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THE CONTRIBUTION OF A MONETARY HISTORY  
OF THE UNITED STATES: 1867 TO 1960  
TO MONETARY HISTORY

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ABSTRACT

This paper assesses the role of Friedman and Schwartz's A Monetary History of the United States: 1867 to 1960 as a progenitor of research in monetary history. The paper critically surveys the literature on three major themes in the book: monetary disturbances; the domestic monetary framework and monetary policy; and monetary standards.

The book's unique portrayal of the historical circumstances of monetary disturbances and of alternative institutional arrangements serves as the closest thing to a laboratory experiment for the monetary economist. Historical study has become an important tool of modern macroeconomic research.

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The Contribution of A Monetary History of the United States: 1867-1960  
to Monetary History\*

"The long-awaited monetary history of the United States by Friedman and Schwartz is in every sense of the term a monumental scholarly accomplishment ... the volume sets, ..., a new standard for the writing of monetary history, one that requires the explanation of historical developments in terms of monetary theory and the application of them to the techniques of quantitative economic analysis. ...One can safely predict that it will be the classic reference on its subject for many years to come." (H.G. Johnson, 1965, p. 388).

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"The book is clearly destined to become a classic, perhaps one of the few emerging in that role rather than growing into it." (A. Meltzer, 1965, p. 404).

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"The transcendent virtue of the History is its unerring vision in seeking out important problems and its clear delineation of areas needing further research. The book offers an almost inexhaustible supply of worthwhile conjectures. I have no doubt that it, ..., will be the focus of a major share of scholarly research on money and income during the coming decade. For this, if for no other reason, the book must be counted a monumental contribution to positive economics." (R. W. Clower, 1964, p. 380).

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"This is one of those rare books that leave their mark on all future research on the subject." (J. Tobin, 1965, p. 485).

1. INTRODUCTION

Four eminent scholars from different schools of thought all believed over twenty years ago that A Monetary History of the United States: 1867-1960, by Milton Friedman and Anna J. Schwartz, published in 1963, was destined to be a classic. Their judgment was sound.<sup>1</sup>

Table 1 presents a chronological breakdown of citations to the book in the professional journals. The citation analysis is based on two sources: the Social Science Citation Index which covers the period 1969 to 1987; a sample of 10 leading journals in monetary economics and economic history from 1964 to 1987. The second sample is included in the SSCI, but separating it out has value because it covers the entire period since the book was published and because it allows us to examine the incidence of citations in journals from different fields.

As can clearly be seen from the table, the number of citations has been increasing, although irregularly, since 1965. This is clearly the hallmark of a classic since the citation rate for most articles and books in science generally peaks within three years and then gradually tapers off.<sup>2</sup>

Also of interest is the pattern of citations revealed by an examination of the articles in the sample of 10 journals. In the first 10 years after publication, the majority of articles citing A Monetary History were in monetary economics, of which a considerable number concentrated on issues raised by the debate between modern quantity theorists and Keynesians. By contrast, in the last decade, the majority of articles, even those in mainstream economics journals, have concentrated on the interpretation of historical episodes in A Monetary History. This recent interest in monetary history is the focus of this paper.

A Monetary History is a treatise both in economics and in economic history. In the former role, the book uses history to expound the modern quantity theory of money. In its latter role, the book reinterprets U.S. monetary history in terms of the relationship between the quantity of money and the rest of the economy. The former treatment represents a major component of modern quantity theory research of the 1950's, 60's, and 70's; the latter treatment has in itself led to a revolution in monetary history as economic historians and economists expand upon and criticize Friedman and Schwartz's treatment of diverse episodes of U.S. monetary history. This paper focuses on the second legacy of A Monetary History — its role as a progenitor of research in monetary history. Specifically the paper surveys the literature on three major themes in A Monetary History: monetary disturbances (Section 3); the domestic monetary framework and monetary policy (Section 4); monetary standards (Section 5).

As background to the survey in Section 2, I briefly summarize the contribution of the book to modern quantity theory research and provide a brief overview of its interpretation of U.S. monetary history. Finally the paper concludes with an evaluation of A Monetary History's contribution to monetary history.

## 2. BACKGROUND

### 2.1 A Monetary History and the Modern Quantity Theory

In the 1950's, Milton Friedman and Anna Schwartz began their collaboration on the NBER's highly acclaimed money and business cycles project. This collaboration, over a period of thirty years, resulted in three volumes (A Monetary History of the United States 1867-1960 (1963a), Monetary Statistics of

TABLE 1

Citations to "A Monetary History of the United States: 1867-1960"

a) 10 Major Journals 1964-1986;<sup>1</sup> b) Social Science Citation Index 1969-1986

Year	JPE	AER	JME*	JMCB**	RESTAT	JEH	EEH	JF	EJ	QJE	TOTAL	SSCI
1964		1				1		1			3	
1965	3	2							1		6	
1966	4	1			1			2			8	
1967	4	2						1			7	
1968	6										6	
1969	3	2		3		1	1				10	13
1970	2	1		1				1		1	6	19
1971	2			4		3	1	1			11	14
1972	2	2		5		1	1	3			14	15
1973	1	1		1		4		2			9	10
1974		2		1		1	1	1		1	7	20
1975	1	2		3		1	1		2		10	19
1976	3	2	3	1		3		1			13	33
1977		1	1	4		2	1	1			10	33
1978		1	3	3	1	1	2	2			13	30
1979			4	1	1				1		7	19
1980	1	2	1	3		2	1				10	28
1981				3		3	1		1		8	40
1982	2		4	3		2	1				12	30
1983	2	2	4			1	3	1			13	38
1984	3	3	1	1		6					14	35
1985	3	2	4	3		3	4		1		20	35
1986	3	1	2	3			2	1			12	47
Total	45	30	29	43	3	35	20	18	6	2	229	478

Notes to Table 1

\* JME began publication in 1975.

\*\*JMCB began publication in 1969

<sup>1</sup> The journals are: Journal of Political Economy (JPE); American Economic Review (AER); Journal of Monetary Economics (JME); Journal of Money, Credit and Banking (JMCB); Review of Economics and Statistics (RECSTAT); Journal of Economic History (JEH); Explorations in Economic History (EEH); Journal of Finance (JF); Economic Journal (EJ); Quarterly Journal of Economics (QJE).

the United States (1970), Monetary Trends in the United States and the United Kingdom, 1875-1975, (1982)), in addition to Phillip Cagan's Determinants and Effects of Changes in the Stock of Money, 1875-1960 (1965), several journal articles including "Money and Business Cycles" (1963b).

The theoretical background of the project is the modern quantity theory of money (Friedman, 1956). Based on the interaction of a stable demand for money with an independently determined money supply, the key proposition of the modern quantity theory is that a change in the rate of growth of money will produce a corresponding but lagged change in the rate of growth of nominal income. In the short run changes in money growth lead to changes in real output. In the long run, monetary change will be fully reflected in changes in the price level.

Long-run historical evidence for the modern quantity theory of money is provided in A Monetary History of the United States: 1867-1960, short-run cyclical evidence in "Money and Business Cycles" and long run econometric evidence in Monetary Trends.

A Monetary History of the United States 1867-1960 (1963a) is a study of the quantity of money and its influence on economic activity in the U.S. economy over nearly a one-hundred-year span, marked by drastic changes in monetary arrangements and in the structure of the economy.

The principal finding is that changes in the behavior of money are closely associated with the rate of change of nominal income, real income and the price level. Secularly a close relationship between the growth of money and nominal income, independent of the growth of real income is found. Cyclically a close relationship is isolated between the rate of change of money and of subsequent changes in nominal income.

The authors also find a number of remarkably stable relationships between money and other economic variables. These include: (a) that velocity exhibits a steady secular decline of a little over one percent per annum until after World War II; (b) that the relationship between U.S. prices and prices in other countries, adjusted for the exchange rate, changed little over the period, evidence of the strength of the purchasing-power-parity theory.

However, of most interest are the findings from history that the money-income relationship is invariant to changes in monetary arrangements and banking structure. These changes are captured in the arithmetic of the proximate determinants of the money supply. Over the long run, high-powered

## 2.2 Overview of Friedman and Schwartz's Interpretation of U.S. Monetary History 1867-1960

As a backdrop to the literature survey to follow, we briefly sketch some of the salient points of the authors' reinterpretation of the monetary history of the United States from shortly after the Civil War to after World War II.

The book begins in 1867 during the greenback episode that ended on January 1, 1879. During that period, when the U.S. was on a flexible exchange rate with the rest of the gold standard world, the principal concern was to resume specie payments at the previous parity. Friedman and Schwartz demonstrate, based on earlier work by Kindahl (1961) that, despite active public debate over the pace and methods to achieve the required deflation, resumption was achieved by the economy growing up to a constant money stock rather than as a consequence of any explicit government policies.

The succeeding seventeen years, after the U.S. successfully returned to gold, were characterized by deflation, monetary instability, and political agitation over the monetary standard. The advocates of silver wanted injections of silver to offset the ravages of the worldwide gold deflation. Instead of inflation, Friedman and Schwartz demonstrate, the silver movement produced more deflation than would otherwise have been the case, as capital and gold fled the U.S. in fear of its abandonment of the gold standard. Fear of deflation and silver agitation diminished, once new gold supplies from South Africa and Alaska swelled the world monetary gold stock. The gold discoveries, the authors argue, were no accident but under a commodity standard were induced with long lags by secular deflation.

The national banking system from 1863 to 1914 was characterized by periodic banking panics. The panics of 1893 and especially 1907 precipitated a movement for banking reform — to establish an agency to satisfy the public's demand for high-powered money in times of distrust of bank solvency. Friedman and Schwartz argue that the Aldrich Vreeland Act of 1908, which was successful in preventing a panic in 1914, and the occasional resort by clearing houses to restrictions of convertibility of deposits into currency under the National Banking System, proved superior to the actions of the agency designed to prevent panics — the Federal Reserve System established in 1914. It failed to act as a lender of last resort. Had the clearing houses during the panics of the early 1930's restricted convertibility, as they would have done in the absence of



the Fed, the massive bank failures and monetary collapse of 1929-33 would have been averted.

The newly established Fed, after a serious blunder in 1920-21, when it delayed too long to stem the post-World War I commodity price boom and then raised the discount rate too sharply, subsequently developed the tools to provide monetary stability in the 1920's. The authors argue that had the architect of Fed policy in the 1920's, Benjamin Strong, lived beyond 1928 the disaster of 1929-33 would have been avoided. They attribute to a vacuum of leadership after Strong's death, the failure of the Fed to curtail the banking panics and its passive acceptance of a one-third decline in the money supply. Power shifted from the New York Federal Reserve Bank, an agency tuned to the needs of the money market and adept at the operation of policy, to the Board and the other reserve banks, neither of which had the experience or understanding of monetary policy required to deal with the crisis.

The New Deal introduced legislation which radically altered monetary arrangements in the U.S. Of key importance, according to Friedman and Schwartz, was the adoption federal deposit insurance in 1934. By eliminating at the outset, loss of confidence by the public in convertibility of its deposits into currency, it solved the problem of banking panics, which the Fed had failed to prevent.

In addition, prohibition of private gold holdings, the gold purchase program, and revaluation of the price of gold, converted the U.S. from the gold exchange standard to a managed fiduciary standard with gold relegated to the status of a price-supported commodity. Legislation allowing the Fed to alter reserve requirements led to a disastrous monetary contraction in 1937-38 after the Fed doubled reserve requirements in a mistaken attempt to soak up excess reserves to restrict future credit expansion. According to Friedman and Schwartz, the banks held reserves in excess of requirements because their demand for liquidity had increased given their traumatic experience of the panics of the early 1930's. The increase in required reserves just locked up their precautionary balances, forcing the banks to reduce earning assets to restore their reserve holdings to the desired level.

During the next two decades, monetary policy was subordinated to fiscal policy and the Fed played a role subservient to the Treasury. This passive policy culminated in the bond-price-support program of World War II. By pegging the interest rate on short term treasury bills at 3/8% and pledging to

maintain the rate on long-term securities at 2 1/2%, the Fed was converted into an "engine of inflation" providing whatever high-powered money was required to maintain the fixed pattern of interest rates.

The threat of renewed inflation during the Korean War led to the Accord of March 1951 and the restoration of monetary independence to the Fed. The remaining years of the study according to the authors were characterized by remarkable monetary stability — a stability which in hindsight was quite unique.

### 3. MONETARY DISTURBANCES

The 94-year span covered by A Monetary History was characterized by a wide variety of monetary disturbances. Of the 24 NBER designated cyclical downturns, 6 are designated severe, each of which Friedman and Schwartz document was preceded by a sharp downturn in the money supply. Two of the monetary contractions were the result of monetary policy actions — 1919-21 and 1937-38 and the others including the Great Contraction of 1929-33 were marked by banking panics. In addition to monetary disturbances that produced declines in economic activity, the book documents one period of sustained inflation — 1897-1914 — a consequence of the gold discoveries, and two world war periods of fiat-induced inflation.<sup>3</sup>

A key theme in A Monetary History and the subsequent literature is the role of monetary institutions and monetary policy in producing monetary and economic contraction. In consequence, the survey of the literature on monetary disturbances focuses on two issues: banking panics and the Great Contraction.

