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EXPLORATIONS IN MONETARY HISTORY: A SURVEY OF THE LITERATURE

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ABSTRACT

Explorations in Monetary History: A Survey of the Literature

Monetary economists have long been interested in economic history as a laboratory for the testing of theory. This paper surveys recent work in monetary history within the context of the modern quantity theory of money and the new classical macroeconomics. Topics surveyed include: the development of historical monetary statistics and the determinants of money supply and money demand; historical uses of Granger-Sims causality tests of the relationships between money, prices, and output; historical studies of the secular behavior of velocity; the Great Depression; financial crises; historical evidence for the long-run and short-run neutrality of money; the domestic and international aspects of monetary standards. The paper concludes with an evaluation and an agenda for future research.

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Monetary economics has always been fascinated with monetary history. Indeed historical examples have been used by monetary economists since the early beginnings of the subject. The extensive use of history can be traced back to the work of R. Cantillon (see Bordo 1983) and even earlier (see Bernholz 1982). History has been so widely used because it provides the closest thing to a laboratory experiment for the economist. For the monetary economist, unusual monetary disturbances such as gold discoveries and hyperinflations, unique institutional arrangements such as free banking and unique monetary standards such as bimetallism, provide the raw materials for the testing of theories.

While theorists have used history as a testing ground, policy advocates have long cited the historical record to make their case (e.g. the recent debate over restoring the gold standard, Schwartz 1982 or the recent case for free banking, Rolnick and Weber 1983).

Specifically, the debate over the quantity theory of money--whether monetary or real forces explain movements in the price level--has long focused on the historical record of monetary disturbances. Such interest can be traced back to the Bullionist debate in early nineteenth century England over the causes of inflation and exchange rate depreciation during the suspension (see Viner 1937), to the debate between Tooke/Newmarch and Jevons/Cairnes in the mid-nineteenth century on the effects of the Californian and Australian gold discoveries (Bordo, 1975), to the competing views on the quantity theory of Laughlin and Fisher at the turn of the century (Girton and Roper 1978), to the debate over the sixteenth century Price Revolution (Hamilton (1934), Ramsey (1971). More recently interest has focused on the modern quantity theoretic explanation of the Great Depression (Friedman and Schwartz, 1963a and Temin 1976) and of hyperinflations (Cagan 1956), and finally the emphasis by the new classical macroeconomists on regime changes (Sargent 1982). Discussion about the monetary standard, whether fiduciary or commodity, monometallic, or bimetallic has always centered on the historical evidence.

Finally, the case for and against government intervention in the provision of money--the role of central banks and discretionary monetary policy--has long been intimately linked to history.

Much of the recent work in monetary history follows this tradition. History is used as a laboratory for testing postulated relationships between the money supply, the price level and real output in both closed and open economies. In addition, the interest by new classical macroeconomists in identifying changes in monetary regimes--where the effects on the price level and real output can be clearly identified--has led to research on the ending of hyperinflations and on the performance of alternative monetary standards.

Monetary economics has also been closely linked to monetary history because historical examples provide a way of dealing with the related problems of reverse causality and the endogeneity of the money supply. While there is a strong theoretical presumption that changes in the money supply impact on real economic activity, there also is an argument for feedback to the money supply from the real economy via the money supply multiplier, the central banks' reaction function, and the balance of payments (under fixed exchange rates). Identifying historical periods where a strong case can be made for an exogenous money supply, e.g., periods of rapid emission of paper money and floating exchange rates, provides a dimension of evidence supplementary to that of conventional econometric testing (the use of structural reduced form models, vector autoregressions, and Granger-Sims causality tests). Indeed if a strong case can be made for the effects of monetary disturbances on prices and real output under special (clearly identified) historical circumstances of exogeneity, then the case for an influence of money on prices and output in other (more normal) periods is strengthened.[1]

The focus of this survey is on historical research in the past decade on the relationships between the money supply, velocity, the price level and real output, within given economies and across economies. In addition, historial research deals with the role of monetary standards/regimes in the relationships. The choice of topics has been dictated by the attention paid to recent theoretical developments in

the modern quantity theory of money and in the new classical macroeconomics. Focus on macro relationships unfortunately precludes an examination of the fascinating literature on the more micro aspects of topics, such as banking history, regulation, financial integration, financial innovation and financial development. These topics may be the subject of a future survey.

Scope of the Study

This survey covers journal articles in a number of key journals in economic history, monetary economics, and general economics and selected books and conference volumes. Most of the literature is cliometric, using economic theory and econometrics to establish and test hypotheses. The time period of the survey is roughly 1976 to the present. This time span complements an earlier survey (1977) by the author and Anna J. Schwartz covering the period from 1956 to 1976. That earlier study surveyed about 75 items. The present study which covers less than half as many years as the earlier one surveys close to 200 items. Such an explosion in the literature likely reflects both a growing interest in monetary history per se and continuing interest by monetary economists in monetary history as a testing ground for monetary theory.

Organization of the Study

Section II provides the theoretical background to the historical survey. It briefly reviews the principal elements of the modern quantity theory as well as recent developments of the new classical macroeconomics. Section III presents seven interrelated subjects summarizing recent monetary history.

Development of historical monetary statistics and the determinants of money supply and money demand for the U.K. and other countries is the first subject. The second subject examines some historical uses of Granger-Sims causality tests of the relationships between money, prices, and output. Historical studies of the long-run relationship between nominal income and money--the secular behavior of velocity--are the third subject. The historical literature on the effects of one of the most severe, widespread, and well documented monetary disturbances of the real economy--the Great Depression--is the fourth subject

Fifth and closely related to the fourth is a discussion of very short-run monetary disturbances--financial crises. The sixth focuses on the extensive historical literature on the relationship between the money supply and the price level--evidence for the neutrality of money in both the short run and the long run. The final subject deals with the domestic and international aspects of monetary standards. Section IV suggests an agenda for future research.

II. Theoretical Issues for Monetary History

This section briefly reviews the principal tenets of the modern quantity theory as theoretical background to the historical survey. It also includes recent developments of the new classical macroeconomics that impinge on historical research.

II.1. The Modern Quantity Theory

Money, Income, and Prices

Much of the recent work in monetary history reflects concurrent trends in monetary theory. A key theme in the literature is historical evidence for and against the modern quantity theory of money. 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. (Friedman and Schwartz, 1982)

Thus, according to the modern quantity theory of money, sharp declines in economic activity such as the Great Depression of 1929-33 are caused by monetary contraction, while long-term sustained movements of the price level, which characterize many episodes in monetary history, are determined by the growth of the money supply relative to the long-run trend growth of real output.

Rules vs Discretion

Modern quantity theorists have long argued the case for monetary rules over discretionary policy. The case made by Friedman (1948) (1953) against discretionary stabilization policy is based on the

difficulty of timing and calibrating the appropriate stabilizing policy action. Though Friedman (1960) advocated a rule whereby money growth would be set at a predetermined rate equal to the growth rate of real output, adjusting for secular growth in velocity, others, e.g., (Hall 1982), in recent years have argued the case for commodity standards such as the classical gold standard and for competition in the provision of money (Hayek 1976).

The Open Economy

Theory has focused on the monetary nature of the relationships between different economies. The monetary approach to the balance of payments (MABP) and the exchange rate (MAE) is an extension of the classical price-specie-flow mechanism incorporating the modern quantity theory notion of a stable demand for money. Under fixed exchange rates according to the MABP (see Frenkel and Johnson 1976) the balance of payments is determined by excess demand or supply in the money market. Under flexible exchange rates according to the MAE (Frenkel and Johnson 1978), the exchange rate is determined by relative excess demands (supplies) in two countries. In addition, the insulating properties of alternative monetary standards has been examined. Under fixed exchange rates the monetary standard closely links the price levels and real outputs of different countries while a flexible exchange rate provides insulation against monetary and (some) real shocks.

II. 2 The New Classical Macroeconomics

Rational Expectations: Short-run vs. Long-run Neutrality

Recent advances in the treatment of expectations have revised perspectives on the relationship between money, prices, and output. In contrast to the modern quantity theory which postulates the long run neutrality of money, the rational expectations view also makes the case for neutrality in the short run.

According to the rational expectations hypothesis (REH), economic agents act rationally with respect to the gathering and processing of information, just as they do with respect to any other

activity (Muth 1961). This proposition implies that agents will not make persistent forecast errors. A stronger variant of the REH postulates that private agents form expectations about the rate of inflation based on their understanding of the economic model that generates the inflation rate, as well as on the policy rule followed by the monetary authorities. A consequence of this view, is that if expectations of inflation are formed rationally, then real output cannot diverge from the natural rate, and monetary changes which are expected will be fully reflected in prices. Only unexpected monetary change can affect real output. That view is labelled the rational expectations version of the natural rate hypothesis. It conflicts with an earlier statement of the natural rate hypothesis by Friedman (1968), based on adaptative expectations, which argued that before agents have fully adjusted their expectations of inflation to the actual rate of inflation, output could diverge from the natural rate.

The Lucas Hypothesis

One popular variant of a rational expectations model that can explain a positively sloped short-run aggregate supply curve (violation of neutrality) is the Lucas hypothesis (1973). In its simplest terms the Lucas hypothesis argues that deviations of real output from trend (the natural rate) are produced by deviations of the price level from the expected level. If the price level is greater than expected, agents supply more output because part of the higher price level is misperceived as a possible change in relative price. Furthermore, the hypothesis argues that the greater is the variance of the price level the greater the probability that agents would misperceive a given change in prices as representing a change in relative prices.

The Importance of Regime Changes

It has been pointed out by Sargent (1976) and others that it is hard to distinguish tests of the rational expectations version of the natural rate hypothesis (based on regressions of output (employment) on measures of expected and unexpected monetary growth, see e.g. Barro (1977) and Barro

and Rush (1980)), from more traditional approaches.[2] For Sargent, the only way to test a refutable hypothesis is to be able to isolate periods involving a clear-cut change in policy rules (the regime).

A successful regime change occurs when the public believes the authorities have changed the policy rules. Thus, e.g., a shift from a regime of unbacked fiat money to one of a gold standard and a balanced budget, such as occurred at the end of hyperinflations, would be incorporated into the expectations of rational agents. In such a case rapid monetary deceleration would only impact on prices.

Credibility and Monetary Rules

In an important article, Kydland and Prescott (1977) have demonstrated that discretionary policy, defined as reacting to the current situation, holding everything else constant, will always lead to a dynamically inconsistent result because of the reaction of rational agents. Thus the monetary authorities, maximizing an objective function concerned with maintaining full employment or reducing the real value of the debt, would hope to achieve its objectives by expanding the money supply and raising the inflation rate. However private agents with rational expectations will quickly catch on to this policy and adjust their expectations of inflation accordingly. The outcome will be an equilibrium with a positive rate of inflation and no change in either real output or the real value of the debt.

Such behavior can be prevented by establishing a rule limiting the authorities' discretion. However, once such a rule is established and the public comes to believe it, there still exists an incentive for the authorities, maximizing some objective function, to violate the rule. When the public recognizes what is happening, the rule breaks down. Thus, according to Barro and Gordon (1983a, b), what is required is to establish an enforcement mechanism to prevent violations of the rule and to ensure credibility.

Monetary history has been concerned with testing mainly propositions of the modern (and more traditional versions of) quantity theory but recently also propositions of the New Classical macroeconomics---specifically the role of regime changes during hyperinflations and the Lucas hypothesis. In what follows we survey the historical literature within the macro framework of money, prices and output.

III. Historical Studies

III.1 Monetary Studies of the U.K. and Other Countries

In this section we review new monetary statistics for a number of countries and especially for the United Kingdom, an important country for which the most extensive research has been undertaken. Compilation of monetary statistics is crucial for establishing the links between money, prices, and output. In addition, we review historical studies of two elements essential to the understanding of the links; the money stock and its proximate determinants; and the demand for money.

