Economic Studies*, 77(2), 665–696.

Sargent, T. J., and N. Wallace (1981): "Some Unpleasant Monetarist Arithmetic," *Federal Reserve Bank of Minneapolis Quarterly Review*, 531(Fall), 1–17.

Sims, C. A. (1994): "A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy," *Economic Theory*, 4(3), 381–399.

——— (2013): "Paper Money," *American Economic Review*, 103(2), 563–584.

——— (2016): "Active Fiscal, Passive Money Equilibrium in a Purely Backward-Looking Model," Manuscript, Princeton University, May.

Sims, C. A., and T. Zha (1998): "Bayesian Methods for Dynamic Multivariate Models," *International Economic Review*, 39(November), 949–968.

——— (1999): "Error Bands for Impulse Responses," *Econometrica*, 67(5), 1113–1155.

Stein, H. (1996): *The Fiscal Revolution in America*. AEI Press, Washington, D.C., second revised edn.

Steindl, F. G. (2004): *Understanding Economic Recovery in the 1930s: Endogenous Propagation in the Great Depression*. University of Michigan Press, Ann Arbor.

Studenski, P., and H. E. Krooss (1952): *Financial History of the United States*. Beard Books, Washington, D.C.

Temin, P., and B. A. Wigmore (1990): "The End of One Big Deflation," *Explorations in Economic History*, 27(4), 483–502.

Uhlig, H. (2005): "What Are the Effects of Monetary Policy? Results From an Agnostic Identification Procedure," *Journal of Monetary Economics*, 52(2), 381–419.

——— (2017): "Shocks, Sign Restrictions, and Identification," in *Advances in Economics and Econometrics: Eleventh World Congress*, ed. by B. Honoré, A. Pakes, M. Piazzesi, and L. Samuelson, vol. 2 of *Econometric Society Monographs*, p. 95–127. Cambridge University Press.

Wheelock, D. C. (1991): *The Strategy and Consistency of Federal Reserve Monetary Policy, 1924–1933*. Cambridge University Press, New York.

Wicker, E. (1966): *Federal Reserve Monetary Policy 1917–1933*. Random House, New York.

——— (1971): "Roosevelt's 1933 Monetary Experiment," *Journal of American History*, 57(4), 864–879.

Wicker, E. R. (1965): "Federal Reserve Monetary Policy, 1922–33: A Reinterpretation," *Journal of Political Economy*, 73(4), 325–343.

Woodford, M. (1995): "Price-Level Determinacy Without Control of a Monetary Aggregate," *Carnegie-Rochester Conference Series on Public Policy*, 43, 1–46.