#### 3.1 Banking Panics

##### 3.1.1 Banking Panics and Monetary Instability

Friedman and Schwartz devote considerable attention to the role of banking panics in producing monetary and economic instability in the United States.

Bernanke (1983), contrary to Friedman and Schwartz, argued that banking panics have direct effects on economic activity over and above their effects on the money supply. To the extent that banking panics produce losses in the financial sector of the economy, the cost of financial intermediation is increased and the efficiency of resource allocation reduced.

Bernanke tested his hypothesis that the banking panics of 1930-33 increased the cost of financial intermediation, reducing output over and above the effects due to monetary contraction, by incorporating several measures of that cost — real deposits of failing banks, liabilities of failing banks, and the

spread between the Baa and the Treasury bond rate — into a Barro-Lucas type regression equation (which explains changes in output by unexpected money growth, unexpected changes in the price level, and lagged output). The statistically significant results that he obtained for the equation lend support to his hypothesis.

However, according to Vaubel (1984), Bernanke's results may imply that bank failures led to a risk-induced rise in the demand for money or else were associated with an anticipated decline in output. If the cost of financial intermediation reduced income, it could only have done so because the monetary authorities allowed a large risk premium to develop. The risk premium was not the inevitable consequence of bank failures but rather reflected the public's uncertainty about how the authorities would react.

Brunner and Meltzer (1988) do not accept Bernanke's treatment of the debt crisis as a separate and independent exogenous shock. They view the debt crisis as an induced response to the major deflation of asset and output price levels consequent upon the failure of the Fed to act as a lender of last resort, in a system with many holders of nominally fixed debt. Major shocks to the banking system affect both the money supply and bank credit multipliers simultaneously.

Bernanke's interpretation of his results, moreover, suggests that financial intermediation skills were irretrievably lost as a result of bank failures. Those skills, however, continued to be available once the banking situation stabilized.

Also contrary to Friedman and Schwartz on the role of banking panics in producing monetary and real contraction, Delong and Summers (1985) provide evidence that removing panics and the quarters immediately surrounding them from the data reduces the variance of income 1896-1914 by only 20% as against a 40% reduction in the variance of monetary growth. They therefore conclude that monetary shocks are an inadequate explanation of shocks to real output. According to them, severe economic contractions before World War II were produced by deflationary real shocks that raised the real interest rate in the face of sticky nominal rates.<sup>4</sup> Such an interpretation however, is inconsistent with evidence of a high degree of international capital mobility during this period.<sup>5</sup> High real interest rates should have attracted capital inflows that would halt severe economic contractions.

### 3.1.2 Rational Expectations

In recent work by Garber (1981), Garber and Flood (1982), and Blanchard and Watson (1982) bank panics are viewed as rational — based on the rational expectations hypothesis that rational agents will not systematically make forecast errors.

Bank panics are the contagious effects of "runs." According to Garber (1981)

"a run is defined as a speculative attack on an asset price fixing scheme which causes a discontinuous asset shift in private agents portfolios. The run occurs because of agents' beliefs that the nature of the price fixing regime will change, thereby causing a discontinuous shift in asset rates of return."

In the case of a bank run, the price under attack is the price of deposits fixed in terms of currency. In a world of perfect foresight, the required asset exchange will be carefully arranged in an orderly manner far in advance of the event, as, for example, in the case of a run on a banking system insured by a central bank as lender of last resort. In that case the run will end through the sudden acquisition of bank assets by the central bank.

A "panic" characterizes a run whose timing was not perfectly foreseen. In such a case there may be discontinuous shifts in asset prices and unanticipated capital gains or losses on some assets.

According to Diamond and Dybvig (1982), in a world of asymmetric information, banks are able to transform illiquid financial assets into liquid ones by offering liabilities with a different, smoother pattern of returns over time. Banks provide efficient risk sharing which the private market cannot provide. However, the illiquidity of bank assets also subjects banks to the vulnerability of runs. A run can be triggered by any random event because rational depositors not wishing to be last in line will rush to convert deposits into currency.

Waldo (1985) developed a model in the Diamond and Dybvig mold which explains two empirical regularities associated with banking runs observed by Friedman and Schwartz: a rise in short-term interest rates and a fall in the deposit-currency ratio in anticipation of a possible run. The rise in short-term interest rates occurs because banks attempt to meet withdrawals by selling long-term securities before maturity. Yields on short-term assets rise in concert. The fall in the deposit-currency ratio in anticipation of a possible run

occurs because, in the event of a run, the banks' losses on the premature sale of their long-term securities eventually force them to default on some of their deposits. Savers shift from deposits to currency in anticipation of possible runs to partially protect themselves against this risk.

Smith (1987) also constructed a model of nationwide banking panics in the Diamond-Dybvig vein, which captures many features of the National Banking System. Key features of the model are the assumptions of: geographically dispersed unit banking; nationwide linkages of unit banks through the inverted pyramid of reserves held in reserve city and central reserve city banks; and interest payments on deposits and loans not state contingent.

Based on these assumptions, Smith demonstrated how exogenous shocks that caused unit banks to withdraw interbank deposits could produce panics. According to Smith, the key reason for a nationwide panic was the holding of bankers balances with a central reserve agent. The absence of this feature, he argued, explains why nationwide banking panics didn't occur in the free banking era. Moreover, following Friedman and Schwartz, Smith argued that the added severity of the panics of 1930-33 can be explained by the existence of the Fed. Banks did not consider suspending convertibility of deposits into currency as they had done under the National Banking era.

Smith's interpretation of history differs from the record in two important respects: there were panics in 1819, 1837, 1839, 1847, and 1857 and interbank balances were a feature of the pre Civil War banking system; his model implies that nationwide branch banking systems will not be subject to panics, the experience of Austria, Germany and other central European countries in 1931 to the contrary.

In a slightly different vein but on rational expectations lines, Gorton (1984b) argued that banking panics are not unique events, as argued by Friedman and Schwartz, but represent a rational response by depositors who wish to smooth their consumption flows over time. Rational depositors plan to dissave in periods of expected low consumption such as at business cycle troughs. The likelihood of suspensions of convertibility also would be highest in mid contraction, so depositors will rush to convert their deposits to currency when they expect a trough to occur.

To provide evidence that rational depositors will increase the currency-deposit ratio (precipitate a banking panic) when they expect a business cycle trough to occur, Gorton (1984b) regressed the currency-deposit ratio during the

national banking era (1873-1914) on measures of the expected return on deposits, the variance of that return, and a variable acting as a signal of the covariance of consumption and capital losses on deposits — the unexpected shock component of failed business liabilities.<sup>6</sup> His finding of a significant and positive coefficient on the failed liabilities variable was consistent with his hypothesis. Moreover, findings that panics coincided with dates of the largest values of the shocks in the liabilities of failed businesses, and that the shocks came after business cycle peaks and before troughs in all panics except 1895, led him to conclude that the failed business liability shock was a cause of panics. Friedman and Schwartz's hypothesis was that panics were due to unanticipated failures of financial institutions, often holding assets of failed nonfinancial firms.

A problem with Gorton's approach is that if depositors could predict a panic, should there have been panics? If depositors could predict panics, why couldn't banks, equally vulnerable during panics predict them? In addition, panics did not necessarily occur in all situations that were otherwise equivalent. In some, predictable signals to market participants of institutional readiness to provide additional funds promptly nipped an incipient panic in the bud, as in 1884, (Schwartz, 1986). In others, no such signals were forthcoming and panic erupted. Finally, Gorton's approach implies that a panic may be optimal for private arrangements but it will not necessarily be socially optimal.

### 3.1.3 Restrictions of Convertibility

Friedman and Schwartz, p. 698 and elsewhere, argue that restrictions of convertibility of deposits into currency by the banking system during the national banking era had therapeutic effects in alleviating a banking panic and facilitating speedy recovery. Had such an option been available to the banks in the early 1930's, the banking panics would have ended before producing the massive fall in the money supply.

Dewald (1972) disputed Friedman and Schwartz's interpretation, instead following Sprague (1910), who opposed restriction because of the high costs imposed on the payments system. According to Dewald, the New York banks could have reduced their reserves to handle withdrawals in emergencies such as the panics of 1893 and 1907 even if it meant violating reserve requirements. Furthermore, he alleged that Friedman and Schwartz's advocacy of restriction in 1907 and suspension during the Great Contraction in 1930 rather than 1933 contradicts their approval on page 698 of the issue in 1914 of emergency currency under the Aldrich Vreeland Act.

In reply, Schwartz (1972) doubted that the New York banks would have been willing to run their reserves below the legal limit without a change in the law. Moreover, even if the New York banks had been willing to run deficits, what mattered was their own preference for liquidity in a panic. For Friedman and Schwartz (1963) suspension was a second best solution if no institutions existed to increase high-powered money.<sup>7</sup> In 1914, Aldrich Vreeland currency was available. In the 1930's, the Fed could have created high-powered money but didn't do so; therefore early restriction was preferable to deflation.

According to Gorton (1985b), in a world of rational expectations but limited information, restriction of convertibility represented an optimal arrangement between banks and customers to allay an incipient panic. With limited information bank customers monitor a noisy signal of banks' investments, e.g., the failures of important nonfinancial firms or the liabilities of failed companies. A panic is then a rational response to movements in this indicator because depositors fear capital losses on their deposits. Restriction is a way in which banks indicate to customers that their investments are sound.

#### 3.1.4 Clearinghouses

Friedman and Schwartz (Chapters 3 and 4) discussed the private market lender of last resort role of the New York Clearing House and other clearing house associations in issuing clearing house loan certificates during panics. Timberlake (1984) and Gorton (1984a) described how the New York Clearing House evolved ways to restore confidence in bank deposits during financial crises. Issuance of clearing house loan certificates in 1873, based on the discounted collateral of member banks' earning assets, released the greenbacks that otherwise would have been tied up in interbank settlements to satisfy depositors' demands. Later in the crises of 1893 and 1907 clearing house currency was issued in exchange for loan certificates. The system provided depositors insurance that individual bank failures would not impose a liquidity squeeze on other banks.

For Gorton (1985a) the development of the clearing house on the lines of Coase (1937) was a response to the idiosyncratic/agent specific nature of demand deposits. Unlike bank notes, these instruments do not possess the information qualities requisite to developing a market. During a panic, according to Gorton, the clearing house association by quickly organizing all member banks into one firm, established a coinsurance scheme that made it difficult for the public to focus on the weakness of an individual member. The clearing house could also

allay the panic by issuing loan certificates which acted as a close substitute for high-powered money.

In sum, Friedman and Schwartz's treatment of banking panics has spawned interesting theoretical research. A key integrating element in these papers is the assumption of asymmetric information — an assumption implicit in Friedman and Schwartz's treatment. A second element is the importance of real world institutional features — the absence of a lender of last resort, unit banking, the inverted pyramid of credit and restrictions on the interest that banks can pay on deposits and charge on loans — all features stressed in A Monetary History. The third element that emerges from this approach is the asserted predictability of panics in sharp contrast to Friedman and Schwartz's view of them as unique events.

### 3.2 The Great Contraction 1929-33

The Great Contraction of 1929-33, characterized by a one-third decline in the stock of money, prices and output, was the most severe and prolonged contraction in U.S. history. It quickly became worldwide in scope. For Friedman and Schwartz (Chapter 7) monetary forces were paramount in explaining it. The key ingredient of the monetary collapse was a series of banking crises which led to the closing of one-third of the nation's banks. In terms of the proximate determinants of the money supply, the decline in M was produced by declines in the deposit-currency and deposit-reserve ratios.

Friedman and Schwartz highlighted several episodes during 1929-33:

a) The stock market crash of October 1929 and the year succeeding it. Concern with stock market speculation combined with a conflict between the New York Fed and the Federal Reserve Board (see Section 4 below) had led to a rise in the discount rate in 1928, too little to stem speculation, but sufficient to reduce money growth below trend and induce deflation. The resultant sharp decline in output from October 1929 to September 1930 marked the contraction as a severe one.

b) The first banking crisis from October 1930 to March 1931. A series of bank failures in the south and midwest led to an attempt by the public to convert their deposits into currency. This attempted conversion produced "a contagion of fear" that spread through the correspondent banking system to the whole country culminating in the collapse of the Bank of United States in December 1930.



c) The second banking crisis March 1931 to June 1931. This crisis was similar to the first banking crisis but, because of the weakened capital structure of the banks, the effects were more severe.

d) Britain's departure from the gold standard in September 1931. An external drain, to which the Fed reacted by raising the discount rate, ignored Bagehot's rule to lend freely but at a penalty rate — thereby exacerbating the internal drain.

e) Under congressional pressure the \$1 billion open market purchase the Fed conducted from April to June 1932. The policy succeeded in offsetting the effects of the fall in the money supply but was short-lived.

f) The Banking Holiday of March 1933. The cumulation of previous banking panics weakened the banking system. Internal drains plus rumors of departure from the gold standard for the first time led to a domestic demand for gold combined with an external drain, precipitating the nationwide banking holiday.