Research in monetary history in the past three decades has concentrated on the U. S. experience. One reason was the availability of reliable data on the U.S. money supply and its components since the publication by Friedman and Schwartz in 1963 of A Monetary History of the United States. For most other countries, until quite recently, the lack of availability of good data has hampered research, especially so for the U.K. before 1914 when it dominated the world monetary system, a period characterized by rapid development of the banking system, and by important monetary controversy. Since commercial banks were not required to publish their balance sheets until the twentieth century, money supply series have not been readily available owing to the absence not only of deposit data but also of reliable currency series. Researchers have been forced to use benchmark estimates of gold coin by Jevons, Palgrave, and others and then to account for changes between benchmarks due to minting, exports, and imports.

Although early attempts were made to construct a money supply series for the U.K., e.g., Tinbergen (1951) and Higgonet (1957), D. K. Sheppard (1971) was the first to construct a consistent series extending back to 1880. To derive a deposit series, Sheppard as well as Tinbergen and Higonnet

used the Economist Banking Supplement which began in 1877. The Economist series suffers from a number of crucial deficiencies of which the chief one is that it provides a record only of those banks reporting their accounts. Since an increasing number of banks began to publish their statements in each year, a misleading impression is given of rapid growth in deposits.[3]

Subsequent to Sheppard's study, Nishimura (1973) put together a deposit series for the 1870's based on sources free from some of the defects of the Economist-based series.[4] Bordo (1981a) constructed a money supply series for the U.K. 1870-1914 by linking Nishimura's deposit series, which ends in 1880, with Sheppard's series, and by estimating a new currency series for the period 1870-80 by extending Sheppard's series backwards.[5, 6] Finally, Collins (1983) constructed new estimates for a five-yearly average for the period 1835-80 of commercial bank liabilities and numbers of banks and branches based on data from the archives of the London Clearing banks.

To remedy defects of existing estimates, Capie and Webber (1985) systematically reconstructed the U.K. monetary data from its smallest subcomponents. The essentially new series constructed for the 1870-1921 period is then spliced on to existing series from 1922 to the present. Based on The Bankers Almanac, Economist Banking Supplement and other sources, a comprehensive list of every bank (both private and joint stock) including branches and dates of operation is given. This roster accounts for the problem of mergers and increases the number of recorded banks not included in other studies for which estimates are provided.[7]

Relating the new U.K. money supply series to real output over the period 1870-1913 affects the interpretation of U.K. monetary history (see Capie and Rodrik-Bali 1983a). The finding that money growth was deficient in relation to real output growth in the Great Depression of 1870-1895 whereas it was excessive in relation to real output growth in the 1896-1913 period is interpreted as sympathetic to the 'monetarist' rather than 'realist' interpretation of late nineteenth century British monetary history.

Following the approach of Cagan (1965) Capie and Rodrik-Bali (1983a) calculated the proximate determinants of the money supply. Over the entire period 1870-1914 the reserve-deposit ratio rose slightly, tending to reduce money growth. This paradoxical result in the absence of any financial crises is explained by a shift from smaller to larger banks which held larger reserves. The currency-deposit ratio declined over the period because of increasing opportunities for holding deposits attested to by growth in bank offices per capita. In sum the two ratios accounted for 30% of U.K. monetary growth, high-powered money accounting for the remaining 70%.

Over the cycle, as in Cagan's study, the reserve-deposit ratio varied countercyclically and as in Cagan's study the currency-deposit ratio increased in the latter part of the upswing and the first half of the downswing. The determinants of its movements are real output, the time deposit rate, the rate of price change, and previous years' bank failures. High-powered money moved procyclically--one would expect under a specie standard that gold flows would be countercyclical reflecting a deteriorating trade balance--but this was offset by Bank of England actions to defend its reserves and by the influence of rising income that increased the demand for monetary gold.

Finally the new money supply series are used to estimate a demand for money function for the 1870-1913 period (Capie and Rodrick-Bali (1983b)). To overcome difficulties of identifying a money demand function under fixed exchange rates when the money supply is endogenous, following the approach of Hendry (1979) and Mills and Wood (1982), Capie and Rodrick-Bali estimated a money adjustment process, showing the adjustment of money holding to changing conditions affecting money demand. The demand function is found to be stable between the 1870-95 and 1896-1931 periods.

Other Countries

Scholars have assembled money supply series and proximate determinants for diverse countries following the approach of Friedman and Schwartz and Cagan. Some have estimated stable long-run money demand functions following the approach of Chow (1960), Laidler (1966), and others. The studies

by country include: Canada, Patterson and Shearer (1985), data on the money supply and its components 1842-71; Sweden, Jonung (1976), on the proximate determinants of the Swedish money supply 1870-1970, Jonung (1978), on the long-run demand for money, Lybeck (1975), on the long-run demand for money function; Norway, Klovlund (1978), data on the Norwegian money supply 1870-1970, and Klovlund (1982), the Norwegian demand for money function in the interwar period; Italy, Spinelli (1980) on the long-run demand for money function 1870-1970; France, Saint Marc (1983), data on the French money supply and its determinants 1800-1980; Germany, Tilly (1973), data on the German money supply and its determinants 1870-1914; Australia, Butlin, data on the Australian money supply (1971).

III.2 Money and Income: Causality Tests

Recently historical studies have applied Granger (1969) and Sims (1972) causality tests to determine whether monetary forces were the primary cause of movements in nominal income, prices and real output as postulated by the modern quantity theory of money, or whether movements in money are primarily determined by feedback from the economy to the money supply as has been frequently argued by critics of the modern quantity theory of money approach (see e.g., Tobin (1970) and Kaldor (1970)).

Causality in the Granger sense means that X causes Y if past values of X significantly affect Y, once past values of Y have been accounted for. The Sims test is to regress Y on both past and future values of X. The coefficients on the future values of X should prove insignificant if the conclusion is that X causes Y.[8, 9]

Brillembourg and Khan (1979) applied Sims' test for the direction of causality between the money supply, nominal income, and prices for the U.S., 1870-1975. For the whole period they show undirectional causality from money to income and prices, results which confirm the long-run propositions of the modern quantity theory. At the same time money and real output are contemporaneously correlated. Breaking the entire period into 3 regimes they find that under the classical gold standard, 1870-1913, money caused both nominal income and prices with a contemporaneous relationship between money and real output. For 1914-45 the relationships between money and each of nominal income, prices, and

output are all contemporaneous. Finally for the postwar period 1946-75 money caused nominal income with no relationship between money and prices and money and output.

Mills and Wood (1978) conducted Sims causality tests for the U.K. 1870-1914, finding that output Granger-caused money. This result they interpret as consistent with the operation of the gold standard fixed-exchange rate regime where the money supply is endogenous with gold flows largely determined, according to the monetary approach to the balance of payments, by output induced movements in money demand.[10]

Huffman and Lothian (1980) found that U.K. high-powered money (H) for the period 1837-70 Granger-caused nominal income but little evidence that gold flows determined H. The importance of domestic determinants of H suggests that before 1870 Great Britain was a relatively large economy with the gold standard primarily a British standard. In the period 1870-1914 they found two-way causality between H and nominal income, with stronger links from income to H but neither significant. These results differ from the Mills and Wood finding of a link from nominal income to money, according to the authors, because of a likely feedback from income to the money multiplier (the reserve-deposit ratio) reflecting the Bank of England's response to foreign-induced gold flows.

Dwyer (1983) conducted Sims tests between the money supply, prices, real output and interest rates for the U.K. 1870-1913 based on multivariate vector autoregressions. He found prices and interest rates to be unrelated to past values of real output and the money supply. These results suggested to him that the U. K. under the gold standard was a small open economy. Other tests for exogeneity of real output led him to conclude the money supply was demand-determined--results consistent with Mills and Wood.

Finally, Eichengreen (1983) tested real vs. monetary theories of the business cycle for the U.K. 1833-1913, with Granger-Sims methods based on vector autoregressions of GNP, exports, residential construction, prices and high powered money. His results are mixed, neither real nor monetary forces dominated over the whole period. Real forces were more important pre-1880, monetary forces, post 1880.[11]

The conflicting evidence for the gold standard with money causing nominal income in the U.S. and the opposite in the U.K. may reflect the larger size of the U.S. economy. This is consistent with the finding of Huffman and Lothian (1984) of the growing importance and predominance of the U.S. towards the end of the gold standard period. In addition the evidence suggests (for the U.K.) significant feedback from real income to money consistent with the monetary approach to the balance of payments.

III.3. Money and Income in the Long-run: The Long-run Behavior of Velocity

The income velocity of money for a considerable number of advanced countries displays a U-shaped pattern over the past century, declining from the late nineteenth century to just after World War II for most countries when it begins a secular rise.[12]

The central determinants of the decline in velocity stressed in the literature are permanent income (Friedman and Schwartz (1963a)),[13] interest rates (including the own-rate of return on money), (Latane 1954, Klein 1973), monetization and the spread of commercial banking (Tobin 1965), improved quality of money (Klein 1977), growing financial sophistication (Friedman and Schwartz 1982). The key determinants of its rise include: technological improvements in the payments process (Fisher 1911, Garvy, 1959 and Garvy and Blyn 1970, Clower 1969, Townsend 1983) and the development of money substitutes (Gurley and Shaw 1961). However, no single theory can explain both the secular decline and the rise of velocity.

Bordo and Jonung (1981) and Jonung (1978), building on the work of Knut Wicksell (1935, 1936) and Irving Fisher (1911), stress the influence of institutional factors to explain the secular behavior of velocity. They attribute the downward trend in velocity to the process of monetization that encompasseed two interrelated forces, (a) the spread of the money economy, and (b) the spread of commercial banking. They attribute the upward trend to financial sophistication and improved economic security and stability. Financial sophistication refers to both the emergence of money substitutes and the development of

methods of economizing on cash balances. The rubric of improved economic security and stability reflects many aspects of the modern welfare state as well as stabilization policies.

The authors tested this approach to the long-run behavior of velocity with annual data for approximately one hundred years for five countries: the United States, Canada, the United Kingdom, Sweden, and Norway. For each country they developed empirical counterparts for the institutional variables which they added to a standard regression of velocity on interest rates and permanent income.

The variables added include: the share of the labor force in nonagricultural pursuits as a measure of the monetization process, the currency-money ratio to capture the spread of commercial banking, the ratio of total nonbank financial assets to total financial assets as a measure of financial development, a six-year moving standard deviation of the annual percentage change in real per capita income as a measure for the influence of growing economic stability.

Their results showed that for every country inclusion of the institutional variables significantly improved a benchmark regression of velocity on permanent income, interest rates, and cycle variable. In addition, in the majority of cases the institutional variables were correctly signed and significant with the exception of the measure of economic security and stability. Finally, they found that introduction of institutional variables lowered the permanent income elasticity of the demand for money for each of the five countries, suggesting that permanent income in earlier studies masked the influence of the institutional factors.[14]

Additional evidence for several countries and different historical periods on the importance of institutional variables also explains the long-run trend of velocity. Jonung (1983) studied the monetization process in the Swedish economy 1871-1913 and its relationship to velocity. He examined institutional details of three aspects of monetization: (1) the rise of commercial banking and to capture the increased use of money, (2) changes in wage contracts and in labor markets, and (3) changes in exchange arrangements in the markets of goods. He tested the velocity function as in Bordo and

Jonung (1981), by regressing it on empirical proxies for the three aspects of monetization and found that they exerted a significant influence on Swedish velocity. When income was added as an additional explanatory variable there was no major improvement in fit, while the interest rate was generally significant.

Capie and Rodrik Bali (1983b) found the number of bank offices per 10,000 inhabitants and the deposit currency ratio to be significant determinants of the U.K. velocity function 1870-1920 (using different data than Bordo and Jonung). Saint Marc (1983) in a manner similar to Bordo and Jonung explained the decline in French velocity from 1850 to the 1920's by a macro and micro index of monetization and the rise from the 1920's to the present by measures of financial development.[15] Finally Komlos (1984) found the number of banking offices and the share of agricultural income in national income to be significant determinants of the decline in velocity from 1867-1913 in Austria-Hungary.