According to Friedman and Schwartz, the banking holiday was much worse than restriction of payments under the National Banking System. Then only some types of payments — those involving the conversion of deposits into currency, were restricted. In the banking holiday, all payments were restricted, throwing the economy into paralysis.

The survey that follows examines the literature on the Great Contraction that A Monetary History stimulated. That literature includes new interpretations of the origins of the contraction: Peter Temin's (1976) critique of the monetary approach and the subsequent debate, a reiteration of the position taken in A Monetary History by Schwartz (1981), a reinterpretation of the banking holiday of 1933, and recent studies of the recovery.

### 3.2.1 Origins of the Great Contraction

Hamilton (1987a) provided evidence consistent with Friedman and Schwartz that the contraction started with tight monetary policy beginning in 1928. He stressed two factors: policy to stem stock market speculation and a gold drain in 1929 to France after she returned to the gold standard at a parity that undervalued the franc.

According to Meltzer (1976), expansionary monetary policy 1927-28 raised U.S. prices relative to those of other gold standard countries (i.e., prices here declined less than in other gold standard countries). This produced a current account deficit, a gold outflow, and a decline in the money supply in 1928-29.

Field (1984a) contended that the increase in the volume of asset exchanges associated with speculation in the stock market markedly raised the transactions demand for money in the 1920's. Using monthly data over the period 1919-29, he found that the level of trading on the New York Stock Exchange, holding constant income and interest rates, had significant effects on the demand for narrow money (currency plus demand deposits). A dynamic simulation of the model showed an upward shift of 17 percent in demand deposits in New York City due to asset exchanges. Had the Fed been aware of the effects of this upward shift in the demand for money in raising interest rates, according to Field, it would not have engaged in as contractionary a policy to offset the speculative boom as it did. Because it ignored the effects of stock exchange transactions on the demand for money the Fed tolerated high interest rates, with devastating effects on the construction and automobile industries. Both industries turned down before the stock market crash, precipitating the Great Depression, (Field, 1984b).

### 3.2.2 The Temin Debate

In A Monetary History of the United States, Friedman and Schwartz attributed the massive decline in prices and real output in the U.S. 1929-33 to an unprecedented decline in the quantity of money.<sup>8</sup> The fall in the money stock, attributable to a shift to currency from deposits, was largely caused by bank failures in 1930-31 and 1933. Temin (1976), however, countered that the bank failures could not have caused the fall in the quantity of money since there was no evidence of a rise in short-term interest rates 1929-31 (short-term rates fell). In his view, a fall in income produced by a decline in autonomous consumption expenditures led to a fall in the demand for money, which interacting with an interest-elastic money supply function, produced the fall in the money stock and in short-term interest rates.

Against Friedman and Schwartz's money hypothesis, Temin propounded first reverse causality. Because changes in the money supply affect interest rates and income but money demand is also determined by interest rates and income, it is possible that nonmonetary forces that reduced the level of income could have reduced the demand for money, in turn causing a fall in the money supply.<sup>9</sup>

Three sources provide evidence for the money hypothesis: Anderson and Butkiewicz (1980), Schwartz (1981), and Evans (1985). Estimates of a structural model for 1921-33, showed bank failures had a greater effect on money supply

(via their influence on the currency-deposit ratio) than on money demand (Anderson and Butkiewicz). Moreover, bank failures were explained not by income but by lagged bank failures (suggesting the Fed might have been at fault). Money Granger causes income but not the reverse based on monthly data 1919-39 (Schwartz). According to estimated vector autoregressions also using monthly data demand deposits during the Great Depression were not related to past output, prices, and interest rates (determinants of money demand), but were related to bank reserves and a proxy for the marginal cost of funds (determinants of money supply) (Evans).

Two sources provide evidence for significant contemporaneous feedback from income to money and a passive money supply: Gordon and Wilcox (1981) and Boughton and Wicker (1979). According to Gordon and Wilcox, who used both quarterly and monthly data 1920-41, lagged money significantly caused income (GNP), lagged income had no effect on money, but the correlation between money and income was significant contemporaneously.<sup>10</sup>

Evidence against Friedman and Schwartz's view that bank failures were a key cause of the unprecedented rise in the deposit currency ratio was that they accounted for only about a third of the 1930-33 rise (Boughton and Wicker (1979) in a regression using quarterly data 1921-36). Moreover, the substantial fraction of the variation in the currency-deposit ratio due to interest rates and income suggested to these critics that there must have been important feedback from income to money.<sup>11</sup>

Temin's second argument against the money hypothesis was that bank failures in 1930 could not have been the precipitating cause of the Great Depression because they in turn were caused by a previous decline in economic activity. First, contrary to Friedman and Schwartz, who attributed the initial bank failures in U.S. agricultural regions to poor loans and investments in the 1920's, Temin concluded, based on a regression explaining bank failures across states for the years 1929, 1930, and 1931, that previous bank suspensions were not significant whereas a measure of agricultural income (cotton income) was. Thus, according to Temin, a depression-induced decline in agricultural income was a key cause of bank failures, not previous bad loans.

Temin's view was not sustained by Wicker (1980), who demonstrated forcefully that the banking panic in the autumn of 1930 was triggered by the collapse of Caldwell and Company in Nashville, attributable to its "weak and precarious financial state on the eve of the depression" and not to the decline

in agricultural income. The collapse of Caldwell quickly led to the suspension of numerous Caldwell-related banks across the South. According to Wicker, the collapse of the Caldwell financial empire represented an autonomous disturbance to the currency-deposit ratio as postulated by Friedman and Schwartz which in turn contributed to the spread of confusion and fear that produced the panic of October 1930 to March 1931.<sup>12</sup>

Temin's view that the 1930 bank failures were not explained by previous bank failures was also not sustained. Significance tests by Stauffer (1981) showed that the trend of state bank failure rates 1928-29 did carry over into 1930. Moreover, for twelve states where cotton production was important, rank correlations between measures of bank failures, farm income, and measures of weakness of the banking system, suggested that the banking structure of the rural states rather than income was the key determinant of bank failures.

Finally, micro data on national banks, assembled by White (1984), explained the bank failures of 1927, 1928, 1929, 1930 by the structure of the banking system. The results of a logit model showed that the increase in the number of bank failures didn't represent a radical departure from the 1920's. In the 1920's, many rural banks carried assets whose expected future value had declined. The coincidence of tight money and the weakening of asset positions due to deteriorating conditions in agriculture led to the failure of many small unit banks in sparsely populated rural areas — a result consistent with both Temin's and Friedman and Schwartz's positions. However, the key cause of bank weakness, according to White, was the prohibition of branch banking in most of these states. The case of Canada which experienced a similar decline in agricultural income but had nationwide branch banking and no bank failures makes the point.

Temin also argued that the value of banks' portfolios reflected a depression-induced increase in the riskiness of bonds (measured by the differential between the Baa and Aaa corporate bond yields for a fixed sample of bonds). Mayer's (1978a) criticism of this point was that, although the yield on high grade bonds did not increase significantly between July and December 1930, it was unlikely that banks held many risky Baa bonds on which yields did increase by one percentage point. In sympathy with Temin, White (1984) found that the portfolios of state banks in Vermont were susceptible to a decline in value. Those banks held only small portions of U.S. government securities.

Temin was further challenged for holding that the money multiplier was sufficiently interest-elastic that it would have fallen in response to a fall in money demand. Mayer (1978a) found little evidence of response of the deposit-reserve ratio to a fall in interest rates and only moderate evidence of a response by the deposit-currency ratio, for semi-annual periods of low interest rates 1913-1930, confirming Cagan's (1965) earlier evidence of interest inelasticity of the money multiplier.<sup>13</sup> Second, Mayer argued that, as declining income reduced the demand for money, this would create an excess supply of money which would have the effect, after some lag, of raising income and hence money demand.<sup>14</sup>

Temin's third argument against the money hypothesis was that the short-term commercial paper rate which declined in 1930, should have risen. The rise in other interest rates, he explained, by an increase in risk rather than a scramble for liquidity. In his view, the fall in nominal interest rates could not be masking a deflation-expectation-induced rise in ex ante real rates because contemporary evidence suggests that expectations were sanguine until mid-1931.<sup>15</sup>

Schwartz (1981) criticized Temin's (and other Keynesians') use of short-term interest rates as a measure of the price of money. She showed that monthly data for the inverse of the price level — a true measure of the price of money according to monetarists — over the interwar period mirrored all monetary events. She attributed the decline in the short-term commercial paper rate in the face of bank panics to increased demand by banks for commercial paper as collateral for borrowing to meet their need for reserves. However, for Mayer (1978a) the evidence was unclear, even though the decline in short-term rates likely reflected a shift into short-term securities for liquidity motives, outweighing a shift from short-term securities to money. He concluded that the monetary explanation was vulnerable on this issue.

Gandolfi and Lothian (1979) found Temin's use of interest rates misleading because of their procyclical pattern that tended to mask the liquidity effect of monetary change. Moreover, they argued that the twelve percent decline of the wholesale price index that occurred between August 1929 and August 1930 was substantial enough to have created expectations of a continued decline in prices in the short run.

For Meltzer (1976), Temin, like the Federal Reserve System during the Great Depression, neglected the distinction between nominal and real interest rates, misinterpreting the fall in interest rates as indicating monetary ease.

It should be pointed out that, had Temin started his analysis in April 1928, when the Federal Reserve sharply reduced the rate of monetary growth, instead of in August 1929, he would have observed a rise in short-term interest rates between March 1928 and September 1929. Then as the lagged effects of monetary change affected prices and output in 1929, interest rates declined.<sup>16</sup>

Temin's final argument against the money hypothesis was that the real money supply didn't fall. Monetary forces, it followed, couldn't possibly explain the massive decline in real income that occurred.

According to Gandolfi and Lothian (1979), Temin confused desired and actual real cash balances. They estimated a money demand function using annual data over the periods 1900-29, 1900-41, that showed an increase in predicted real balances 1929-31 and a fall 1931-33 by magnitudes similar to the movements in actual real balances. They concluded that both the initial rise and the subsequent decline were due to changes in the determinants of money demand, evidence suggesting that movements in actual real balances are a poor measure of the degree of monetary ease or restraint.

In place of "the money hypothesis" Temin substituted a modified version of "the spending hypothesis." According to the original Keynesian version, a fall in income and prices was produced by the multiplier effects of a fall in autonomous spending (consumption and investment), supposedly caused by an oversupply of housing and the stock market crash. In Temin's view, however, though the crash reduced consumption through adverse effects on the community's wealth, it was not crucial. He did not find evidence of a massive decline in investment expenditures, but judged that an unexplained decline in autonomous consumption expenditures was the likely cause of the decline in economic activity 1929-31. The judgment was based on an unusually large negative residual for 1930 from a consumption function for the interwar period (1919-41). After 1930, following Kindleberger (1973), Temin regarded international forces as dominant.

Mayer (1978b) replicated Temin's consumption function regression excluding 1919, a transition year from war to peace, and found the 1930 residual was no longer negative.<sup>17</sup> Estimates of a consumption function he judged to be superior — the MPS model — over the period 1921-41, in both levels and first differences

and including a dummy variable to account for the 1930 shift, according to Mayer failed to establish Temin's hypothesis of an unusual downward shift in the consumption function in 1930. Gandolfi and Lothian (1979) showed that the change in the residual for 1930 was far from unique compared to all contractions in the longer period, based on a permanent income consumption function for the period 1889-1941.

In sum, the Temin debate leaves monetary forces as the key cause of the Great Depression. The evidence on causality is generally in favor of the money hypothesis but the contemporaneous correlation between money and income also allows scope for nonmonetary forces. The evidence does not sustain Temin's view that the bank failures of 1930 were caused by the depression-induced decline in agricultural income and depression-increased riskiness of bank portfolios. However, the Stauffer and White studies that attribute the bank failures to weak bank structure in agricultural regions are consistent with both the Temin and Friedman and Schwartz accounts. Temin's contention that the decline in short-term interest rates 1929-31 is inconsistent with the money hypothesis has also been rejected but why short-term nominal rates declined has not been definitively answered. Finally neither Temin's claim that the failure of real balances to decline 1929-31 contradicts the money hypothesis nor his suggestion of an unexplained decline in consumption as the source of contraction has won acceptance.

### 3.2.3 A Reappraisal by Anna Schwartz

According to Schwartz (1981) the Great Depression was started by two unexpected shocks of monetary origin, a contractionary monetary policy in 1928 initiated by the Federal Reserve to halt the stock market boom, and the stock market crash of October 1929. Unexpected declines in aggregate demand would lead employers to hire fewer workers at each real wage perceived by them and workers to refuse offers of employment at lower nominal wages on the basis of no change in expectations. But eventually on the assumption of rational expectations a new equilibrium would be reached as expectations were revised. Other things equal the result would have been a severe contraction similar to earlier contractions. But instead the consequence of inappropriate Fed policy generated a further series of monetary shocks — most notable the banking panics of 1930, 1931 and 1933 — which in turn led to further declines in output and the demand for labor, and a shift in demand for securities to both short-term instruments and high grade long-term securities.<sup>18</sup>

### 3.2.4 The Banking Holiday of 1933

Wigmore (1987) challenged the view espoused by Friedman and Schwartz that domestic factors were the primary cause of the banking holiday of March 1933 and instead posited rumors of devaluation as the key factor. Though Friedman and Schwartz discussed the role of rumors of devaluation as responsible for converting the internal drain into a demand for gold they did not view it as the primary cause of the panic. Wigmore argued that rumors of devaluation appearing weeks before the banking holiday — events such as bills in Congress proposing to devalue the dollar, statements by leading financial figures and FDR's unwillingness to commit himself to the current exchange rate — triggered the run on the dollar. The run manifested itself in both an internal demand and a foreign demand for gold by individuals and central banks.<sup>19</sup> Furthermore he argued that though the increase in currency was three times the gold reserves lost by the New York Fed, the fact that gold losses threatened to reduce its reserves below the legal limit while at the same time it had a virtually unlimited ability to meet demands for domestic currency was crucial.

Wigmore also attributed the calm which immediately followed the banking holiday to the Roosevelt administration's international policies — the embargo on gold ownership and export and restrictions on foreign exchange dealings. The former cut off the domestic channels for a speculative run on the dollar, and the 60% devaluation of the dollar in the ensuing three months removed the source of the speculative pressure.

### 3.2.5 The Recovery

The recovery from 1933 to 1937 was marked both by rapid money growth (53%) and rapid inflation (50% for the WPI). Friedman and Schwartz (Chapter 9) attributed the monetary expansion to an increase in the monetary gold stock, in response to the devaluation of the dollar, the gold purchase program, and capital flight from Europe. At the same time, they argued, rising prices and wages represented in part a rare case of cost-push inflation, the consequence of NIRA and other policies that encouraged unionization and monopolization. These policies, with the gold induced monetary expansion acting as an accommodating force, encouraged inflation at the expense of real growth.

In support of Friedman and Schwartz, Weinstein (1981) found that the New Deal NIRA codes (1933-35), which encouraged the formation of labor unions and the cartelization of industry, reduced output and raised unemployment more than



otherwise would have been the case. First, by increasing wages relative to prices, the codes increased unemployment by 2%. Second, by raising the price level by an amount in response to the 14% increase in the money supply that occurred 1933-35, the codes prevented output from rising 8% and unemployment from declining by 3%. Third, the codes-induced rise in the price level, by reducing the real value of financial assets, led to an additional 6-11% decline in output.

However, McCloskey and Zecher (1984) denied that the inflation of 1933-34 could be attributed to a wage price-spiral induced by the New Deal NIRA codes since the majority of the codes were enforced after the price level rose. Based on an examination of weekly data, they contended that the key cause of the price burst was the devaluation by the Roosevelt Administration.<sup>20</sup>

Friedman (1984) in rebuttal cited statements from A Monetary History (pp. 465-466) which attributed considerable importance to the gold policy as a causal factor in the inflation; emphasized that Friedman and Schwartz's concern was with the entire period 1933-37; and demonstrated that McCloskey and Zecher's factual evidence involved the inappropriate use of arithmetic scales in comparing weekly movements in wholesale prices and the exchange rate — a logarithmic scale would give a more accurate picture, and would portray narrower movements in the wholesale price index than the exchange rate.

The literature on the Great Depression spawned by A Monetary History suggests varied explanations of the causes, duration, and severity of the Great Depression. The upshot of the Temin debate and other literature on the period is the primacy of monetary forces. However contemporaneous correlation between money and income has been interpreted as evidence for significant feedback from nonmonetary to monetary forces. In addition, nonmonetary forces, especially institutional factors such as the regulations governing banking structure, emerge as having considerable importance, and some authors such as Bernanke (1983) (see Section 3.1.1 above) stress the disruption of the financial system as an important independent cause.

Evidence of the endogeneity of the money supply or of feedback from real forces to the money supply begs the question of whether the Great Depression had to happen. As Friedman and Schwartz pointed out, the Fed clearly could have stopped the decline in the money supply and the depression with it. A comparison of the Great Depression with previous and subsequent experience suggests that monetary contraction was the "sine qua non" that made the

depression great. Other explanations do not detract from the importance of monetary contraction which has been a crucial part of all severe cycles. Given the importance of a decline in the money supply, other influences — including the disruption of the financial system — became in most cases endogenous rather than causal.

#### 4. THE DOMESTIC MONETARY FRAMEWORK AND MONETARY POLICY

A key theme in A Monetary History is the role of banking arrangements and monetary policy as the setting for monetary disturbances.

In this section, the literature is surveyed for both the pre-1914 period when the U.S. did not have a central bank and the period since 1914 when monetary policy has been conducted by the Federal Reserve System.

##### 4.1 The National Banking Era

##### 4.1.1 Inelasticity of High-Powered Money

A key problem facing the national banking system, which ultimately led to its replacement by the Federal Reserve System, was the inelasticity of high-powered money — the inability to convert deposits into currency during banking panics. This problem was exacerbated by "the inverted pyramid of credit" — interbank deposits held in New York and to a lesser extent Chicago and St. Louis. In times of financial stringency country banks would recall deposits from the central reserve cities to meet local demands for currency, in turn exacerbating pressure on the reserves of these banks.

Cagan (1963) agreed with Friedman and Schwartz that the key defect of the national banking system was inelasticity of the currency and that the problem was solved by the Aldrich Vreeland creation of emergency currency. In addition, he argued that minimum reserve requirements didn't reduce monetary instability because banks viewed these reserves as locked-up. For Cagan, the inverted pyramid of credit was not as serious as commonly believed because the call loan market, in which interbank deposits were invested, would have attracted the funds anyway. The key problem with the inverted pyramid was that it raised the money multiplier, thereby allowing a greater monetary contraction than otherwise in the face of an attempted conversion by the public of its deposits into currency.

Dewald (1972) contended that the U.S. had virtually all the elements of a central bank in place with the national banking system. The New York City national banks, by serving as a depository for other banks, acted as a central reserve. In addition, they acted as lender of last resort by providing interbank

loans, by channelling specie from abroad and from the Treasury to other banks and by banding together and issuing clearing house certificates. Schwartz (1972) denied that the New York banks could be regarded as a central bank since they could not issue high-powered money at will. Furthermore, interbank loans and clearing house loan certificates did not represent additions to high-powered money but substitutes.

#### 4.1.2 The National Bank Note Puzzle

National bank notes representing liabilities of the national banks were issued by banks depositing government securities with the U.S. Treasury equal in face value before 1900 to 111% of the value of notes issued. The amount of notes issued depended on the market prices of the securities serving as collateral. As long as bonds sold at or above par, it was profitable to issue notes. Except for the period 1884 to 1891, Friedman and Schwartz noted, based on calculations in Cagan (1965), that eligible U.S. securities sold above par for all the fifty years before the establishment of the Fed.<sup>21</sup> The amounts issued varied with their profitability, yet the amount of notes issued was well below the maximum. Friedman and Schwartz viewed this as a puzzle. "[e]ither bankers did not recognize a profitable course of action ... or we have overlooked some costs of issue that appeared large to them." (Friedman and Schwartz, p. 24)

Goodhart's (1965) explanation for less than the maximum note issue for the period 1907-1913, was uncertainty over the possibility that circulation privileges would be terminated in forthcoming reform legislation, which reduced the value that banks attached to bonds serving as collateral. For James (1976), the reason for the less than maximum note issue in the last quarter of the nineteenth century was that the rate of return on loans was sufficiently high to make it more profitable to make loans through creating deposits rather than buying government bonds and then issuing notes (in the form of loans) on the basis of 90% of par value. Local loan rates were higher in the south and the west than in central reserve cities accounting for the lower fraction of the maximum note issue in these regions. As loan rates converged towards the end of the nineteenth century, national banks in the interior increased their note issue.

## 4.2 Founding of the Federal Reserve System

### 4.2.1 A Change in Regime

The beginning of operations by the Fed in 1914 marked a "major watershed" in U.S. monetary history. According to Friedman and Schwartz, (p. 9), the change in internal monetary arrangements coincided with a loosening of

the external link to the gold standard. These two changes created the potential for the new central bank to exercise deliberate control over the stock of money and promote monetary stability. Yet, the record of subsequent events and greater variability of money after 1914 than before led them to conclude that "[t]he blind, undesigned and quasi-automatic working of the gold standard turned out to produce a greater measure of predictability and regularity — perhaps because its discipline was impersonal and inescapable — than did deliberate and conscious control exercised within institutional arrangements intended to promote monetary stability." (p. 15)

Mankiw, Miron and Weil (1987) demonstrated that a significant change in monetary regime actually occurred at the beginning of operations by the Fed in November 1914 evidenced in the behavior of interest rates, and that market agents rationally anticipated the change. They showed that the stochastic process of the three-month time loan rate at New York City banks changed from one of mean reversion with a strong seasonal from 1890 to 1910, to one close to a random walk from 1921-1933. This, they argued, reflected the Fed's role in offsetting seasonal and panic-induced fluctuations in interest rates. Evidence of low posterior odds ratios (the ratio of subjective probabilities of different switch dates conditioning on the data) before December 1914, according to the authors, casts doubt that abandonment of the gold standard in August 1914 explains the change in stochastic process. Moreover, they found that the relationship between 6-month and 3-month rates changed in a manner consistent with the expectations theory of the term structure. Regressions of the long rate on the short rate revealed the long rate to be less responsive to shocks in the short rate in the earlier subperiod. Switching regressions revealed the change in stochastic process to have occurred between December and February 1915 and the change in expectations to have preceded the regime change by one month.

#### 4.2.2 A Change in the Seasonal Pattern of Interest Rates

The seasonal in short-term rates under the national banking system reflected autumnal crop moving and Christmas demands for currency which put pressure on bank reserves and hence on interest rates. The Fed reduced the seasonal in short-term interest rates, altering its outstanding credit to offset seasonal fluctuations in bank reserves, and at the same time, increased the seasonal in currency outside the Treasury and Fed and in high-powered money, (Friedman and Schwartz, 191-196)

More recently evidence for a significant decrease in nominal interest rate seasonality after 1914 was found by Shiller (1980), who used the X-111 seasonal adjustment program, and by Mankiw and Miron (1986) and Mankiw, Miron and Weil (1987), who used time series methods.

According to Miron (1986), financial panics in the U.S. before 1914 generally occurred at seasonal peaks in nominal interest rates. This reflected the tendency of seasonal demands for credit to raise interest rates, increasing the ratio of loans to reserves and deposits to reserves. Panics precipitated by exogenous shocks occurred at times when banks were least prepared. After 1914, however, the Fed extended reserve bank credit to accommodate seasonal credit demands, thereby considerably reducing the amplitude of the seasonal interest rate cycle and preventing any panics from occurring between 1914 and 1929. On grounds similar to Trescott (1982), Field (1984a), Miron associated banking panics after 1929 with a shift to a restrictive policy and the reduction of seasonal accommodation.<sup>22</sup>

Because a similar reduction in seasonality occurred in a large number of countries at the same time, Clark (1986) was skeptical of the Friedman and Schwartz view that it was the advent of the Fed that accounted for the reduction in the seasonal in short-term interest rates. Moreover, the disappearance of the U.S. and U.K. interest rate seasonal occurred three years before a significant seasonal appeared in total currency and high-powered money in each country. Though the reduction in the U.S. interest rate seasonal from 1914 to 1916 might be explained by the liquidity effects of reduced reserve requirements and gold inflows, Clark doubted that U.S. seasonal policy could explain a similar phenomenon in other countries. Instead, he attributed the timing of the change in the seasonal pattern of interest rates in 1914 to the breakdown of the gold standard.

Clark's view, however, was challenged by Barsky, Mankiw, Miron and Weil (1987). Evidence that the seasonal pattern of interest rates did not change after the U.S. and U.K. left Bretton Woods in 1973 and that the correlation between U.S. and U.K. interest rate levels and changes did not change before and after 1914 makes their case that the change in the seasonal was unrelated to the change in regime. Instead they constructed a hypothetical model in which a central bank, committed to interest rate smoothing and avoiding gold flows, is introduced into a world already containing a central bank dedicated to the same policies (the Bank of England). The two central banks, each pursuing its own

policy but taking the other's actions as given, smooth interest rates without gold flows. This is in contrast to the case of a single central bank whose attempts to smooth interest rates will always be offset by gold flows. Based on this model, the authors argue, it is plausible that the introduction in 1914, into the world monetary system of the Fed, dedicated to smoothing interest rates, can explain the reduction in the interest rate seasonal in the U.S., U.K., and other countries.