III.4 Money and Real Output in the Short Run: The Great Depression

One of the major battles in the debate between Keynesian and classical economists and their successors in the postwar period has been over the causes of the Great Depression 1929-33. The debate centered on whether the depression was caused by real forces such as the collapse of the housing market, the stock market crash, and the world decline in agricultural prices that produced a fall in autonomous spending, or by monetary forces--a severe reduction in the money supply precipitated by contractionary Federal Reserve monetary policy and banking panics. Temin (1976) added fuel to the fire by attacking Friedman and Schwartz's (1963a) monetary interpretation of the Great Depression. This book spawned numerous critical articles, an important conference volume (Brunner 1981) and most important, valuable evidence and insights on the greatest economic disturbance of all time. Section III.4.1 surveys the literature derived from Temin's book, Section III.4.2 other recent interpretations of the monetary history of the Great Depression, and Section III.4.3 recent literature in the experience of other countries on the Great Depression.

III.4.1 The Temin Debate

In A Monetary History of the United States (1963), 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. This fall in the money stock was largely caused by bank failures in 1930-31 and 1933, although they argue it could have been prevented by active monetary policy. Temin (1976) attacked the Friedman and Schwartz view by arguing that since there was no evidence of a rise in short-term interest rates 1929-31 (short-term rates fell), the bank failures could not have caused the fall in the quantity of money. Rather he argued, 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.

In greater detail, Temin made four principal arguments against Friedman and Schwartz's money hypothesis. The first was 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, reducing the level of income, could have reduced the demand for money in turn causing a fall in the money supply.[16]

Evidence for the money hypothesis is presented by Anderson and Butkiewicz (1980), Schwartz (1981) and Evans (1985). Anderson and Butkiewicz estimated a structural model over the period 1921-33, that showed bank failures had a greater effect on money supply (via its influence on the currency-deposit ratio) than on money demand. Moreover bank failures were not explained by income, but by lagged bank failures (suggesting the Fed might have been at fault). Schwartz (1981) found using monthly data 1919-39, that money Granger causes income but not the reverse. Finally, Evans (1985) also using monthly data estimated vector autoregressions and found that 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).

Gordon and Wilcox (1981) and Boughton and Wicker (1979) presented evidence for significant feedback from income to money and a passive money supply. Gordon and Wilcox, using both quarterly and monthly data 1920-41, found that lagged money significantly caused income (GNP), lagged income had no effect on money, with significant contemporaneous correlation between money and income.[17]

Boughton and Wicker (1979), using quarterly data over the period 1921-36 to explain the currency-deposit ratio, found that during the 1930-33 period bank failures accounted for only about a third of the ratio's rise. This was evidence against Friedman and Schwartz's view that bank failures were a key cause of its unprecedented rise. 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.[18]

The 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 (1963a) 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 became in most cases endogenous rather than causal.

Temin's second argument 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. This argument was based on two pieces of evidence. First, contrary to Friedman and Schwartz, who attributed the initial bank failures in agricultural regions of the U.S. 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 insignificant 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.

Wicker (1980) demonstrates forcefully that the banking panic in the autumn of 1930 was triggered by the collapse of Caldwell and Company in Nashville, a collapse attributed 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 (1963) which in turn contributed to the spread of confusion and fear producing the panic.[19]

Significance tests by Stauffer (1981) of the trends of state bank failure rates, showed that the trend of 1928-29 did carry over into 1930--evidence against Temin's view that the 1930 bank failures were not explained by previous bank failures. 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 E. N. 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. A comparison to Canada which experienced a similar decline in agricultural income but had nationwide branch banking and no bank failures makes the point.

Temin then 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 (1978a) criticized Temin's view by arguing that although the yield on high grade bonds did not increase significantly between July and December 1930 and yields did increase by one percent for risky Baa bonds, it was unlikely that banks held many of the latter.

White (1984) examined the portfolios of state banks in Vermont, and argued, in sympathy with Temin, that their securities were susceptible to a decline in value because state banks held only a smaller proportion of government securities.

In addition, Temin argued that, if bank failures hadn't reduced the money supply by reducing the deposit-currency ratio, the money multiplier was sufficiently interest-elastic that it would have fallen in response to a fall in money demand.

Mayer (1978a) disputed Temin's position. Although Temin assumes that the D/R and D/C ratios (the money multiplier) are interest-elastic, in a comparison of semi-annual periods of low interest rates 1913-1930, Mayer found little evidence of response of the D/R to a fall in interest rates and only moderate evidence of a response by the D/C, confirming Cagan's (1965) earlier evidence of interest inelasticity of the money multiplier.[20] Second, Mayer argued, on quantity theoretic lines, that as income falls reducing the demand for money, this would, ceteris paribus, create an excess supply of money which would have the effect of raising income and offsetting the decline in money demand.[21]

Temin's third argument was based on the behavior of short-term interest rates. The short-term commercial paper rate declined in 1930. If the money hypothesis holds, according to Temin, it should have risen. Moreover, though other interest rates rose their rise is explained by an increase in risk rather than reflecting 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.[22]

Schwartz (1981) criticized Temin's (and other Keynesians') use of short-term interest rates as a measure of the price of money. According to the monetarists the inverse of the price level is a true measure of the price of money. She showed that monthly data over the interwar period mirrored all monetary events. She attributed the rise in the short-term commercial paper rate in the face of bank panics to the increased demand by banks that used 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. Both the expected rate of inflation and income produce the cyclical effect, tending 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.

Finally, 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.[23]

Temin's final argument was the behavior of the real money supply. Since it didn't fall, monetary forces 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. If actual equal desired cash balances, then movements in the real money supply tell us nothing about

the presence or absence of monetary stimulation, only about the shape of the demand for money function. 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 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. Of greater importance to consumption expenditures was an agricultural depression originating abroad. An unusually large negative residual for 1930 from a consumption function based on income and wealth for the interwar period (1919-41), led Temin to conclude that consumption declined much more than the stock market crash and poor harvests in 1930 can explain. Since he did not find evidence of a massive decline in investment expenditures, he judged that an unexplained decline in autonomous consumption expenditure was the likely cause of the decline in economic activity 1929-31. After that period, following Kindleberger (1973) he regarded international forces as dominant.

Mayer (1978b) repeated Temin's consumption function regression excluding 1919, a transition year from war to peace, and found the 1930 residual was no longer negative.[24] Estimates of a consumption function 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.

III.4.2. Issues in the Monetary History of the Great Depression

In this section we survey monetary explanations of the causes and severity, of the Great Depression in the U.S., which are ancillary to, although in numerous cases spawned by, the debate between Temin and Friedman and Schwartz. [25]

Domestic Factors

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 offset 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 notably 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. [26]

Meltzer (1976) on the basis of a reading of the Open Market Investment Committee minutes explains the Fed's failure to act effectively after 1929 by its adherence to the Burgess-Rieffler doctrine--a variant of the real bills doctrine. As measures of ease and tightness, the central bank focused on nominal interest rates and member bank borrowing, ignoring the distinction between real and nominal magnitudes. Thus low market interest rates which may actually reflect deflationary expectations and a high real rate were misinterpreted as evidence of ease.

Trescott (1982), however, claims that Fed policy after 1929 represented a radical departure from its policy over the period 1924-29. A monthly regression to explain Fed holdings of open market assets for the 1924-29 period by variables determining defensive operations and dynamic operations,

is exploited to generate levels of open market assets 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. For Trescott monetary policy was not more expansive after 1929 because of a change in the structure of the Open Market Investment Committee. Before 1929, as Friedman and Schwartz (1963) argue, it was dominated by the Federal Reserve Bank of New York. In January 1930, the OMIC (which consisted of the 5 key reserve banks) was replaced by a new open market policy committee (OMPC) which included all 12 reserve 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.

In a similar vein, Epstein and Ferguson (1984) exploiting the Fed's archives, attributed the failure of the Fed to adopt expansionary policies to a chronic dualism of responsibility within the system--between responsibility for overseeing the welfare of the whole economy and responsibility for the profitability and health of the member banks. Since Federal Reserve open market purchases would have lowered interest rates on government bonds, banks which had loaded up on government bonds would have lost earnings.

Field (1984a) sees the increase in the volume of asset exchanges associated with speculation in the stock market as having 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. 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)

Bernanke (1983) tested the hypothesis that the financial crises of 1930-33 increased the cost of financial intermediation, reducing output over and above the effects due to monetary contraction. He incorporated several measures of the cost of financial intermediation--real deposits of failing banks, liabilities of failing banks and the spread between the Baa and 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), and obtained statistically significant results that lend support to his hypothesis.[27]

Finally, O'Hara and Easley (1979) make the case that during the Great Depression the U.S. Postal Savings System worsened disintermediation for both savings and loan associations and commercial banks. As interest rates fell below the fixed postal savings rate, depositors diverted funds from each of the two types of intermediaries. The withdrawal of funds from savings and loans institutions reduced the availability of mortgage finance, adversely affecting the housing industry, while the withdrawal of deposits from commercial banks and the reinvestment of the inflow by the Postal Savings System in government securities, reduced bank reserves and hence the money supply.

International Factors

Meltzer (1976) sees U.S. adherence to the gold standard as an important precipitating cause of the Great Depression in addition to its well known effects of spreading the depression abroad. According to Meltzer, expansionary U. S. monetary policy 1927-29 raised U.S. prices relative to those of other gold standard countries (caused prices not to decline as much as in other gold standard countries). This produced a current account deficit, a gold outflow and a decline in the money supply in 1928-29.[28]

Roper (1978) attributed worsened deflation in gold standard countries during the Great Depression to an increase in the world demand for gold interacting with an inelastic (in the short run) world supply.

III.4.3. The Experience of Other Countries in the Great Depression

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 the U.S. real output and 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.[29]

Jonung (1981) compared U.S. and Swedish experience (not covered by Choudhri and Kochin) in the Great Depression. The Swedish depression started later (in 1930), ended earlier (in 1932), and was far less severe than in the U. S. The key cause of the Swedish contraction according to Jonung was a decline in Swedish exports aggravated by the Kreuger scandal in 1932. In sharp contrast to the U. S. there were no banking panics in Sweden. Furthermore, after Sweden abandoned the gold standard along with Britain in late 1931 and switched to a successful price stabilization policy (prices remained stable until 1937), recovery was swift.

Jonung found the evidence for Sweden inconsistent with Temin's spending hypothesis, since the sharp fall in Swedish exports did not lead to a fall in money demand and hence money supply. The Riksbank successfully kept the money supply constant.

Estimates of aggregate demand and supply equations for 6 Latin American countries in the 1930's by Twomey (1983) revealed that real output declined considerably less there than in the U. S., with declining exports the key source of declining aggregate demand. Moreover, more of the decline in nominal income was reflected in the price level and less in output than in the U.S., a result he explained by the predominance of primary products, characterized by flexible prices, in overall activity in these countries.

III.5 Financial Crises

Recent fears of insolvency of major U.S. banks have evoked interest in financial crises, in the last three years spawning three conference volumes[30] two dealing primarily with historical issues. The literature on financial crises deals with (a) their existence; (b) their causes; (c) the role of a lender of last resort in their resolution; (d) their international propagation. In what follows we briefly consider each of three different approaches by monetarists, Kindleberger, and rational expectationists to financial crises and the historical evidence on the above issues.

The Monetarist Approach

The monetarist approach of Friedman and Schwartz (1963a), Cagan (1965) and Schwartz (1985) identifies financial crises with banking panics that either produce or aggravate the effects of monetary contraction.[31]

In A Monetary History of the United States, 1867-1960, Friedman and Schwartz devoted considerable attention to the role of banking panics in producing monetary instability in the United States. According to them, banking panics arise out of the loss of confidence by the public in the ability of banks to convert deposits into currency. A loss of confidence is typically precipitated by the failure of some important financial institutions (e.g., as in 1873, 1893). Attempts by the public to increase the fraction of its money holdings held in currency in a fractional reserve banking system can only be met by a multiple contraction of deposits. A banking panic in turn, if not allayed by early intervention by the monetary authorities (or as was often the case before the establishment of the Federal Reserve in 1914, by the suspension of convertibility of deposits into currency and the issuance of clearing house certificates), will produce massive bank failures.[32] Otherwise sound banks are forced into insolvency by a fall in the value of their assets induced by a mass scramble for liquidity. Banking panics which lead to widespread bank failures, such as occurred in the 1929-33 period, have deleterious effects on economic activity, primarily by reducing the money stock through

a decline in both the deposit-currency and deposit-reserve ratios. According to the monetarist approach, financial crises (and also business fluctuations) are spread internationally by the monetary standard. Since financial crises are important only to the extent that they affect the money supply, they should not be a crucial part of the transmission mechanism.[33]

Kindleberger

Kindleberger (1978), following Fisher (1932, 1933) and Minsky (1982), views financial crises as an essential part of the upper turning point of the business cycle--as a necessary consequence of the excesses of the previous boom.[34] According to Kindleberger, some displacement, e.g., new inventions, or wars, which improves profit opportunities leads to an investment boom, fueled by bank money and rising velocity. This in turn produces a "speculative mania," involving a shift from money to real or financial assets, "overtrading," and then "distress". At that point some event triggers a massive and attempted shift from real or financial assets to money and a "panic" results. The culmination of the process is the crash, with the collapse of prices of assets acquired during the mania (Kindleberger, 1978, p. 5). Financial crises are transmitted from country to country via the traditional links of gold flows, the balance of trade and capital flows, but also by psychological factors, commodity and interest arbitrage which, by linking the banking systems of different countries directly, can offset the normal operations of the classical price-specie-flow mechanism. Kindleberger assigns a key role as do Fisher and Minsky, to a lender of last resort to abort the crisis. Because he emphasizes the international nature of financial crises, he stresses the need for an international lender of last resort.

Rational Expectationists

Kindleberger's discussion of financial crises as involving manias, crashes and panics assumes irrationality on the part of economic agents. In a recent approach by Garber (1981), Garber and Flood (1982), and Blanchard and Watson (1982), such phenomena are viewed as rational--based on the rational expectations hypothesis that rational agents will not systematically make forecast errors.

According to this approach, manias may be viewed as examples of speculative bubbles which arise when the expected rate of market price change is an important factor determining current market price change. Such a bubble can arise if for a brief period two distinct classes of traders coexist in the same market--distinguished for example by different access to information, or by different attitudes toward risk. What makes the bubble rational is that no agent can, given his private information and the information revealed by prices, increase his expected utility by reallocating his portfolio. (Blanchard and Watson (1982) p. 296).

"Panics" are related to the phenomenon called "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 the bank's assets by the central bank.

A "panic" characterizes a run whose timing was not perfectly foreseen. In such a case there may be discontinous 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 can't provide. However, the illiquidity of bank assets also subjects banks to the vulnerability

of runs. Like Flood and Garber, 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.

In a slightly different vein but on rational expectations lines, Gorton (1985a) argues that banking panics are not unique events, as argued by Friedman and Schwartz and Cagan, but represent a rational response by depositors wishing to smooth their consumption flows over time. Rational depositors wish to dissave in periods of expected low consumption such as at business cycle troughs but, since the likelihood of suspensions of convertibility also would be highest at the trough, depositors will rush to convert their deposits to currency when they expect a trough to occur.

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

III.5.2 Historical Evidence on Financial Crises

The Incidence and Causes of Crises

Kindleberger (1978) presented a useful chronology of world financial crises for the past two and one-half centuries. However, Schwartz (1985) argued that since most of these crises did not involve a scramble for high-powered money they were not real crises but rather "pseudo-crises." Most of the pseudo-crises (especially in the period since 1933) were characterized by deflation or disinflation, all involving loss of wealth and distress, but in none of which the stability of the banking system was threatened.

Seabourne (1985) designates the events of July-August 1914 in England preceding the outbreak of World War I as a crisis,

"since they were real and transient, marked a turning point and were sparked by a dangerous political and commercial situation though they do not fit into the Kindleberger-Minsky framework because they occurred independent of the business cycle."

The crisis arose because foreign debtors could not repay their debts, making the liquid assets of the London money market illiquid and many financial institutions insolvent. The crisis was solved by massive and extraordinary government financial assistance to the money market.

Capie, Mills and Wood (1985) examined the 'crisis' of 1931 when the U.K. left the gold standard, and rejected various explanations including: a Kindleberger-type of financial crisis triggered by an exogenous shock; the government's budget deficit; the drain of Empire reserves from London; and overvaluation of the pound. A time series intervention analysis of the price level revealed no evidence of any shocks suggesting a crisis; however, an upward shift in short-term interest rates from July to November reflected continental bank failures. Thus they concluded that the main explanation for the abandonment of the gold standard was the continental banking crisis--national central banks failed to act as lenders of last resort, precipitating national banking crises, an international scramble for gold and, because the Bank of England had low reserves, an attack on it.[35]

James (1984) viewed the German banking crisis of 1931 as consistent with the Kindleberger-Minsky approach, rejecting the traditional explanation which attributes it to withdrawals of short-term deposits by foreign holders in response to the Austrian Creditanstalt crisis. In his account the German banking collapse of July 1931 was a consequence of difficulties in the public finance sphere which led to a German loss of confidence in financial markets. In particular, the crisis was the result of the conjunction of three endogenous destabilizing pressures, the instability of the debt structure of the capital market, biased heavily towards short term debt; the inability to control capital flight out of Germany; and the difficulty of all levels of government to fund their debts, since monetization through the Reichsbank had been forbidden in the aftermath of the hyperinflation.

Rational Expectations

Neal and Schubert (1985) test whether the Mississippi bubble of 1719 and the related South Sea bubble of 1720 can be characterized as rational. They argue that since the markets for Compagnie des Indes and South Sea stock were characterized by different sets of traders possessing differing sets of information they satisfy an important precondition for the theory. Using daily data on detrended Compagnie des Indes and three English stock prices they find that only South Sea stock in the first half of 1720 followed an autogressive process consistent with a rational bubble.

Batchelor and Desmond (1985) used the rational expectations approach to explain the differences between two key crises of late nineteenth century Britain: Overend Gurney (1866) and Barings (1890). The collapse of the discount house of Overend Gurney, led depositors, who could not tell whether the problems were specific to it or prevailed throughout the money market, to fear the worst and withdraw deposits from the whole system. In the case of Barings the extent of its involvement in Argentina was well-known--only its brand name prevented mass withdrawal. In response to the crisis the Bank of England could increase information to enable depositors to distinguish between sound and unsound institutions--the approach taken in 1866--or it could replenish the assets of the bank in trouble --the approach taken in 1890. According to the authors, supplying information is more likely to succeed, but the second approach, though less secure was probably appropriate for Barings because the public was well informed about the risks to other financial institutions.

To provide evidence that rational depositors will increase the currency deposit ratio (precipitate a banking panic) when they expect the business cycle trough to occur because they wish to dissave in periods of expected low consumption and periods of high capital loss on deposits, 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.[36] 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, contrary to Friedman and Schwartz's hypothesis that panics were due to unanticipated failures of financial institutions.

III.5.3 Role of the Lender of Last Resort

According to Schwartz (1985), all the real financial crises in the U.K. and the U.S. occurred when the monetary authorities failed to demonstrate readiness at the beginning of a disturbance to meet all demands of sound debtors for loans and of depositors for cash. Thus in the U.K. in 1866 the Overend Gurney failure led to a crisis because the Bank of England's actions were hesitant and the public was not convinced there was no reason to panic. This is compared to the Baring failure in 1890 which was not a crisis because of fast action by the Bank. The U.S. in 1873 experienced a real financial crisis because no institutions were available to deal with the sudden increased demand for high-powered money. In 1907 although institutions did exist to act as lender of last resort, there was a real crisis in the U.S. because the right actions were taken too late, whereas in 1884 bank failures in New York City did not lead to panic because of a timely announcement that assistance was at hand.

Dornbusch and Frenkel (1984) showed how fumbling was the Bank of England's ultimate response to the crisis of 1847--suspending the link between its fiduciary issue and its gold reserves in the Issue Department, while dramatically raising Bank rate--the first implementation of what later came to be known as Bagehot's rule.

Bagehot's Lombard Street, long regarded as the handbook for effective lender of last resort intervention, suffers from an ambiguity that Rockoff (1985b) has spotted. In some places Bagehot tells the central bank to lend freely at high interest rates, in other places to protect the reserves.

But he does not provide clear guidance as to when a central bank should do one or the other. An examination of the Bank of England's operations in crises throughout the nineteenth century suggests it was not always clear to the Bank which Bagehot to follow. According to Rockoff, the main problems in nineteenth century banking in Britain were not caused by the Bank's unwillingness to lend in time of crisis but rather "the problem was typically one of recognizing the right moment for extreme actions."

According to Schubert (1985), the Austrian national bank in 1931 by not following Bagehot's strictures (to lend freely but at a penalty rate) converted a banking panic (the Creditanstalt crisis) into a run on the Austrian schilling. When it became aware of the Creditanstalt's difficulties the central bank quickly allayed the bank run by a liberal discounting policy. The increase in domestic credit produced by this policy was perceived by rational agents to be inconsistent with the continued maintenance of convertibility into the dollar. This quickly led to a drain of Austria's international reserves and a speculative attack on the currency.[37]

Kindleberger (1973, 1978) stressed the role of a lender of last resort and especially of an international lender of last resort in the successful resolution of crises. In his discussion of 1873, 1920-21, and 1931, he argued that the crises could have been aborted by the effective operation of a supernational monetary authority. Support for his position may be found in Presnell's (1982) paper on the sterling system and financial crises before 1914 which provides examples of effective intervention by colonial officials borrowing from the London money market.[38] However, Moggridge (1982) argued against Kindleberger's position: in 1920-21, there was no crisis hence no need for the lender of last resort and in 1931, though there was considerable international cooperation, the fundamental disequilibrium of the international monetary system could not have been alleviated by an international lender of last resort.

Clearing Houses

In the U.S., in the absence of a formal central bank, clearing house associations emerged as an effective private market lender of last resort. 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 specie 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 against individual bank failures that prevented runs against 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 they 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 specie.

III.5.4. International Propagation of Financial Crises

Kindleberger (1984a) described how a series of financial crises around the world in the period 1888-93 were intimately connected through capital flows and price arbitrage. A boom originated in England with the Goschen Conversion of 1888 and in anticipation of tightening of the Company Law of 1892, and simultaneously in South Africa with discoveries of precious metals. It was fueled worldwide by capital exports from Europe. The succeeding crisis began in Argentina with the failure of a new bank issue, spread to the Barings in London, and then across the world as London tightened up on capital exports.[39]

Huffman and Lothian (1984) focused on monetary shocks as the key sources of cyclical fluctuations, with the fixed exchange rate pre-1933 gold standard the primary mechanism for transmission of shocks abroad. In a comparison of common cycles in the United States and Great Britain, 1830-1933, they

found panics in only three of twelve common cycles, leading them to conclude that little importance should be attached to panics as a direct channel of international transmission of cyclical fluctuations.

Bordo (1985) provided evidence for both the monetarist and the Kindleberger approaches to international transmission of financial crises. According to the monetarist approach, financial crises (and also business fluctuations) are transmitted internationally primarily through the monetary standard. Under a fixed exchange rate, such as the classical gold standard, a financial crisis in one country by reducing the money supply or velocity in that country will attract gold flows from other countries. These countries will in turn suffer a contraction in their money supplies and a reduction in economic activity. Transmission can also occur through short-term capital flows, changes in real income, and commodity arbitrage, but the way in which these channels affect activity is primarily through monetary change. By contrast, under flexible exchange rates, according to the monetarist approach, one would expect the transmission of financial disturbances to be considerably muted.

Bordo compared reference cycle contractions for six countries: the U.S., Great Britain, France, Germany, Canada and Sweden over the period 1870-1933, and found that severe contractions in economic activity were in all cases accompanied by monetary contraction, in most cases with stock market crises, but not (with the exception of the U.S.), by banking crises.[40]

He also found under fixed exchange rates, for cyclical contractions, a close correlation for each country between changes in the monetary gold stock and changes in high-powered money. That evidence shows, in agreement with Huffman and Lothian (1984), linkages between the money supplies of the different countries through gold flows and high-powered money. At the same time, countries under flexible exchange rates were in several cases insulated from the effects of financial crises abroad.