A fundamental problem with Barsky et al's explanation is that in 1914 all countries (except the U.S.) had left the gold standard. Consequently they would not be worried about gold flows. In addition the question remains why the Fed was so special. Why could not the Bank of England and the Bank of France, each of which represented large gold standard countries, have initiated the reduction in the seasonal before 1914? Possibly the answer lies with the populists in the U.S., who influenced the constitutional structure of the Fed and who were strongly opposed to the seasonal.

#### 4.2.3 Founding Principles versus Reality

The Fed was established to provide elasticity to the money supply — specifically to provide easy convertibility between deposits and currency and to prevent a recurrence of the banking panics of the national banking era. This goal, according to Friedman and Schwartz (Chapter 5), was to be achieved by the expansion and contraction of Federal Reserve notes and deposits. Two key principles lay behind the establishment of the Fed: the gold standard and the real bills doctrine.<sup>23</sup>

West's (1976, 1977) reading of archival material and contemporary sources led him to support Friedman and Schwartz's interpretation — that the two principles behind the Federal Reserve Act were obsolete before the Fed opened its doors. The real bills doctrine behind the Federal Reserve Act reflected early nineteenth century reality — the widespread use of bills of exchange and commercial bills. However, after the Civil War, the market for commercial bills, especially two-name bills, declined. Furthermore, the classical gold standard principle behind the Federal Reserve Act was based on a stylized model of observance by the Bank of England of "the rules of the game" and its use of the discount rate to facilitate gold flows. According to West, the Bank had difficulty making Bank Rate effective and frequently violated "the rules" through the use of policies such as the gold devices (Sayers, 1936). Thus the Fed was designed to follow a policy which never existed.

#### 4.2.4 The Fed's First Policy Failure 1920-21

According to Friedman and Schwartz (p. 238), if the Fed had raised the discount rate earlier in 1919 this would have moderated post-World War I inflation and the subsequent contraction. Fuel was added to the fire by further raising the discount rate in 1920 and keeping it there until May 1921. Thus 1920-21 was the first important test of Fed monetary policy and its first failure.

They (p. 234) interpreted the Fed's reluctance to reduce the discount rate in 1920 after prices and output had declined because of concern over its gold reserve ratio. Wicker (1966, 1967, ch. 3), however, based on his reading of Federal Reserve records, regarded domestic considerations as more important. Fed officials in his view feared that lowering the discount rate before member bank borrowing had been reduced to desirable levels would encourage further speculative borrowing. The Fed did not understand the harmful effects of deflation, believing that with declining prices and activity member bank borrowing would quickly be liquidated. The problem, not recognized by the Fed, according to Wicker, was that much of the buildup in bank credit financed inventories which took several months to liquidate.

Wicker's reading of the archives suggests that a reinterpretation of Friedman and Schwartz's view of 1920-21 may have merit.

#### 4.3 Was the Federal Reserve System's Policy Consistent 1923-33?

Friedman and Schwartz (Chapter 6) described the 1920's as the "High Tide" of the Federal Reserve System. Though the real bills doctrine still strongly influenced Fed policy and despite an ongoing conflict between Governor Strong of the New York Fed and the Federal Reserve Board that affected all policy discussion, the Fed, nevertheless, successfully conducted countercyclical stabilization.<sup>24</sup> They then went on to argue in chapter 7 that the contraction of 1929-33 could have been prevented if the policies developed in the 1920's were consistently applied.

Friedman and Schwartz attributed the policy failure to a "shift of power within the system and the lack of understanding and experience of the individuals to whom the power shifted." (p. 411)

The only episode when the system united was the decision to raise the discount rate after Britain left gold in September 1931. The experiment with expansionary open market policy in 1932 did not reflect a change in policy but was just a temporary reaction to Congressional pressure.<sup>25</sup> The final banking

panic in 1933 demonstrated a complete lack of leadership as each reserve bank acted to protect its own reserves.

According to Friedman and Schwartz, none of this would have happened had Benjamin Strong lived or if the pre-Fed set of monetary institutions, including restrictions of payments and the Aldrich Vreeland Act, were in place.

Wicker (1965) denied that Fed policy deteriorated dramatically after Strong's death in 1928. Based on his reading of the minutes of the Open Market Policy Committee, unavailable to Friedman and Schwartz when they wrote the book, he concluded that the Burgess-Riefler-Strong doctrine of open market operations predominated both before and after Strong's death.

According to this doctrine, commercial banks were reluctant to borrow from the Fed and did so only if in need. By engaging in open market sales, the Fed could induce banks to borrow. When member bank indebtedness rose, rates were raised and loans reduced. By engaging in open market purchases, the Fed reduced member bank borrowing. Interest rates fell and banks increased their outstanding loans and investments.

The decision to conduct open market purchases depended on the level of member bank indebtedness in the reserve districts of New York and Chicago. In 1924 and 1927, member bank borrowing in those cities was sufficiently high to induce open market purchases whereas in 1930 it was comparable to or below that of 1924 and 1927. Consequently, there was no need seen for action. Moreover, based on the voting record of the executive committee of the Open Market Policy Committee (OMPC) in 1930, three of the four members who voted against purchases had been on Strong's Open Market Investment Committee in the 1920's, suggesting to Wicker that Strong might not have carried the day.<sup>26</sup>

Brunner and Meltzer (1968), supported Wicker's claim that the Burgess-Riefler-Strong doctrine remained in place after Strong's death. According to their interpretation of statements of the Fed staff, members of the (OMPC) and reports sent to each board member and Reserve Bank president, policy was consistent over the whole period. Based on the Burgess-Riefler-Strong doctrine, the Fed had two policy indicators: the level of borrowed reserves and short-term market interest rates. According to Brunner and Meltzer, market interest rates were the key policy indicator during the Great Contraction. The reason the Fed failed to increase high-powered money after 1929 was that market interest rates had fallen to levels lower than reached in earlier contractions.



Meltzer (1976) explained the majority of decisions by the Fed to purchase or refrain from purchases in the period September 1929 to April 1931, by the level of borrowing, the change in borrowing, and the level of short-term interest rates. Focus on nominal interest rates as measures of ease and tightness, according to him, ignores the distinction between real and nominal variables. Thus low market interest rates, which may actually reflect deflationary expectations and a high real rate, were misinterpreted as evidence of ease.

Trescott (1982), on the other hand, claimed that Fed policy after 1929 represented a radical departure from its policy over the period 1924-29. He estimated a monthly regression to explain Fed holdings of open market securities for the 1924-29 period by variables determining defensive operations and dynamic operations. He then generated levels of open market securities each month in 1930-33 on the counterfactual assumption that the Fed continued its policy regime of 1924-29 through 1933. Beginning December 1929, actual federal open market credit increasingly fell below its estimated value. Trescott attributed the changes in monetary policy after 1929 to a change in the structure of the Open Market Investment Committee (OMIC). Before 1929, as Friedman and Schwartz argued, it was dominated by the Federal Reserve Bank of New York. In January 1930, the OMIC (which consisted of the five key reserve banks) was replaced by a new Open Market Policy Committee (OMPC) which included all twelve banks. This change produced two blocks to effective decision making: (a) some of the new banks were hostile to expansionary policies; (b) as the size of the necessary interventions increased, the greater the likelihood they would need the approval of the entire OMPC and the Board, rather than just the discretion (as in the previous regime) of the New York Fed.

Finally, to determine whether Fed policy changed in 1929, as argued by Friedman and Schwartz and Trescott, or whether the Fed followed the same flawed strategy in the early 1930's as it did in the 1920's, as argued by Wicker and by Brunner and Meltzer, Wheelock (1987) tested whether policy reaction functions over the 1919 to 1933 period for different policy tools changed significantly in 1929. In support of the Brunner, Meltzer-Wicker view, he found that the Fed's policy tools responded to the same indicator variables over the whole period but that they responded less vigorously in the 1929-31 contraction than in earlier periods.<sup>27</sup> Again in agreement with the above authors, he concluded that the Fed did not conduct expansionary open market purchases because low values of its key policy indicators — member bank borrowing and

market interest rates — indicated monetary ease. Estimated demand functions for member bank borrowing for the system as a whole and for each Fed district suggest that the Fed's strategy was flawed. It ignored the influence of declining economic activity and financial crises on the demand for member bank borrowing.

In defense of Friedman and Schwartz, however, Wheelock noted that the redistribution of power away from the New York Reserve Bank might have locked the system into a more restrictive monetary policy than otherwise. It did so by increasing the influence of officials who opposed expansionary open market policy relative to those who consistently advocated expansionary policies and who possibly understood the basic flaw in Fed strategy.

In sum, evidence from archival sources and from econometric reaction functions is not entirely in favor of A Monetary History's interpretation of the reason Fed policy failed during the Great Contraction. The revisionist view suggests that the Fed failed because it followed a flawed policy strategy developed in the 1920's. It ran into trouble in 1929-31 because its principal policy indicator — short-term market rates — was misinterpreted as a signal of ease. During the contractions of the 1920's, the decline in activity was so moderate that neither member bank borrowing nor short-term interest rates fell sufficiently for the Fed to refrain from an expansionary policy. This is not to say that superior leadership might not have jettisoned the strategy. But such an explanation places perhaps too much emphasis on the personality of one individual prevailing against institutional tradition.

#### 4.4 New Deal Regulation of the Banking System 1933-35

The emergency legislation of 1933 and subsequent bank acts created a package to insure the stability of the banking system and prevent a recurrence of bank panics (Friedman and Schwartz, Chapter 8).

For Benston (1982), the New Deal legislation package of FDIC and regulation of the commercial banks — specifically the prohibition of interest payments on demand deposits and the separation of investment from commercial banking — represented a horse trade between the small unit banks and large money market banks. The small unit banks wanted deposit insurance to protect them from runs. They also continued to oppose branch banking.<sup>28</sup> The big city banks were not interested in deposit insurance but wanted a prohibition of interest payments on demand deposits as a price fixing arrangement.<sup>29</sup> The investment bankers at the same time wanted protection from commercial bank

competition.<sup>30</sup> New Deal legislation was a deal whereby the small unit banks received FDIC and continuation of the McFadden Act prohibition against branching, the large banks received the prohibition of interest payments on demand deposits, and the investment bankers received freedom from commercial bank participation in their business.

Recently the contribution of federal deposit insurance to monetary stability has been questioned. Schwartz (1987) argued that it was price level stability until the mid-1960s, rather than federal deposit insurance, that was responsible for financial stability. During this period other countries without deposit insurance also experienced financial stability. Given price stability, an effective lender of last resort can insure stability with or without deposit insurance. Moreover the flat insurance premium FDIC charges on deposits, regardless of risk, has in recent years — as a consequence of reduced regulation of the financial sector in the face of inflation — increased the incentives for risk taking and hence the potential for monetary instability, Short and O'Driscoll (1983), Kane (1985).

#### 4.5 The Increase in Reserve Requirements 1936-37

In chapter 8 of A Monetary History, Friedman and Schwartz documented the consequences of a major policy error by the Federal Reserve System — a doubling of reserve requirements between August 1936 and March 1937 — which led to a sharp monetary contraction and recession in 1937-38. They dismissed as incorrect the Fed's liquidity trap explanation of the excess reserves. According to their interpretation, two shifts occurred in the liquidity preferences of the banks: an increase in the reserve deposit ratio from 1933 to 1936 in response to the 1929-33 collapse; and then a second increase from 1937-1940 as the banks, viewing their increased required reserves as unavailable to them in the event of a liquidity crisis, restored their desired holdings of excess reserves to the previous level. Thus they concluded that the adjustment of the actual deposit reserve ratio to a change in the desired ratio takes up to three years.

Horwich (1963, 1966), based on a lack of correlation between effective reserves and bank earning assets in the mid 1930's, argued for the liquidity trap interpretation of excess reserves, although Brunner (1965) correctly criticized Horwich's methodology as flawed in its specification. Morrison (1966) provided evidence in favor of Friedman and Schwartz's interpretation. Against the liquidity trap hypothesis he provided evidence: first, that Canadian banks did not exhibit excess reserves despite similar movements of interest rates and

real income (also see Friedman and Schwartz, p. 458); second, that country member banks' reserve deposit ratios quickly restored their original relationship to that of nonmember banks after the reserve requirement doubled in 1936-37; third, that the elasticity of the demand for excess reserve shows little evidence of increase as interest rates fall.<sup>31</sup>

More recently, Wilcox (1984) estimated a demand function for excess reserves, based on the Tobin-Brainard model of bank asset demand and supply, and quarterly data for New York City member banks. In addition to the traditional interest rate and wealth variables he included a proxy variable to capture Friedman and Schwartz's shock hypothesis (that the demand curve shifted as a reaction to the liquidity crisis and doubling of reserve requirements). Both the interest rate and the shock variable were significant. Moreover, the interest elasticity of demand for excess reserves rises as the interest rate falls, a result which Wilcox interpreted as evidence of the liquidity trap view. In accordance with Brunner's (1965) critique of A Monetary History, the adjustment period to a liquidity shock is somewhat shorter (two years) than that reported by Friedman and Schwartz. Finally, simulations of the model over the 1933-40 period revealed changes in interest rates to explain much more of the increase in excess reserves than the financial shock proxies, especially after 1935.

Wilcox's use of a log linear demand function biases the case towards finding a liquidity trap. Also omitting nonmember banks and member banks outside New York biased the case against the Friedman and Schwartz view. Since most bank failures occurred among smaller banks outside New York, one would expect the New York banks to be more interest sensitive and less affected by financial shocks, given their larger size and more diversified portfolios.

For at least a decade, Friedman and Schwartz's interpretation of excess reserves was accepted although the portfolio adjustment mechanism of the banking system was questioned (Brunner 1965, Tobin 1965, Johnson 1965). Wilcox's recent study, despite some problems, suggests that the topic is worth a deeper look.

#### 4.6 Treasury Dominance of the Federal Reserve

Friedman and Schwartz, chapter 9, documented a major shift in policy responsibility from the Fed to the Treasury in the aftermath of the Great Contraction. The Fed switched to a passive policy (with the exception of the 1936-37 doubling of reserve requirements) because it believed the traditional

tools of monetary policy to be ineffective since they could not reduce the excess reserves accumulated by the banking system.

Toma (1982) applied the theory of bureaucracy to explain some aspects of Fed policy in the 1930's and 1940's. According to this theory (Niskanen 1971, Acheson and Chant, 1973) the Fed acts to maximize its discretionary profits — the revenue from its open market portfolio — all of which it was allowed to keep after 1933.

The model Toma constructed predicts that the Fed will try to increase its share of inflation tax revenue, at the expense of the commercial banks and the Treasury, by following policies to reduce the ratio of the total money stock to Federal Reserve credit. But at the same time it will attempt to forestall potential intervention by the Treasury and the Congress by transferring some of its resources to the Treasury.

Thus, according to Toma, (pp. 181-182) the Fed's acceptance of the Treasury's gold sterilization policy in 1936 rather than conducting the open market sales itself, did not represent acceptance of Treasury dominance over monetary policy, as Friedman and Schwartz argued (p. 532), but rather represented a policy designed to preserve its share of inflation tax revenue at the expense of the Treasury. Gold sterilization according to Toma was a way of preventing the Treasury from continuing to capture the capital gain from monetization of gold inflows.

Evidence for the bureaucratic model is based on an observed positive association between the Fed's expenditures and its open market wealth.<sup>12</sup>

A key implication of this approach is that the Fed has sufficient independence to produce whatever rate of monetary growth is required to maximize its profits. This assumes the central bank operates in a vacuum, completely removed from the underlying political realities. The record, to the contrary, indicates that the Fed's overall policy stance is clearly related to the desires of the elected government, Weintraub (1978). The scope for the type of independent action suggested by Toma is limited indeed.

#### 4.7 The World War II Bond-Price-Support Program

During World War II, the Fed followed a bond price pegging program to assist Treasury bond financing of the war at favorable interest rates. Wicker (1969) held, contrary to Friedman and Schwartz, that the Fed did not give up its independence to the Treasury by agreeing to the bond price support program in March 1942. Based on his reading of the record, both the Fed and the Treasury

were in favor of preventing interest rates from rising, but disagreed on how to do it — the Treasury favoring reductions in reserve requirements to provide excess reserves, the Fed favoring open market operations. As a compromise, the Treasury accepted a Fed plan to peg the short-term interest rate at 3/8%.

Rather than being an "engine of inflation," Toma (1985) construed the bond price support program (Friedman and Schwartz, Chapter 10), as a solution to the time inconsistency problem faced by the wartime monetary authorities following Barro and Gordon (1983). According to the Barro-Gordon hypothesis, as long as the public rationally expects the monetary authorities to produce monetary surprises, they will reduce their real cash balances, and hence the authorities will capture less seigniorage than long-run revenue maximizing would predict. To solve the problem a preannounced rule is needed. The 2 1/2% ceiling on long-term yields was a rule to allow the authorities to rearrange the time path of inflation, to satisfy the government's intention to shift consumption from the future to the present and to assure the public that while money growth might increase during the war it did not represent a long-run policy. For long-term interest rates to stay below the pegged level for extended periods of time, and long-term expectations to stay low, open market operations had to keep the long-run inflation rate low. The support program thus implied that anticipated rapid money growth during the war would be followed by a long period of restraint.

Toma's arguments in favor of this view were: (1) if the public did not believe in the government's commitment, it would have shifted into short-term securities; (2) money growth declined after the war; (3) real cash balances were abnormally high even after price controls were lifted — reflecting expectations of postwar disinflation; (4) based on the 35% greater increase in interest rates that occurred during World War I, seigniorage collected in World War II, absent the bond support program, because of reduced real cash balances, would have been 3.5 to 10% lower each year.<sup>33</sup>

An interpretation alternative to that of Toma's, which also stresses the role of expectations, yet is consistent with that of Friedman and Schwartz, is that long-term price expectations were anchored by a strong belief in a return to the gold standard. The experience of rapid deflation after World War I in the U.S. and other countries committed to a return to the gold standard, would still be in the memories of investors. Moreover, investors would have been aware of the negotiations leading to the Bretton Woods Agreement in 1944. In addition, Toma

fails to mention the wartime unavailability of consumer durables and the role of wartime price controls. These were two factors which, according to Friedman and Schwartz, raised the level of real cash balances (also see Rockoff, 1981) in turn generating more inflation tax revenue than otherwise, and at the same time reducing inflation expectations.

## 5. MONETARY STANDARDS

The ninety-four years spanned by A Monetary History were characterized by several distinct relationships between the U.S. economy and the rest of the world. Friedman and Schwartz devoted considerable attention to the role of the monetary standard in influencing the relationship between monetary and other variables.

### 5.1 The Greenback Episode 1862-1878

The greenback period 1862-1878, was a unique episode of freely floating exchange rates between the U.S. and the rest of the world.

The literature stemming from Friedman and Schwartz's treatment of the greenback episode focuses on three themes: the conditions required for resumption; the role of "news"; and Gresham's Law.

#### 5.1.1 The Conditions Required for Resumption

Timberlake (1975) argued, contrary to Friedman and Schwartz, that the Treasury did act directly to reduce the money supply and foster resumption. His interpretation of the Resumption Act of 1875 was that it allowed the Secretary of the Treasury to retire U.S. notes equal to the gross amount of national bank notes issued without accounting for voluntary retirement by the commercial banks. Successive Secretaries of the Treasury took advantage of this provision to reduce high-powered money.

Based on Berry's (1978) GNP deflators rather than the wholesale price series used by Friedman and Schwartz and Kindahl (1961),<sup>34</sup> Officer's (1981) calculation of the real exchange rate between the U.S. and Great Britain in the greenback era suggests that considerably less than the 54 percent deflation that Friedman and Schwartz calculated was required to resume specie payments. In addition, Officer found that the use of Berry's GNP data corroborates Friedman and Schwartz's conclusion that deflation was a result of rapid real growth and a virtually constant money stock.<sup>35</sup>

#### 5.1.2 The Role of "News"

According to Friedman and Schwartz, "news" affects the exchange rate to the extent it affects the demand for and supply of foreign exchange and at one

remove the determinants of the price level. Some studies, however, have found evidence to support Mitchell's (1903) emphasis on the importance of "news" as an exchange rate determinant. Roll (1972), using the capital asset pricing model, demonstrated that the Civil War bond markets were efficient, in that bond prices quickly reflected changes in the premium on gold, as well as all information on military events.

McCandless (1985) tested W. C. Mitchell's hypothesis (1903) that short-term movements of exchange rates during the Civil War could be explained by war news. Based on a time series model using semi-monthly data of the gold prices of the currencies of both the Union and Confederacy, he found that a "news" variable, containing information on battles and major political events, systematically affected the exchange rates of the belligerents in accordance with Mitchell's hypothesis.

For Friedman and Schwartz the money stock was an independent variable with the price level and exchange rate strongly influenced by monetary forces. According to Calomiris (1986), the exchange rate was determined primarily by "fiscal news" — news about the size of the government's budget deficit and the speed of retirement of debt — which influenced the probability and timing of resumption. In turn, the price level was anchored by movements in the exchange rate. Given the price level and the exchange rate, the money supply passively adjusted to equate real money supply and demand. Vector autoregressions provided evidence for his view. They show that innovations in the exchange rate and price level precede innovations in the money stock, and that innovations in several proxies for fiscal news precede those for the exchange rate and the price level.

Unfortunately, this study, like the McCandless study does not explain how fiscal and war news affects the fundamental determinants of the exchange rate. Moreover, Calomiris' model of an endogenous money supply implies an unstable money multiplier, an implication inconsistent with ample evidence that it is stable and predictable.<sup>36</sup>

Phelps (1985) compared Friedman and Schwartz's approach to resumption to that of the finance approach (Sargent and Wallace 1983). According to Phelps, the Friedman and Schwartz view implies that the behavior of the greenback price of gold should vary inversely with expectations of future money growth. In the finance approach (the approach also followed by Calomiris), it should vary inversely with the probability of resumption, which in turn depends on



announcements of a fiscal policy compatible with gold convertibility and an announcement of the date of resumption. Phelps devised a chronology of 13 key financial events in the greenback era, which he used to show that the exchange rate responded in the direction predicted by events suggesting future changes in money growth in only 7 cases, whereas it responded to "fiscal news" in all 13.

A key difficulty with the finance approach is that ex ante news is virtually impossible to identify. The events deemed important from today's perspective may not have been deemed so by market participants at the time.

#### 5.1.3 Gresham's Law

Despite Gresham's Law — which Rolnick and Weber (1986) define as "the claim that when market and legal prices of money differ, bad money drives out the good," — the issue of greenbacks did not drive both gold and silver coins out of circulation. Instead, though small denomination silver coins disappeared, in the eastern part of the country gold coins circulated at a premium. The authors explained this paradox as follows. If two types of money are coined and made legal tender and the market and legal prices differ, the money which is overvalued at the mint becomes the unit of account, and the undervalued money, if of large denomination, circulates at a premium while small denomination coins are bundled and used as a store of value. The reason is that the transactions costs of paying a premium will likely be higher for small than larger denomination currency.

Furthermore, the fact that in the west, gold remained the unit of account and medium of exchange while greenbacks circulated at a discount does not, according to these authors, contradict the hypothesis that the overvalued currency becomes the unit of account. The reason they give is that in 1863 California passed legislation which effectively divested greenbacks of legal tender status so they did not have to be accepted for payment at par.

This approach is based on a misinterpretation of Gresham's Law. Friedman and Schwartz clearly state in footnote 16, page 27, that Gresham's Law "applies only when there is a fixed rate of exchange ..." According to them, the simultaneous circulation of gold coins and greenbacks simply reflected the operation of a flexible exchange rate. The reason subsidiary silver disappeared was that the market value of silver was bid up to the point which would make it useless to facilitate low value transactions.

To sum up, Officer, using better data confirmed Friedman and Schwartz's explanation for and the timing of resumption. Several articles suggest that

"news" may be a more important factor in exchange rate determination than Friedman and Schwartz accept, but this literature does not explain how "news" affected the fundamental determinants of exchange rates. Finally, Rolnick and Weber view the greenback episode as a denial of Gresham's Law but their reinterpretation itself does not make clear the distinction between fixed and flexible exchange rates among types of money.

## 5.2 The Classical Gold Standard, 1879-1914

The U.S. restored specie payments on January 1, 1879, and returned to the gold standard.

According to Friedman and Schwartz, the way in which adjustment to both external and internal disturbances took place was via the classical (Hume) price-specie-flow mechanism aided by capital flows.

### 5.2.1 The Balance of Payments Adjustment Mechanism: Hume vs. MABP

By contrast to the classical balance of payments adjustment mechanism of the gold standard, in the monetary approach to the balance of payments (MABP), prices and interest rates are rigidly linked together through the force of arbitrage in commodities and capital markets, and gold flows are the equilibrating mechanism by which excess demands (or supplies) of money are cleared (Frenkel, 1971; Johnson, 1976; Mundell, 1971).

McCloskey and Zecher (1976) tested a model of the monetary approach to the balance of payments that assumes arbitrage in world commodity and capital markets to explain movements in the U.K. and U.S. balance of payments under the gold standard, 1880-1913.

The authors tested the key assumption of commodity arbitrage by examining correlations among price changes between countries, and among regions within countries under the gold standard. For traded goods, such as wheat, they found synchronous correlations equally high among regions as among nations, unlike the case of nontraded goods, such as labor services and bricks. For overall price indices they found a significant correlation between the wholesale price indices of the U.K. and the U.S., less so for GNP deflators and even less for consumer price indices. The larger share of traded goods in the wholesale price index undoubtedly accounts for higher correlation for the WPI. Evidence in favor of capital market arbitrage was less conclusive.<sup>27</sup> They also compared gold flows — predicted by a simple demand for money function less the money supply produced by domestic credit expansion — with actual gold flows, and found a very close relationship.