In the Kindleberger real approach, financial crises are transmitted primarily through nonmonetary channels, such as link portfolios of financial institutions, capital flows, commodity arbitrage, and changes in the balance of trade. Monetary factors are of secondary importance.

Bordo found evidence for this approach in a close relationship across countries between peaks in the long-term short-term interest differential and in a stock price index. Moreover the similarity between countries of turning points in stock market prices, the common incidence of stock market crises, and the similar importance of the deposit-reserve ratio as the key determinant of monetary contraction in all countries except the U.S., suggests a possible additional channel of influence whereby crises link national money supplies.

III.6 Money and Prices: Old Debates Revisited. New Debates Opened

A key theme in monetary history has long been the relationship between money and prices. Much of the earlier literature focused on the validity of the quantity theory of money--whether monetary or real forces explain earlier inflationary episodes. In recent years on new data and developments in theory have revived a number of perennial debates, include: population versus monetary explanations for the Price Revolution of the sixteenth century; Tooke and Newmarch versus the quantity theory of money; Cassell versus Wicksell on the causes of world inflation; the effectiveness of wartime wage-price controls. In addition, inspired by the new classical macroeconomics interest has focused on new topics: the classical neutrality of money: the wage lag hypothesis; hyperinflations: their process and termination: the backing of currency and the relationship between money and prices: the American colonial experience; and the Lucas hypothesis.

III.6.1. Old Debates Revisited

The Sixteenth Century Price Revolution

An old debate in monetary history is whether the close to 200% rise in the European price level from the beginning of the sixteenth century to the middle of the seventeenth century can be explained by an increase in the money supply induced by the influx of New World treasure into Spain (Hamilton, 1934), or by population growth pressing against inelastic supplies of arable land that raised food prices and hence the overall price level (Ramsey 1971). Until recently the evidence was not overwhelmingly convincing for either side. Against the population view is its failure to distinguish

between forces affecting relative prices and those affecting the price level. Against the quantity theory view is the lack of evidence that the European money supplies increased sufficiently to explain the magnitude of the inflation and the imperfect correlation of the timing of price movements and the specie inflows.

Two recent papers provide evidence for the Quantity Theory view. Flynn (1976) accounted for the apparent puzzle that price movements in Spain and other countries were not synchronized with specie flows in terms of the monetary approach to the balance of payments (MABP).

According to the MABP, under fixed exchange rates price levels in all countries would be linked together by the force of arbitrage. The world price level would be determined by the world money supply and any one country would only be able to raise its prices to the extent it raised the world money supply. The influx of specie into Spain was quickly dispersed to the rest of Europe, according to Flynn, by the issue of domestic money (copper, vellon and bills of exchange). This served to raise the European price level in general while at the same time creating the impression that individual country's price rises were not correlated with domestic specie stocks. As evidence for his thesis Flynn cited Braudel and Spooner (1967) on the convergence of price levels across the regions of Europe and evidence of the displacement of Spanish gold coins by alternative means of payment.

Glassman and Redish (1984) estimated a new mint output series for France 1493-1680. Their new series which allows for recoinage and net specie flows was then used to construct a French money supply series. The authors found that the increase of the French money supply from the early fifteenth to the mid-sixteenth century was similar to the concurrent rise in the price level.

Lindert (1984) has recently suggested two possible channels of the population inflation thesis. First, rapid population growth by raising the ratio of children to adults for a given income per household reduced the demand for money (raised velocity) as income had to be stretched over more people and, as a consequence, the reduction of household wealth relative to income. It also raised

the relative price of food by channeling an increased proportion of fixed earnings into food. Second, following the approach of Goldstone (1984), increased population density in the sixteenth century raised the ratio of velocity to transactions. In support of his arguments Lindert presented evidence for England 1526-1603 of velocity rising greatly in excess of what could be explained by inflationary expectations. Further, rising traded goods prices, a measure of monetary pressure in an open economy, only explain 60% of the rise in the English cost of living; also the price rise and rapid population growth on the continent characterized the same period.

Two questions arise from the Lindert study. First, it is unclear why increased population density would not be associated with a rise in the aggregate demand for money as the economy monetized (see e.g., Bordo and Jonung (1981), Jonung (1983)), and second, why the two population induced effects on velocity might not have shifted the level rather than explained the long-run trend.

On a more fundamental level, the evidence for both positions hinges critically on estimates of the money supply as well as prices and the volume of trade, data which before the mid-nineteenth century are crude at best. Research of the type conducted by Glassman and Redish may help resolve the debate.

Monetary vs. Nonmonetary Causes of Nineteenth Century Price Level Movements: Was Thomas Tooke Right?

In the inflationary period following the Californian and Australian gold discoveries in the mid-nineteenth century a debate raged in England between those (J. S. Mill, J. E. Cairnes), who explained world inflation by the effects of the increased gold supplies on the world money supply and those (Tooke and Newmarch), who explained it by a change in important relative prices induced by real factors.[41] Recently the debate has been revived by Rostow[42] and Lewis (1978) who argue that price level behavior in the U.S. and Great Britain in the period 1797-1914 can be explained by real factors: the relative growth rates of industrial and agricultural production changed their relative prices (the sectoral terms of trade) and hence changed the price level. According to Rostow and Lewis, monetary forces play only a passive role in determining the price level, the money supply being flexible or passive and velocity flexible.

Bordo and Schwartz (1981) tested the Rostow-Lewis view that changes in the terms of trade between primary and industrial products explain price level movements; and the modern quantity theory that the ratio of the money supply to real output is the key determinant of price level movements. They first regressed the price level on the ratio of the money supply to real output and on Lewis' terms of trade variable (the ratio of the world price of primary to industrial products) for the period 1870-1914, for the U.S. and U.K combined.[43] Both independent variables had significant coefficients but the significance level for M/y favored the modern quantity theory. To determine whether the price of wheat was the key cause of price movements in primary products, as argued by Rostow and Lewis, they then regressed the prices of 5 nonwheat agricultural commodities on the money-output ratio and the price of wheat. The finding that coefficients on the price of wheat were generally insignificant led the authors to reject the Rostow-Lewis position.[44]

According to Bessler (1984), Bordo and Schwartz's tests do not discriminate between the two views: (a) individual commodity prices may be more highly correlated amongst themselves than with the money supply if they are members of the same separable commodity group; (b) it is possible that movements in the price level could be causing movements in the money supply. Bessler tested the competing views by running Granger causality tests for the U.S. on money and nominal income and between the prices of key agricultural products, key industrial products and the price of wheat and money supply. Results that money caused nominal income supported Bordo and Schwartz's position. The finding that industrial prices are not caused by agricultural prices is contrary to Rostow and Lewis. Bessler interpreted the results that wheat prices are more significant in causing agricultural prices than is the money supply as suggesting that commodities within separable groups move together while the prices of commodities in different separable groups are by definition not as closely related and hence should show stronger links to earlier movements in the money supply.

Wicksell vs Cassel on Secular Movements in Prices

The Swedish economist, Knut Wicksell, explained periods of secular inflation and deflation in the nineteenth century by reference to the behavior of the market rate of interest, determined in the loan market, relative to the natural rate of interest determined by the forces of thrift and productivity. If the market rate were below the natural rate, prices would rise cumulatively. The price rise could be arrested only by a gold outflow that would reduce the banking system's reserves, causing banks to raise their loan rate. Were the market rate of interest above the natural rate, a cumulative deflation would occur. In contrast to Wicksell, another Swedish economist Gustav Cassel applied classical doctrine to episodes of world inflation and deflation, explaining them by the growth of the world's gold supply relative to the growth in demand for gold, the former influenced primarily by the production of new gold, the latter by the growth of real income.

Jonung (1979) tested the predictions of each of these theories for Sweden 1875-1913, finding that the reserve deposit ratio of the commercial banks declined throughout the period 1875-1913, most rapidly in the period of 1897-1913, and that the ratio of gold reserves of the Riksbank and the commercial banks to the money supply remained constant over the period. This is inconsistent with Wicksell's theory.[45] Evidence that price level movements were similar among gold standard countries, 1870-1914, and that Swedish price level movements could be largely explained by changes in the monetary gold stock, Jonung concluded, was consistent with Cassel's approach.

The Effectiveness of Wartime Wage Price Controls

Advocates of wage-price controls have argued on the basis of measured price indices in the two World Wars that controls are successful in reducing inflation, while critics, especially the monetarists (see Friedman (1966)), argue that controls only temporarily reduce inflation below the long-run trend dictated by the underlying growth rates of the money supply, velocity and real output. According to Rockoff (1981), since the temporary decline in velocity induced by controls reduces the total amount

of money governments need to create to capture a given volume of real resources, the total rise in prices determined by the growth of money relative to output will be less with temporary controls than in their absence. Rockoff estimated the decline in velocity in the U.S. that occurred in the two World Wars after the imposition of controls, and the effects of the decline in velocity on the inflation tax base. He found that the money supply would have increased five percent more in the absence of controls in World War I and 50% more in World War II.[46]

In a slightly different vein Evans (1982) argued that controls by affecting workers' labor leisure choice reduce the effective supply of factor services. He estimated the Barro-Grossman (1974) model of suppressed inflation for 1942-48, and concluded that the money supply would have been 30% less in 1945 in the absence of controls for the price level to follow its actual path, while employment would have been 12% higher and output 7% higher. Thus according to Evans, had a tight monetary policy been followed instead of the expansionary policy coupled with controls that was actually followed, employment and output would have been higher--controls hindered the war effort.

The British controls are generally believed to have been more successful than their American counterparts that both a lower rate of money growth per unit of output and a greater degree of acceptance by the British may explain (Friedman and Schwartz, 1982). Rockoff who compared the British and American performances in World War II, however, concluded that the British were more successful because they applied controls more vigorously through more extensive rationing and output standardization and more assiduous prosecution of violations.

III.6.2 New Debates Opened

The Classical Neutrality of Money: the Wage Lag Hypothesis

The traditional argument that real wages declined during the Napoleonic war inflation because of slow adjustment of wages to changes in the price level has been challenged. This wage lag is usually attributed to wage inflexibility (an argument with considerably more empirical support in the twentieth

century than the early nineteenth). Based on recent developments in the theory of rational expectations, Modest and Smith (1983) argued that real variables such as the real wage should be independent of anticipated movements in nominal variables such as the price level, taking for granted that agents understand the structure of the economy and that their subjective probability of future states of the world approximates the objective probability. They presented evidence drawn from alternative data sets that the price level did not Granger cause the real wage over the 1790-1848 period, consistent with classical neutrality and contradicting the wage lag hypothesis.

Hyperinflations: Their Process and Termination

Considerable attention in monetary economics has been devoted to explaining price behavior during hyperinflation. The literature following Cagan's (1956) pioneering study has treated hyperinflation as a monetary phenomenon. With inflation serving as a tax on real cash balances, governments print money to finance fiscal deficits.[47] The inflation process is exacerbated by a flight from cash balances (or a rise in velocity) as the public reduces its real money holdings in the face of expected inflation. Cagan provided evidence for seven hyperinflation episodes of a stable demand for money as a function of the expected inflation rate, with expectations formed adaptatively. Calculations of the revenue maximizing inflation rate based on the parameters of the money demand function revealed that most countries inflated at an excessive rate.

Cagan's results for post-World War I Germany were confirmed by Frenkel (1977), who used the exchange rate as a measure of inflationary expectations.[48] Sargent and Wallace (1973), however, constructed a model of hyperinflation in which the government increases money to keep real government expenditure constant, and the public with rational expectations understands the process. Under such a scheme, in contrast to Cagan's monetarist approach, the money supply becomes endogenous. Granger causality tests for the German hyperinflation supported this conclusion.[49] In addition Sargent (1977) found Cagan's money demand function to be unstable.

Like Cagan, E. White (1985) who analyzed the hyperinflation of the French revolution, found rates of inflation to exceed the revenue-maximizing rate. The Revolutionary government increased the supply of assignants in response to changing rates of inflation in order to sustain a constant flow of revenues, a finding similar to that of Sargent and Wallace. Based on a calculation of an index of government revenue from inflation, White concluded that this early hyperinflation "was a fairly successful way to generate revenue."