According to McCloskey and Zecher (1984), Friedman and Schwartz based their interpretation (p. 99) of the 1879-82 episode as an excellent example of the operation of the classical gold standard on annual data. An examination of monthly data on gold flows and changes in the price level revealed no tendency for price rises to follow gold inflows, but rather price rises preceded gold flows, evidence McCoskey and Zecher interpret to be consistent with arbitrage and the monetary approach.

Friedman (1984) in reply argued that the relationship between changes in money supplies and price levels is more pertinent than that between gold flows and price levels. Moreover if one examines semi-annual data, the evidence for that episode suggests that changes in money preceded changes in the price level, and that when account is taken of the proximate determinants of the money stock, it turns out that a rise in the money multiplier enabled the money supply to rise after resumption despite no initial gold inflow, and for a large gold inflow in 1879 to be absorbed by a rise in the gold-high powered money ratio rather than the money supply. Thus for him, the episode still remains as an example of the classical mechanism in operation.<sup>3\*</sup>

The brief literature cited here on the classical gold standard adjustment mechanism for the United States could be supplemented by earlier articles on both the pre Civil War period and this period by Macesich (1960), Williamson (1961, 1963) and Willett (1968). Pertinent recent evidence for other countries include: Jonung (1984) - Sweden; Fratianni and Spinelli (1984) - Italy; Rich (1984) - Canada; and Drummond (1976) - Russia.

The upshot of these studies is that the answer to the question whether the Hume mechanism or the monetary approach better explains the operation of the classical gold standard remains unresolved. The evidence is consistent with the existence of a number of adjustment mechanisms — commodity price arbitrage, interest rate arbitrage, changes in relative prices, gold flows, money supply changes, and changes in the underlying structure of the international economy — each operating within different time horizons. Thus running a race between the classical and monetary approach models only has limited value because of the complexity of the issue.

### 5.3 The Silver Agitation

Shortly after the U.S. successfully returned to the gold standard, maintenance of the standard was threatened by political agitation for the free coinage of silver. The Free Silver movement achieved some of its aims with the

passage of the Bland Allison Act of 1878 which created a silver trading dollar and, the Sherman Silver Purchase Act of 1890 instructed the Treasury to purchase 4.5 million ounces of silver per month. According to Friedman and Schwartz (p. 131), the ensuing issue of silver certificates in itself would not have increased the money supply sufficiently to force the country off the gold standard because of the offsetting effects of other sources of change in high-powered money. The real threat to the gold standard created by the silver purchases were the adverse expectations created that these purchases would lead to even more. The resultant capital outflow led to more deflation than would otherwise have occurred. The deflationary pressure in turn was an important contributor to the banking panic of 1893 and the depression of the mid 90's. Between 1893 and 1896 threats to the Treasury's gold reserves were allayed by direct measures taken by the Treasury including the formation of syndicates of bankers who used their credit abroad to engineer offsetting capital inflows.

Garber and Grilli (1985) interpreted the Belmont-Morgan syndicate of 1895 as a successful attempt to prevent a speculative attack on the fixed exchange rate gold standard. Their model of speculative attack posits an increased probability of attack on the currency to the extent the rate of domestic credit expansion generates an exchange rate in excess of parity. The U.S. in the period 1890-95 ran continuous budget deficits financed by domestic credit expansion; of special importance for the deficits were the silver purchases after 1890. The Belmont-Morgan syndicate reduced the money supply by selling government bonds for gold and succeeded in reducing the probability of speculative attack.<sup>39</sup>

According to Friedman and Schwartz (p. 134), had a silver standard been adopted after 1879, the U.S. would have had the benefits of a flexible exchange rate with the rest of the gold standard world. The resultant fall in the monetary demand for gold and increase in the monetary demand for silver would have raised the gold price of silver sufficient to offset the deflation that occurred under the gold standard.

In support of this contention, Drake (1986) calculated the hypothetical behavior of the U.S. price level between 1879-1914 had the U.S. not demonetized silver in 1879. Accounting for biases in the market to mint ratio due to the hypothetical monetization of silver, the effects of releasing gold and a reduction in silver for nonmonetary uses, as well as for the effects on other bimetallic

countries, he found that the U.S. wholesale price index would have been more stable than it was,<sup>40</sup> that the U.S. would have been on a gold standard for most of the period with the exception of 1879-90, and that the gold-silver ratio would not have strayed for long from the 16:1 mint ratio.

#### 5.4 The Gold Exchange Standard 1920-1933

The gold exchange standard reinstated in the 1920's was more fragile than its pre-World War I antecedent as countries substituted holdings of foreign exchange for gold, hence reducing the gold reserve base for the world money supply, and as countries adopted gold sterilization policies, thereby preventing the balance of payments adjustment mechanism from working.

##### 5.4.1 The Role of the Gold Standard and U.S. Monetary Policy in Transmitting the Great Contradiction

A number of authors provide evidence in support of Friedman and Schwartz's interpretation of the role of the gold standard and U.S. policies in transmitting the Great Depression.

According to Huffman and Lothian (1984), unexpected monetary shocks that affected real income in one country, in turn were transmitted via specie flows (and short-term capital flows) to the money supplies of other countries, and then to real activity. The gold standard thus served to transmit the business cycle from country to country. Evidence for this view is based on Granger causality tests over the period 1833 to 1933.

Choudhri and Kochin (1980) in a comparison of the experience of a number of small European countries during the Great Depression (1930-33) found that only Spain, a country which maintained flexible exchange rates with the gold standard world, was successfully insulated from the Great Depression. Dividing their sample of countries into: (a) countries which maintained the fixed exchange rate gold standard throughout the depression — The Netherlands, Belgium, Italy and Poland; (b) countries which left gold in 1931 with the U.K. — Norway, Denmark and Finland; and (c) Spain, they regressed real output and the price level for each country on U.S. real output and the price level. The results showed a strong influence of the U.S. depression on the gold standard countries, Spain completely unaffected, and the other countries in depression until they cut the link with gold in 1931.

Eichengreen (1987a) provided evidence that the national gold policies of the U.S. and France were a key cause of international monetary contraction. Based on a pooled cross-section time series regression of the demand for

international reserves for 24 countries, he showed that U.S. and French gold policies reduced available gold reserves to these countries by one half. Furthermore, the effects of these policies on the worldwide demand for reserves far outweighed the effects of a shift in liquidity preferences, in the wake of the international financial crisis of 1931, away from holding reserves in the form of foreign exchange.

However, Fremling (1985) challenged Friedman and Schwartz's view that the Great Depression was transmitted from the U.S. to the rest of the world during the period 1929-31 as evidenced in an increase in gold inflows and the monetary gold stock. According to her, gold inflows to the U.S. and an increase in U.S. gold reserves did not necessarily mean that other countries were losing gold. Gold mining as well as conversions of existing private gold stocks into currency could have raised total world reserves.

She presented evidence that from August 1929 to August 1931, gold reserves in the rest of the world increased from \$6.3 to \$6.7 billion versus \$3.9 to \$4.9 billion in the U.S. Furthermore, though holdings of foreign exchange in the rest of the world declined it was insufficient to offset the increase in gold. Rates of change of the total currency stock and gold reserves in the U.S. compared with the rest of the world indicate that the rest of the world also engaged in significant sterilization. Thus to the extent the Great Depression was transmitted internationally, other countries as well as the U.S. must have played a significant role.<sup>41</sup> However, Fremling's analysis considers only aggregate behavior, not the one-to-one relations of the U.S. in acquiring gold and each country losing gold.

Thus, with the exception of Fremling's study, the evidence is overwhelming in favor of the contention in A Monetary History that the Great Depression was spread internationally by the gold standard. Other forces, both real and monetary, however, also played a role in the international transmission of the Great Depression.<sup>42</sup>

### 5.5 The New Deal Monetary Standard

The New Deal produced major changes in the monetary standard.

A silver purchase program designed to aid the domestic silver industry was instituted at the same time as the gold purchase program.

Brandt and Sargent (1987) reinterpreted the Chinese silver purchase episode. According to Friedman and Schwartz, the increase in the price of silver led to an appreciation of the Chinese yuan, a decline in exports, a rise in

imports, a fall in the monetary silver stock, a fall in the money stock and hence falling prices and output. Brandt and Sargent provide new evidence that though prices fell and the monetary silver stock declined, inside money (private bank notes and deposits) increased, so that the total money supply increased. Also according to them, that real output did not fall.

They view China as a small open economy under the specie standard following a real bills policy (Sargent and Wallace 1982). As a small open economy, China took world prices as given, and by discounting only real bills the private banks ensured convertibility of the currency into specie. Banks issued private notes backed by government securities. Because the securities were backed by future taxes, the authors argue that they can be treated as equivalent to real bills. Because China had a vertical Phillips curve real output did not contract, as a result of the deflation produced by the U.S.-induced rise in the price of silver. The increase in inside money reflected intermediation by the private banks attempting to capture the real resources tied up in a commodity money. The reason given for China's departure from silver and conversion to a fiduciary standard in 1935 was that the government wanted to capture the social saving from issuing paper money for itself.

The paper suffers from a number of serious shortcomings. First the timing of the regime change in 1935 is consistent with Friedman and Schwartz's explanation that it was purely a reaction to the silver purchase policy. Second, a closer examination of the evidence presented reveals that real output did decline from 1931-1934. Third, Tamanga (1942) showed that most bank loans were made on real estate collateral, a far cry from real bills. It is not certain that inside money in fact increased, as Brandt and Sargent contend. Some evidence exists that suggests declining operations by native banks. Modern banks, for which they provide estimates, may simply have replaced the issues of the native banks that no longer operated.

6. CONCLUSION: THE LEGACY OF A MONETARY HISTORY

A Monetary History of the United States has spawned a vast literature in economic history. Much of the literature has either corroborated or extended themes raised by Friedman and Schwartz.

Their views on the timing of resumption, on the implications of a hypothetical bimetallic standard for price stability in the last third of the nineteenth century, on the defects of the theory underlying the Federal Reserve Act, and on the regime change following establishment of the Fed have all been reconfirmed by subsequent researchers applying newer techniques and more recently available data sources.

A number of controversies, however, still remain unresolved. The role of "news" in the greenback era; whether the Hume price-specie-flow-mechanism or the monetary approach better explains balance of payments adjustment under the classical gold standard; whether the Fed really smoothed the seasonal in interest rates and moreover whether its establishment explains an observed change in the stochastic pattern of interest rates around the world; the mechanism of banking panics; whether commercial banks in the 1930's faced a liquidity trap in excess reserves or a shift in liquidity preferences; whether the Fed subordinated itself to the Treasury in the 1930's and 40's, or was acting as a revenue maximizing bureau; and whether the bond price support program was an engine of inflation or an example of a Barro-Gordon rule.

On one important issue, the literature disagrees with the Friedman and Schwartz position — whether Federal Reserve policy was inconsistent before and after 1929. The archival evidence marshalled by Wicker, Brunner and Meltzer, supplemented by Wheelock's econometric evidence makes a strong case for the position that the Fed followed the flawed Burgess-Riefler-Strong doctrine throughout the 1920's and early 1930's. The reason for the Fed's failure to conduct expansionary monetary policy 1929-31 was that based on its indicators — the level of member bank reserves and market interest rates — it believed conditions were easy. However, as Wheelock points out the shift in structure of the Fed after Benjamin Strong's death likely worsened things, in accord with Friedman and Schwartz's position, as it weakened the influence of individuals who had the ability and understanding to depart from the flawed strategy.

Finally, a number of episodes have not yet been reassessed by a later generation of scholars. One is the post-1951 period, which Friedman and



Schwartz regarded as a decade of monetary tranquility in a turbulent era. Why was that period so special?

The legacy to economic history of A Monetary History is not simply that its scholarly and thought-provoking reinterpretation of U.S. monetary history has generated a growth industry of scholarly papers. The legacy also stems from the novel way in which Friedman and Schwartz presented monetary history from the perspective of the relationship between the stock of money and the rest of the economy. This interweave between monetary theory and economic history has changed the way monetary history is approached around the world. The analytical framework of the modern quantity theory underlying the book — modified and expanded to incorporate newer theoretical and empirical techniques — has been applied to the experiences of numerous countries over vast ranges of history.

Before A Monetary History monetary history was dominated by the study of the development of financial and monetary institutions, the conduct of monetary policy, and the anatomy of financial crises. A number of monetary theorists used historical examples to illustrate particular monetary theories, e.g., Fisher (1911), Keynes (1930), Warburton (1952). Some historians applied the quantity theory to explain episodes of inflation, e.g., Hamilton (1934) and White (1980). Friedman and Schwartz were the first authors to consistently apply a set of theoretical tools to the monetary history of a major country over close to a century, spanning numerous institutional changes and monetary disturbances.

In addition, the data on the money stock, its components and other aggregates compiled in A Monetary History and in the two companion volumes, has proved and will continue to prove invaluable to both historical and applied research in monetary economics.

By calculating the hypothetical effects on the money stock of a one-billion-dollar-open-market operation at various watersheds during the Great Contraction, the authors pioneered in the posing of counterfactual questions — an important tool of economic history — even before Robert Fogel's (1964) renowned study of the impact of the railroads on U.S. economic growth.

The unique portrayal of the historical circumstances of monetary disturbances, and of alternative institutional arrangements as background conditions serve the monetary economist with the closest thing to a laboratory experiment. The book's example has become an important tool of modern macroeconomic research.

In the dark age of vector autoregressions where it is no longer possible to identify truly causal relationships, turning to the record of history provides a beacon of light. A Monetary History has shown the way.

## FOOTNOTES

\* For helpful comments and suggestions, I would like to thank George Benston, Bennett McCallum, Allan Meltzer, Hugh Rockoff, Anna Schwartz and Geoffrey Wood. Able research assistance was provided by Ivan Marcotte.

<sup>1</sup> However the reviewers all had critical comments to make. Clower criticized their methodology for its opaqueness, Tobin was highly critical of their treatment of the long-run behavior of velocity and of their explanation for excess reserves in the 1930's Brunner (1965) also criticized the treatment of excess reserves and, along with Meltzer, the lack of an explicit model of the money supply process.

<sup>2</sup> See Price (1961). Also see Bordo and Landau (1979) for earlier evidence on the pattern of citations in economic theory.

<sup>3</sup> There has been only limited attention paid to the inflation of 1897- 1914. See Schwartz (1973) for an excellent summary of worldwide historical evidence consistent with the view presented in A Monetary History that sustained rises in the price level are closely associated with money growth in excess of the growth of real output.

<sup>4</sup> In a similar type of argument, Calomiris and Hubbard (1986) attribute economic contraction in the pre-1914 period to credit rationing in the face of deflationary shocks.

<sup>5</sup> See Calomiris and Hubbard (1987).

<sup>6</sup> Based on Granger causality tests between the unexpected shock component of failed business liabilities and a proxy for consumption (pig iron production) and a measure of losses on deposits.

<sup>7</sup> It also should be pointed out that there were numerous arrangements available short of complete restriction. Thus, for example, in the 1930's banks would pay out part of a withdrawal and then pay interest on the remainder.

<sup>8</sup> This section draws on Bordo (1986).

<sup>9</sup> Friedman and Schwartz (1963 a, b) recognize the possibility of influences running from income to money but present evidence that for major contractions the influence from money to income clearly dominates.

<sup>10</sup> The sample underlying Gordon and Wilcox's simulations covered only a limited number of observations of business cycles, Lothian (1981) noted. In regressions based on annual money and income data over the period 1893-1928, money explained a substantial proportion of the fall in income until 1930 and all of the decline in the decade of the 1930's.

Lothian also compared the experiences of the U.S. and the U.K. in the depressions of 1920-21 and 1929-33, presenting evidence that the cycles in both countries had monetary origins and that monetary factors explained their severity and duration. For money to be passive, he added, some factor other than monetary growth must have varied in the same way between the two countries to explain their different cyclical performances, yet no one had produced such evidence.

Meltzer (1981) denied that the monetary base could have been caused by feedback from income because (a) banks rarely borrowed from the Federal Reserve; (b) there was little evidence of a strong influence coming through the balance of payments; and (c) Fed open market policy did not respond much to movements in income.

<sup>11</sup> Trescott (1984) found that Boughton and Wicker's demand for currency regression was unstable when divided at February/March 1933 and at January 1924. When the pre-1924 and post-March 1933 periods are removed (the first period, according to Trescott (1982), representing a different policy regime, the second dominated by the Bank Holiday), the regression showed bank failures to have been the key cause of the rise in the currency-deposit ratio 1930-33.

<sup>12</sup> Wicker regarded the failure of the Bank of United States in December 1930 as localized in New York City, contributing little to an increase in the bank failure rate elsewhere in the country.

The banking panic of 1930 according to Wicker (1982) was unique in that it originated outside the New York money market and had no discernible effects on interest rates except in local markets. Its only effect appeared to be a decline in expenditure in the St. Louis Federal Reserve District (the district containing most of the affected banks) that was induced by a reduction in bank debits.

<sup>13</sup> Also see Gandolfi and Lothian (1979) and Schwartz (1981). Although Boughton and Wicker (1984), found interest rates to be a significant determinant of the deposit-currency ratio, they were doubtful that the elasticity was large enough to justify Temin's claim.

<sup>14</sup> See also Schwartz (1981), p. 20 and Meltzer (1976), who argued that an implausible implication of Temin's position is that if the economy was characterized by an excess supply of money, excess supply of goods and labor, therefore by Walras' Law there would have been an excess demand for securities.

<sup>15</sup> Also see Temin (1983).

<sup>16</sup> See Bordo and Schwartz (1977), p. 102.

<sup>17</sup> Anderson and Butkiewicz (1980) obtained similar results using quarterly data.

<sup>18</sup> Streefkerk (1983) constructed a rational expectations based model of the Great Depression in the U.S. which, following the approach of Brunner, Cukierman and Meltzer (1980), distinguishes between temporary and permanent shocks. His preliminary results are consistent with the Schwartz account.

<sup>19</sup> Hamilton (1987b) reinterpreted this episode and the 1931 gold drain as examples conducive to analysis by the speculative attack models developed by Garber and Flood (1982) and others.

<sup>20</sup> Bessler (1985) tested Warren's (1935) hypothesis that leaving the gold standard and allowing the price of gold to rise would immediately raise the price of traded goods and hence the price level. Bessler found, based on innovation accounting from vector autoregressions with weekly data, that gold prices in 1933 Granger caused key agricultural commodities prices, with a very rapid response.

<sup>21</sup> Cagan (1965) calculated the rate of return on issuing national bank notes as the ratio of the net interest income earned on the bonds purchased with the notes issued (net of the costs of note redemption, cash reserves on the notes at the Treasury, and a small tax on the note issue) to the amount of capital tied up in acquiring the bonds — the difference between the market price and the amount of notes issued. He found rates of return comparable to those on other assets over the period 1875 to 1913 except for the late 1880's. By 1900, the rate of return was close to 25%. For Cagan, the puzzle was to explain why at such high rates of return less than 60% of eligible notes were issued.

<sup>22</sup> Canova (1987), who used a model of stochastic seasonality based on spectral methods, found that the interest rate seasonal wasn't eliminated in 1914. He attributed the reduction in banking panics after 1914 to the Fed's ability to offset foreign-induced shocks to the money supply. Also see Dewald (1972) for evidence against a reduction in the seasonal, and Wheelock (1987) who found no evidence of any change in interest rate and bank reserves seasonals after 1929.

<sup>23</sup> Friedman and Schwartz saw an inconsistency between the two founding principles in that the gold standard effectively limited money issue whereas the real bills doctrine did not. See Mints (1945). Sargent and Wallace (1982) constructed an overlapping generations model for a small open economy under the gold standard, which they argue was consistent with the real bills doctrine

of Adam Smith. However, Laidler (1983) saw little relevance of their model to Smith's treatment of the real bills doctrine or the gold standard.

<sup>24</sup> However, Toma (1987) demonstrated, based on vector autoregressions and monthly data, that the Fed could not have conducted countercyclical open market operations during the 1920's because such operations were fully offset by changes in member bank borrowing which left Federal Reserve credit constant.

<sup>25</sup> Epstein and Ferguson (1984) disagreed that the reason the Fed conducted large open market purchases in early 1932 was because of Congressional pressure. It did so because the rise in the discount rate in October 1931, by reducing bond prices, threatened the solvency of many large banks, which put pressure on the Fed to act. The reason for early abandonment of the program was declining short-term yields which squeezed the earnings of many large commercial banks (they had shifted their portfolios from long-term to short-term bonds as a reaction to the preceding liquidity crises). According to the authors, it was no accident that Governor MacDougall of Chicago and Governor Young of Boston were the chief opponents of open market purchases. These were two key districts whose member banks had the highest ratio of investments to loans and the lowest net earnings.

<sup>26</sup> Wicker also disagreed with Friedman and Schwartz's view that domestic rather than international considerations dominated policy in the 1920's. His interpretation of the evidence was that in 1924, the majority of governors voting for expansionary open market policy did so because of a desire to build up the security holdings of the Fed to be used to offset a future inflationary gold inflow. In addition, Strong wanted to reduce the interest rate differential between London and New York to help Britain return to gold. International considerations also predominated in 1927 according to Wicker. By contrast, in 1930, the gold standard was not in danger, hence little need was seen for expansionary policy. Brunner and Meltzer's (1968) interpretation of the record disputes Wicker's emphasis on international factors. Their critique is buttressed by the insignificant influence of several international variables in Fed policy reaction functions that Wheelock estimated (1987).

<sup>27</sup> Wheelock used a longer sample period than Trescott used, and constructed separate reaction functions for each of the Fed's policy tools, whereas Trescott focused only on the Fed's open market holdings, and conducted formal stability tests. His application of stability tests to Trescott's model showed no change in policy in 1929.

<sup>28</sup> For a discussion of the influence of the small unit bank lobby on U.S. banking legislation before 1929, see White (1983).

<sup>29</sup> See Friedman and Schwartz, footnote 22, pp. 443-4 for a similar view. Also see Schwartz (1979). For evidence that the paying of interest on demand deposits did not lead banks to engage in riskier investments than otherwise, see Benston (1964).

<sup>30</sup> White (1986) effectively argues that investment banking activity by the commercial banks during the 1920's did not impair their balance sheets.

<sup>31</sup> There is overwhelming evidence against a liquidity trap in the demand for money during the 1930's. See e.g., Gandolfi (1974), Gandolfi and Lothian (1976), and the studies surveyed in Laidler (1985). Brunner and Meltzer (1968) provided evidence against a liquidity trap in bank excess reserves.

<sup>32</sup> Based on a regression using annual data 1947 to 1979 of changes in real Federal Reserve expenditures on the Fed's open market wealth, a measure of the Fed's nonmonetary output, and a wage variable.

<sup>33</sup> The 1947 agreement between the Fed and Treasury to eliminate the 3/8% ceiling on short-term rates was not a reflection of the Fed's concern with inflation, as argued by Friedman and Schwartz, according to Toma (1982). Instead according to the theory of bureaucracy, it served to eliminate a program which made short-term bonds as good as money. The agreement caused banks to increase excess reserves, reduce the deposit-reserve ratio and hence the money multiplier, thereby raising the Fed's share of inflation tax revenue. Further, according to this interpretation, the Fed's decision in 1947 to turn over a fraction of its open market revenue to the Treasury was in exchange for the Treasury's agreement to eliminate the ceiling on short-term rates. At the same time, the transfer served to prevent an attempt by Congress to capture some of the inflation tax revenue earned during World War II.

<sup>34</sup> According to Officer the wholesale price series Kindahl and Friedman and Schwartz used is flawed by double counting, the omission of services, and the overweighing of imports.

<sup>35</sup> Indeed the annual growth rate of Berry's real GNP series of 4.2 percent from 1869-1879 is almost identical to Friedman and Schwartz's refined estimate (1963, Table 3, p. 39) of 4.3 percent.

<sup>36</sup> See e.g., Cagan (1965).

<sup>37</sup> Calomiris and Hubbard (1987) provide further evidence of commodity and capital market arbitrage. They calculated allowable bandwidths between U.S.

and British prices of selected commodities consistent with arbitrage, finding the actual price movements fall within the range. Evidence for capital market integration is based on triangular arbitrage between U.S. and British high-grade commercial paper rates and bills of exchange.

<sup>38</sup> Aghelvi's (1975) evidence for the U.S. during this period that anticyclical movements of the balance of trade dominate procyclical movements of net capital flows supports the Friedman and Schwartz rather than the monetary approach model.

<sup>39</sup> Garber (1985) treated dollar bonds under bimetalism as a type of option allowing the holder to receive on maturity either gold or silver, whichever metal's price had increased relative to the official price. Calculation of the option value of bonds during the period 1818-1896 provided evidence on the probability the market attached at various times to a switch between silver and gold.

<sup>40</sup> Also see Timberlake (1978a) who made a similar argument without the simulations.

<sup>41</sup> Hamilton(1987a) notes that the fact that net gold flows went to the U.S. still supports Friedman and Schwartz. Also it is not clear from Fremling's argument why it should matter if the sources of gold are private or official.

<sup>42</sup> See eg., Meltzer (1976), Brunner (1981) and Saint Etienne (1984) on the importance of the Smoot-Hawley tariff, Eichengreen (1987b) for the counter view. Eichengreen (1987c) assesses various monetary and nonmonetary explanations, downplaying virtually all except the consequences of U.S. and French contractionary gold policies.



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