All of the hyperinflations analyzed by Cagan were terminated by monetary reforms. Sargent (1982) treated the termination of hyperinflation in post World War I Austria, Hungary, Poland and Germany as laboratory experiments isolating changes in the monetary regime. According to the rational expectations hypothesis, a regime change is sufficient to produce an abrupt halt to inflation without serious consequences for output and employment if the public believes that the rules of the game have changed. What happened in every case was a change in monetary regime from an unbacked fiat currency, where notes were used to finance the government deficit, to a gold standard regime where the currency was partially gold backed, and where a pledge to balance the budget guaranteed that sufficient tax revenue would be available to pay the government debt. In each case reform consisted in establishing a central bank dedicated to price stability and prohibited from financing the government deficit, a switch to a balanced budget, and the restoration of convertibility to gold or the dollar. In each case the exchange rate and the price level stabilized instantly and in each case high powered money increased substantially for a considerable time after the reform, yet inflation did not resume (i.e. real balances increased). Prices, according to Sargent, did not rise because after the reform, money was backed. Finally Sargent presented evidence that though output and employment fell somewhat, in no case were the real effects of the order of magnitude associated with the conventional view that disinflation is very costly because of built in wage/price rigidity.

Further evidence for Sargent's hypothesis was provided by Bomberger and Makinen (1983) for the post-World War II hyperinflations where a reform package similar to Sargent's cases was instituted

with similar consequences. For Greece 1944-46, Makinen (1984) showed that it took three reforms to restore stability. The first two reforms failed because they lacked some essential ingredients for success. The first reform had no provision for fiscal reform. Although the second raised taxes, that provision was soon rescinded. The third successful reform established an independent central bank, provided a balanced budget, and restored convertibility to the pound. After the first two reforms real balances increased and then declined. Only after the third reform was the rise sustained. This suggests that in the first two cases the public took time to realize that they were not genuine regime changes.

According to Flood and Garber (1980), rational agents will expect a currency reform when the money supply process becomes inconsistent, i.e., the process by which money is supplied to the private sector is inconsistent with the private sector's money demand behavior. Based on the rational expectations solution of Cagan's model, process inconsistency would occur when the expectation of the price level, given the public's knowledge of the money supply process, becomes infinite. For the German hyperinflation, using Cagan's data and parameter estimates, they found that the highest probability of such inconsistency occurred on November 15, 1923, the week of the start of the currency reform. Accordinly an expectation of currency reform based on the consistency of the money supply process was rational at the end of the hyperinflation. The evidence was also consistent with the rise in real balances toward the end of the hyperinflation.

Three recent articles cast doubt on the costless nature of monetary reform. Witte presented three reasons that stabilization would involve lower output and employment effects in a hyperinflation than in a period of less rapid inflation. First, contract lengths would be reduced and there would be increased indexation during a hyperinflation. Second, the increased use of foreign currency during a hyperinflation reduced the number of transactions affected by domestic stabilization. Third, a more rapid response of actual inflation to the expected inflation rate would occur.

Garber showed evidence for Germany that ending the hyperinflation was associated with substantial costs in output and employment. His explanation for this result was that the hyperinflation by reducing real money balances led to the substitution of capital and labor for real balances, in a shift of resources toward (capital intensive) investment goods and the creation of vertical combines to economize on cash transactions. Termination of the hyperinflation led to declining output and employment in industries which had expanded during the hyperinflation. Wicker (1983) examined evidence on the percentage unemployed in Austria, Hungary and Poland after the monetary reforms. Unlike Sargent, who only focused on the number unemployed, his evidence showed substantial increase in all three countries in unemployment, which persisted for several years.

The Backing of Currency and the Relationship Between Money and Prices: The American Colonial Experience

American colonial experience with inflation on quantity theory lines was the consequence of the overissue of paper money as a form of government finance (Weiss (1970)). An alternative is that inflation occurred only if money were unbacked (Sargent 1982). A link between money growth and inflation would exist if note issues were backed either by a direct claim on some commodity such as gold or by a commitment to retire the issues in future by running a government budget surplus.

From 1720-50 Massachusetts issued paper money in the form of bills of credit and land bank bills. Although both issues were accompanied by provisions for retirement by future taxes, the period was characterized by considerable inflation and a depreciating exchange rate--evidence consistent with the quantity theory. However, Smith (1984) who examined the evidence for Colonial Massachusetts 1720-70 on the link between note issue and inflation[50] argued that the episode was also consistent with the Sargent view since the claims backing the notes were not honored. In 1750 Massachusetts reformed its currency, returning to the specie standard. Subsequently, to finance expenditures in the French and Indian Wars, it issued interest-bearing notes to be redeemed in specie out of foreordained tax

revenues--the decision to issue notes and impose future taxes was made simultaneously hence making the currency backed. For 1755-60 per capita note issue increased 800% and prices (of wheat and molasses) by between 12 and 42%, while over the whole period 1755-70 per capita note issue increased 70% and those prices by 5%. According to Smith successful backing of the note issue--much of the short-term debt issued 1755-60 was retired within five years--broke the link between money and prices. However, for lack of data he ignored the specie component of the money supply and the role of bills of exchange as a payments media (see, e.g. West, 1978). In addition, he represented prices by two highly traded goods whose prices would be strongly affected by external factors. Moreover, Smith did not explain how the link between money and prices was broken.

Wicker (1983) provided such an explanation for the case of Pennsylvania in the period 1750-65, based on the public's discounting its future tax liabilities to the present. As a consequence the issue of fiat money did not increase the community's net wealth and so did not cause a rise in expenditures.

The Lucas Model

Lucas (1973) found favorable evidence, using cross-country data in the postwar period, for a positively sloped short-run aggregate supply curve. His explanation of the slope was that, if the price level is greater than expected, agents supply more output because part of the higher price level is misperceived as a possible change in relative price. Furthermore, the higher the variance of the price level, the greater the probability that agents misperceive a given change in prices as representing a change in relative prices.

Easton (1984) tried a similar test for 7 countries during the classical gold standard era, 1881-1913, but found little correlation between the variance of nominal change and the price level elasticity of nominal income. His negative results, according to Wood (1984), are not surprising since, under the gold standard regime, price arbitrage would cause the variance of nominal income change to converge across countries on the standard.

Dwyer (1983), on the other hand, using data for the U.K. 1870-1913, found a measure of unexpected change in the price level--the part of the logarithm of the price level not predicted by the lagged price level and the interest rate--had the postulated positive significant effect on real output. Dwyer's more favorable results may possibly be explained by a greater range of price level experience within one country over the slightly longer period (including ten years before the heyday of the gold standard) than across countries under the fully operative fixed exchange rate regime.

In a test of a version of the Lucas aggregate supply curve for the U.S. over the period 1840 to 1900, James (1985) found a stable positive relationship. That result contrasts sharply with the progressive flattening of the aggregate supply curve in the twentieth century (Sachs 1980). Dramatic increases in communications in the nineteenth century, which would tend to make it easier to distinguish relative from absolute price shocks hence making the curve steeper, according to James, were likely offset by decreased variability of the general price level resulting from the adoption of the gold standard in the middle of the period.

III.7. Alternative Monetary Standards

Recently because of dissatisfaction with the performance of the current domestic and international managed money systems, there has been considerable interest both by the profession and by the public at large in alternative monetary standards. Interest has focused on designing superior alternatives to the current regime and, in the hope that we may learn from both their good and bad features, on the operation of past regimes.[51]

A monetary standard has two aspects, one domestic and one international. The domestic aspect applies to the arrangements regulating the quantity and growth rate of the internal money supply. The international aspect applies to the arrangements by which the external value of the currency is determined. Both aspects are present for any type of monetary standard but it is possible to adopt a purely domestic standard with the external value of a country's currency floating with respect to other currencies, or to fix the external value of the domestic currency with respect to other currencies.

There are basically two types of standards--commodity and fiduciary standards. This section surveys recent historical research on aspects of two variants of each standard: commodity standards--the gold standard and bimetallism--fiduciary standards--flexible exchange rate and free competition in the provision of domestic money.

III.7.1 Commodity Standards

Commodity money standards in various forms were in worldwide use until the breakdown of the Bretton Woods System in 1971. Until the early nineteenth century, commodity money was silver. Though bimetallism characterized the monetary standards of a number of countries during the nineteenth century, by the final decades much of the world had adopted some form of a gold standard.

The Gold Standard 1821-1931

In what follows we survey the recent literature for evidence on how the gold standard operated focusing on three issues: (a) the record of monetary and economic stability; (b) the balance of payments adjustment mechanism; (c) the rules of the game.[52]

Monetary and Economic Stability: Evidence for the U.S. and U. K.

Wholesale price indices for the U.K. 1821-1914 and the U.S. 1834-1914 exhibited virtual price stability over the whole period, punctuated by alternating episodes of deflation and inflation (Bordo 1981b). Greater long-run price predictability (the tendency of the price level to revert to its mean) characterized the gold standard than the managed money period (Klein, 1975).[53]

The tendency towards both long-run price stability and price predictability under the gold standard may be explained by the operation of the commodity theory of money. Deviations from trend in the purchasing power of gold 1821-1914 were positively correlated with deviations from trend in the world monetary gold stock with the purchasing power of gold leading by 25 years, reflecting both a shift from nonmonetary to monetary uses of gold, and change in gold production in response to change in the price level.[54]

Rockoff (1984b) determined the extent to which changes in the world gold stock were due primarily to random events causing a shift in the short-run supply curve for gold, or instead reflected movements along a long-run supply curve such as one would expect from the classical commodity theory of money. Growth of the world total gold stock since 1800 was characterized by a series of surges in the 1850's and 60's and in the 1890's and 1900's, each of which followed a period of slow growth and a rising real price of gold, suggesting that the supply curve was elastic in the long run.

Next turning to the sources of change in the gold stock, Rockoff examined the historical evidence on the major discoveries that took place in the nineteenth century. Except for the Californian discovery of 1848, other major discoveries were induced by rising real gold prices, especially the discoveries in Australia in 1851, Colorado in the 1880's, South Africa and Alaska in the 1890's. In the latter three cases high real prices in the 1870's and 1880's led to an extensive search for new gold sources. In addition most technical changes in gold production were induced--key examples are hydraulic mining, chlorination process, and the cyanide process.

Despite long-run price stability, considerable short-run price instability (based on the coefficient of variation of year-to-year changes in the price level) characterized the gold standard era compared to the post-World War II period in both the U.S. and the U.K.[55] The gold standard era was also characterized by greater instability in real output than in the post-World War II period for both countries (based on a comparison of the coefficients of variation of annual rates of change of real per capita NNP) and by higher unemployment rates.[56] Short-run price level and real output instability in turn reflected greater monetary instability under the gold standard (based on a comparison of coefficients of variation of annual rates of change of broad money between the pre-World War I gold standard and the post World War I period for both the U.S. and the U.K. (Bordo 1981b)). This reflected two sets of forces, the effects of periodic gold flows through the balance of payments (Bordo 1982a) and banking instability (especially in the U.S.).[57]

Although the average growth rates and standard deviations of the world monetary gold stock by decades from 1800 to 1929 compared with those of the U.S. monetary base in the postwar period, showed greater stability of the monetary gold stock than of the base (Rockoff 1985b), Barro (1984) attributed the greater variability of money in the pre-World War I period primarily to less stable banking conditions (at least in the U.S.). Had important innovations and regulations in banking such as FDIC been instituted earlier, monetary variability would have been less.

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 the to real activity. The gold standard thus served to transmit the business cycle from country to country. According to the descriptive evidence the authors presented, in the pre-Civil War period monetary disturbances originated with the Bank of England when it raised Bank rate. This in turn would induce specie flows from the U.S., a contraction in the U.S. money supply, and an economic downturn. Under the classical gold standard, 1879-1914, monetary disturbances in both countries affected income in each country, although influences from the U.K. dominated. According to econometric evidence based on Granger causality tests, movements in real income in both countries were Granger-caused by lagged money growth in each country, but U.S. real income was Granger-caused by both U.S. and U.K. lagged money while U.K. real income was not influenced by U.S. money.

Evidence for Other Countries

Was adherence to the gold standard a sufficient condition for stability. Fratianni and Spinelli (1984) argued that it was not for Italy. Whenever the government increased its expenditures and financed its deficits by issuing money, Italy abandoned the gold standard.[58] Moreover, in the decade and a half before World War I without being formally on the gold standard, Italy managed to maintain price stability and rapid economic growth.

McGouldrick (1984) found, contrary to the evidence for both the U.S. and the U.K., that both money and real output in Germany were more stable under the gold standard than in the post-World

War II period, but he attributed this successful performance primarily to superior Reichsbank monetary management rather than adherence to the gold standard per se.

The Balance of Payments Adjustment Mechanism: Hume vs MABP

The classical balance of payments adjustment mechanism of the gold standard postulates that, in the face of monetary or real shocks, balance of payments equilibrium is restored by the price-specie-flow mechanism aided by short-term capital flows. By contrast, according to the monetary approach to the balance of payments, 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 the key assumption of commodity arbitrage by examining correlations among price changes between countries, and among regions within countries under the gold standard, 1880-1913. 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.[59] 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. Finally, McCloskey and Zecher (1984) tested for 'purchasing power parity' with evidence from the U.S., Canada and Great Britain 1880-1939.

Italian evidence under the gold standard for the Humean adjustment mechanism and against the MABP is based on persistent deviations from purchasing power parity (explained by country risk) and Granger-Sims causality tests that show (among other things) that changes in domestic and foreign prices take up to two years to produce gold flows. (Fratianni and Spinelli 1984).

The Rules of the Game and the Managed Gold Standard

In a classic study, Bloomfield (1959) presented powerful evidence that most central banks during the classical gold standard era did not follow the rules of the game but violated them, counteracting gold flows by offsetting changes in domestic assets. Moreover, Goodhart (1971) found that the Bank of England, rather than causing the domestic money supply to respond to external balance considerations as postulated by traditional theory, accommodated variations in domestic economic activity, using its discount rate policy to attract gold flows to meet the domestic demand for money. McCloskey and Zecher (1976) argued, according to the monetary approach to the balance of payments that the central banks of the world ignored the "rules of the game" because they were inconsequential--if the world's economy is unified by arbitrage and the world's price level is determined by the world's money supply, then the central bank of a small country adhering to the gold standard could control only the composition of the monetary base between international reserves and domestic credit and not its total amount. Even England held such a small fraction of the world's gold reserves that its influence on the world money supply would only be minor.

Recent research sheds new light on the management of the gold standard. Two studies focus on the performance of the Bank of England and the "Rules of the Game" prel914. Dutton (1984) presented evidence based on estimates of a central bank policy reaction function that the Bank violated the rules, in the traditional (Bloomfield) sense--that they counteracted gold flows by offsetting changes in domestic assets, and in a different sense--that they pursued countercyclical policy. Pippenger (1984), on the other hand, based on a portfolio balance model of bank behavior, presented evidence that the Bank was sensitive to threats to convertibility posed both by internal and external shocks and that it did not accommodate changes in domestic income.

To reconcile the findings of Bloomfield and others of an inverse association between international reserves and domestic credit suggesting violation of the "rules", with his finding that the Bank was primarily concerned with convertibility, Pippenger suggested that the inverse association between reserves and domestic credit can be explained by the monetary approach to the balance of payments--in the long-run the central bank can only control the composition of the base.

Recent studies for other countries present evidence of persistent violations of the rules. Although Italy was only formally on the gold standard for a fraction of the gold standard period, Fratianni and Spinelli (1984) showed that the long-run behavior of the Italian money supply and monetary base was not very different from that of countries with no interruption to their adherence to the gold standard--international reserves were an important determinant of growth in the base. Application of the Bloomfield/Nurkse test of the rules of the game of correlating changes in international reserves with changes in domestic assets revealed an inverse association consistent with violation of the rules. However, the authors regarded this result as more likely the response of international reserves to changes in domestic credit induced by Italian fiscal deficits, in line with the monetary approach to the balance of payments, rather than deliberate offset policies.

According to Jonung (1984) the Swedish experience in the classical gold standard era 1880-1913 was dominated by long-term borrowing that allowed Sweden to run a persistent current account deficit without significant gold outflows. Indeed over the period net foreign assets constituted the major source of expansion of the monetary base. Within this context the Riksbank, Sweden's central bank, though committed to the overriding goal of convertibility, shielded the domestic money stock from external drains.

McGouldrick (1984) showed that the Reichsbank, Germany's central bank in the period 1879-1913, behaved in a similar fashion. By varying its discount rate, causing German interest rates to rise less than foreign rates in a cyclical upswing and to fall less than foreign rates in the downswing, the Reichsbank in effect substituted domestic credit for gold and thus maintained a constant portfolio.[60]

Drummond (1976) found evidence that Russia did not follow the rules of the game during its experience on the gold standard (1897-1914). Annual changes in the money supply were independent of changes in gold reserves, there were few changes in discount rates, and the link between the gold reserve and the discount rate was weak. Russia, according to Drummond, was able to insulate its monetary system because of its large gold reserves and extensive reliance on foreign borrowing.

According to Viner (1924), the price-specie-flow mechanism before World War I worked smoothly and rapidly for Canada without a central bank, because the commercial banks quickly converted foreign capital inflows into increases in the money supply. Rich (1984) accepted the conclusion for the long run but disputed it for the short run. He provided evidence that the Canadian commercial banks rather than facilitating the adjustment mechanism and following the rules of the game, actually impeded the adjustment mechanism and violated the rules. According to Rich, the Canadian commercial banks by varying their reserve ratios were able to impart a procyclical pattern to the money supply despite an observed countercyclical pattern for the monetary base.

Clark (1984) re-examined the issue that Morgenstern (1959) raised, namely whether the gold standard operated efficiently in the sense that violations of the gold points were quickly corrected by gold flows. With better data and methodology than were available to Morgenstern, he found frequent cases of violations of the gold points-that were not quickly corrected--evidence that arbitrage opportunities were missed--and numerous cases of predicted gold exports actually accompanied by gold imports--evidence that the gold standard was not efficient. Clark attributed the violations of the gold points to government intervention, especially attempts to prevent gold outflows, such as the successful intervention by the U.S. Treasury in 1906 and by private syndicates in 1895 and 1896.[61]

Officer (1985) forcefully argues that Clark used an inappropriate financial instrument to measure arbitrage--the London or New York cable rate. Using instead, demand bills he finds virtually no violations of the gold points or evidence for inefficiency of the gold standard.

The Interwar Gold Standard

Although it is well known that the interwar gold standard was characterized by violations of the rules of the game, Eichengreen, Watson and Grossman (1983) provided new evidence on policies of the Bank of England that contributed to interwar instability. Using a dynamic probit model, the authors tested the Bank's discount rate reaction function 1926-1931. Because the Bank raised the discount rate when international reserves fell but not vice versa, its policy shifted the burden

of adjustment onto deficit countries when Britain ran a surplus, thus contributing to the interwar standard's instability. Eichengreen (1984) used a simple model of leadership and cooperation to show, on the basis of British and French experience in the 1920's, that had attempts at central bank cooperation succeeded, monetary policy would have been less deflationary than otherwise.

Bimetallism and Gresham's Law

Bimetallism

In a bimetallic standard, both gold and silver are given legal tender status and the ratio of their prices is fixed at the mint. The commodity with the lower market price ratio will circulate. The U.S., France and many other countries were on bimetallic standards throughout much of the nineteenth century. An advantage claimed for such a standard is that it ensures greater price stability than a monometallic standard as substitution between the two metals offsets the inflationary or deflation tendencies produced by changes in supplies of one metal relative to real output.

Drake (1984) 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,[62] 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.[63]

In the case of Japan's bimetallic standard, upon its opening up to the west in the 1850's, according to Okhawa and Shimbo (1978), the domestic gold/silver ratio was set in excess of the international ratio, leading to a massive inflow of silver and an outflow of gold.[64]

In Nigeria, according to Ofonogaro (1979), both cowries and British currency circulated for close to three quarters of a century despite the British attempt to suppress cowries. The British

currency issued in large denominations, was of no use in low-income agricultural areas (most of the country) so its use was limited to international trade. With inflation and rising real income in the mid-twentieth century, British currency came into general use throughout the country.[65]

Gresham's Law

According to Gresham's Law, in a bimetallic system when the market and legal prices of the two metals differ, the bad money (overvalued) drives out the good money (undervalued). Yet the historical experience of the U.S. and Canada seems to violate the law.

In the pre-Civil War period from 1792-1833 when silver was overvalued, and gold undervalued, gold coins circulated at a premium, while from 1834-61 when gold was overvalued silver subsidiary coins disappeared. Rolnick and Weber (1985a) 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 demonination 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.

In pre-Confederation Canada, contemporaries frequently complained of a shortage of currency. According to Redish (1984), in an argument similar to Rolnick and Weber's, Canada's currency laws gave legal tender status to both gold and silver coins by tale (face value) and not by weight. Thus the observed shortage of currency in the early part of the nineteenth century when the gold/silver ratio was low was primarily a shortage of low denomination high quality silver coins apparently driven out by low quality (clipped) foreign silver coins, while gold coins circulated at a premium.

In a similar vein Hanson (1979) explained the shortage of coin in the American colonies as a consequence of undervaluation of silver relative to gold in the eighteenth century at the British mint. This caused small-denomination silver to be melted down and shipped to the Continent and India.

Michener (1983) explained the shortage of money in Colonial America as a phenomenon that occurred during depressions induced by abrupt reductions in the money supply. According to him, the Colonial economy was characterized by a system of multiple prices: barter (shop notes); credit; and cash. During a deflation a seller would confuse a decline in the overall price level with a fall in the price of his own product and hence would shift to barter (trying to sell at a higher price). He cited pamphlet evidence during periods characterized by shortages of money both of widespread use of shop notes and barter and also of deflation.

III.7.2. Fiduciary Standards

Historical research covers the two aspects of fiduciary standards--the external aspect--flexible exchange rates, and the internal aspect--free competition in the provision of money.

Flexible Exchange Rates

Since the breakdown of the Bretton Woods system in 1971, the major industrial countries of the world have adopted floating exchange rates but the system that has evolved is one of managed floating--with frequent intervention by the monetary authorities in the foreign exchange market. In the last decade many economists interested in exchange rate determination turned their attention to floating rates of the past--specifically to two periods often described as 'clean' floats, the greenback period from 1861-1878 when the U.S. dollar floated vis a vis the rest of the world; and the 1920's when most major countries floated their rates before returning to the gold standard.

The Greenback Episode

Officer (1981) used the greenback episode and a new annual data base[66] to test three competing theories of exchange rate determination: purchasing power parity, the Keynesian theory, and the monetary approach to the exchange rate. In the greenback period the relevant exchange rate was the dollar--pound rate--the product of the greenback price of gold and the gold dollar price of the pound. According to Officer, contrary to the traditional view, the latter ratio was rarely at par although most of the fluctuation occurred in the 'gold premium'. He ignored the influence of both expectations

and speculation because he was primarily interested in explaining long-run or fundamental exchange rate movements.[67]

Three versions of the purchasing power parity theory exist: (a) the pure theory--the exchange rate is solely a function of the ratio of domestic to foreign prices; (b) the theory augumented in turn by capital flows and by (c) the ratio of foreign to domestic interest rates. According to the Keynesian theory, the exchange rate is a function of foreign relative to domestic prices, real income, and interest rates. According to the monetary approach it is a function of the foreign relative to domestic money supplies, real income, and interest rates. Officer's results rejected both Keynesian and monetary approaches, with the best fit exhibited by the interest-augumented version of purchasing power parity.

In addition his calculated index of the real exchange rate based on GNP deflators suggests that considerably less deflation was required to resume specie payments than was previously believed from similar calculations by Kindahl (1961) and Friedman and Schwartz (1963a) based on the wholesale price index. Resumption could have occurred as early as 1875, judging from the actual exchange rate compared to Officer's real rate.

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 acccordance with Mitchell's hypothesis.

Patterson and Shearer (1982) examined the greenback episode from the perspective of Canada, which remained on the gold standard. Using a new exchange rate series they tested whether the flexible exchange rate insulated the Canadian economy from the rapid inflation in the U.S.[68] Their study showed considerable insulation, with Canadian prices moving more in tune with those in Great Britain. However, they also detected a significant influence of the greenback-gold exchange rate on Canadian economic activity through changes in the terms of trade.

The 1920's

In a series of important papers on the floating experience of the 1920's, Frenkel[69] tested a version of the monetary approach to the exchange rate, according to which the exchange rate is determined by the ratios of money supply to money demand in each of two countries. Key determinants of movements in the exchange rate according to this approach are the ratios of domestic to foreign money supplies, real income, and a measure of the expected change in the exchange rate.

Log linear regressions of spot exchange rates against the mark during the German hyperinflation February 1921-August 1923, on these variables, with the forward-spot spread as a measure of expected changes in the exchange rate, all were highly significant and yielded signs consistent with the model. Similar tests for the dollar, pound and franc during the normal period February 1921 to May 1925 yielded results consistent with the theory though of less significance. In addition purchasing power parity held in both periods and the exchange market was efficient in the sense that the forward exchange rate summarized all the relevant available information on the future evolution of the spot rates.[70]

Eichengreen (1982) used a modified version of the monetary approach to solve for the exchange rate to determine whether speculation was destabilizing to the franc in 1923-24 as Nurkse (1944) argued. The modification, to account for speculation, followed Dornbusch's treatment of expected changes in the exchange rate as a function of the gap between the current exchange rate and current purchasing power parity and the difference between domestic and foreign inflation.

He compared the variance of the exchange rate predicted by the modified monetary approach with that of a counterfactual exchange rate in the absence of speculation, and concluded that speculation was stabilizing.

Other Experiences

Bernholz (1982) found several empirical regularities in the behavior of price levels and the exchange rate in 14 historical episodes of floating exchange rates ranging from mid eighteenth century Sweden to the present: purchasing power parity prevails in the long run but not the short run;

systematic undervaluation of currencies of countries pursuing expansionary monetary policy, with the degree of undervaluation depending on the magnitude of inflation relative to that of trading partners; undervaluation disappears with a return to monetary stability. To explain these phenomena Bernholz, Gartner, and Heri (1985) simulated a version of Dornbusch's (1976) asset model of the exchange rate, incorporating a learning process with respect to the money supply in the formation of expectations. Simulations of prices and exchange rates based on alternative monetary growth rates produced results comparable to the actual historical performance in the case of Russia 1803-1814, the U. S. 1861-71, Sweden 1755-1768 and Hungary 1914-27.

Free Competition in Money

Dissatisfaction with current monetary arrangements, in addition to sparking interest in commodity money standards as a superior alternative, has also led to interest in competing currencies. Theoretical papers by Black (1970), Fama (1980), Hall (1982) and Greenfield and Yeager (1983) have argued the case for free competition in the provision of media of exchange with a possible role for government certification of the unit of account.[71] Study of past experience with the competitive issue of bank notes has been sparked by the interest in such hypothetical schemes.

Neoclassical economics while supporting the case for the competitive provision of all other goods and services has traditionally argued that fiduciary money is a technical or natural monopoly which should be regulated by the government.[72] Moreover, the free banking experience in the U. S. before the Civil War and the experience of the British country banks in the early nineteenth century encouraged the traditional view that free competition in the provision of bank notes was associated with counterfeiting and fraud in addition to serious external effects as a consequence of free bank failures. The neo-classical view has been challenged in recent studies.[73]

Free Banking in Scotland

Scotland, according to L. White (1984a) had a fully operating free banking system for a century and a quarter (1727 to 1844). The key features of this system were: (a) free entry into banking

and the free issue of bank notes; (b) bank notes were fully convertible into full-bodied coin; (c) unlimited liability of bank shareholders.

It is traditionally argued that an individual bank in a freely competitive environment, where the costs of issuing paper notes are virtually zero, can issue notes without limit. Yet White argued that though the cost of issuing notes was low, there are rising costs to maintaining them in circulation. The public would only be willing to hold bank notes if they had faith in the brand name of the issuer. Key determinants of brand name capital are ease of redemption and reliability.[74]

Two mechanisms ensured against overissue within the banking system: direct customer redemption and redemption via the note exchange system (similar to a clearing house). In both cases, overissue of notes by an individual bank or group of banks would lead to a decline in specie reserves and a contraction of note issue. Moreover the fact that Scotland was a small open economy on a fixed exchange rate with the rest of the world ensured against overissue by the banking system, since such an expansion in the money supply by raising prices at home relative to those abroad would lead to a balance of payments deficit, a specie outflow, and enforced contraction in the note issue.

Scotland's record under such a system was one of remarkable monetary stability. She experienced very few bank failures and very few financial crises. The reasons, according to White, were twofold. First, the unlimited liability of bank stockholders and strict bankruptucy laws instilled a sense of confidence in noteholders.[75] Indeed the Scottish banks would take over at par the issue of failed banks (e.g., the Ayr bank 1772) to increase their own business. Second, the absence of restrictions on bank capital and other impediments to the development of extensive branching systems allowed banks to diversify risk and withstand shocks.[76] In addition, there was little evidence of counterfeiting because of the quick redemption operations of the note exchange system. Though there was some evidence of economies of scale in the provision of notes, White detected none of monopoly.

By contrast England (until 1826) had a system with a monopoly of the note issue by a central bank within a 26-mile radius of London. Outside that limit note-issuing joint stock banks (country

banks) were limited to 6 partners. This system was characterized by frequent financial crises, numerous bank failures, and the Bank of England unwilling to aid the country banks, according to White.

Free Banking in the United States

In contrast to that of Scotland, the free banking experience of the U.S. before the Civil War has traditionally been regarded as a failure. According to that view, free banks frequently degenerated into wildcat banks (designed specifically for the purpose of fraudulent overissue) and the banking industry was characterized by massive failures and great instability. Recently Rolnick and Weber (1983) following the pioneering work of Rockoff (1974) challenged the traditional views. The experience of four states (New York, Wisconsin, Indiana, and Minnesota) revealed that: (a) though one-half the free banks failed, most paid off their notes at par; (b) most banks had lives in excess of five years--evidence against wildcatting (and contrary to Rockoff's findings for Michigan)[77] (c) based on a measure of the expected value of a randomly selected bank note held until 1863, bank notes were relatively safe.

Rockoff contended that defects in state bank laws which allowed banks to issue notes based on the par rather than the market value of state bank bonds encouraged fraudulent behavior and led to the development of wildcatting. He tested his argument by showing a greater incidence of bank failures in states with par valuation than in those without.

Rolnick and Weber (1985b) however attributed bank closings to a sharp decline in state bond prices that precipitated runs on banks by noteholders. The decline in bond prices exposed banks to the risk of suffering capital losses on their securities holdings that impaired their ability to redeem at par. Eighty percent of free bank closings occurred in periods of declining bond prices in states with and without par valuation (such as New York) was evidence offered by these authors for their interpretation.

Rolnick and Weber (1985c) also tested whether free banking was inherently unstable, whether due to extrinsic uncertainty or intrinsic uncertainty. Extrinsic uncertainty in the economy can cause bank creditors to randomly decide to withdraw their funds for apparently irrational reasons.

Such withdrawals can become contagious leading to runs on other banks. Intrinsic uncertainty occurs when local real shocks reduce the value of some banks' assets, and their creditors begin to withdraw funds. Because noteholders are ill-informed about the value of bank assets, they cannot perfectly distinguish sound banks from unsound ones. Such withdrawals, then can become contagious leading to runs on other banks. Evidence from four states in the free banking era indicated that most failures were associated with local real shocks (reflecting intrinsic uncertainty) but that bank failures rarely spread from state to state. The requirement that free banks keep a reserve of state bonds backing their notes accounted for the absence of contagion. Such a requirement provided some public information about banks' portfolios, thus enabling note holders to distinguish good from bad banks when local shocks occurred.

King (1983) examined the experience of New York State in the pre Civil War period--a state characterized by a dual banking system of chartered and free banking. Both systems required that bank notes be convertible into specie. The chartered system was protected by a safety fund, to which all chartered banks contributed a fraction of their capital as an earnest against losses on note issue. The free banking system required that bank notes be backed by the market value of eligible bonds. Evidence on bank failures and loss rates on notes suggested that both systems worked fairly well except during major financial crises: 1839-43 and 1857.

The U. S. experience with free banking was not as successful as that of Scotland but was not too dissimilar from that of England. According to Vaubel (1984c), it was not free banking per se that was responsible for this performance but deficient legislation which countenanced insufficient backing for the notes and restrictions on bank size.

Alternative Institutions: Fractional Reserve Banking in Grain and Private Central Banks

Williams (1984) demonstrated that fractional reserve banking evolved in the mid 1860's Chicago grain market in a manner similar to the evolution of modern commercial banks from medieval goldsmiths. Chicago warehouses issued receipts for standardized bundles of grain. These receipts satisfied three conditions for successful fractional reserve banking: they were considered valuable in their own

right--they were used as a media of settling accounts in grain; holding fractional reserves was more profitable than full reserves; the depository had the legal right to dispose of depositors as if it itself owned the goods and agents were willing to make deposits aware of this relationship. Warehouse receipts were put into circulation in ways similar to those used by early note issuing banks--by lending or direct purchase. However, fractional reserve banking in grain did not evolve into modern commercial banking because by the mid 1870's the State of Illinois intervened, under pressure to end such fraudulent activities as the issuing of more receipts than goods on hand, and enforced the holding of full reserves.

For Santoni (1984), a private monopoly central bank faced with market constraints, will provide a more stable money supply than a public one.[78] This analysis of the Bank of England from 1695 to 1930, when the Bank was private, stresses that it faced constraints on its note issue[79] which protected the value of stockholders' investment and ensured price stability. When it was effectively taken over by the government during the Suspension of Payments 1797-1821, it violated the constraints, producing a permanent depreciation in the real price of Bank of England stock and significant inflation.[80]

IV. An Agenda for Future Research

Our exploration into the recent literature of monetary history has revealed interesting new evidence on a number of themes: new monetary statistics and studies of the supply of and demand for money; the use of causality tests in monetary history; the long-run behavior of velocity; the importance of monetary disturbances in affecting real economic activity in episodes such as the Great Depression; the nature of financial crises; the relationship between money and prices in earlier times and the operation of alternative monetary standards in the past. In what follows I evaluate the major findings on each of these topics and set out an agenda for future research in monetary history.

First, the U.K. data reveal stable money demand functions similar to the U.S. but different money supply processes reflecting the openness of the economy and the greater stability of the banking system.

The development of new monetary statistics for the U.K., Canada, and other countries represents an important first step to understanding many of the key issues of monetary history. Thus the first and perhaps most important item on the agenda for future research is the derivation of data on the money supply and its components for countries which at present suffer from a paucity of reliable estimates before World War I. This includes virtually the whole world with the principal exceptions of the U.S., U.K., Canada, Australia, Japan, and countries in Western Europe. Such data would provide further evidence to test existing theories on the relationship between money and spending. The data are needed to help resolve old controversies in the historiography of different countries and to shed light on controversies that have been neglected in their absence.

Second, causality tests between money, income, and prices reveal the dominance of one-way causality from money to income and prices for the U.S. before World War I but reverse causality for the U. K. Such a result may be due to the more open nature of the U.K. economy. The use of recently developed causality tests in monetary history is a welcome addition to the economic historians' tool kit but like all new technologies its limitations should be taken into account. Specifically evidence for temporal antecedence is a useful supplement to both solid historical evidence consistent with the causality tests results and to economic theory.

Third, the evidence that institutional factors are important long-run determinants of velocity in a number of countries suggests that detailed historical studies of the monetization process and of the development of financial intermediaries in different economies are important not only in their own right but also because they shed further light on the key link between money and income. Future research detailing the monetization process for countries other than Sweden would be most welcome.

Fourth, the literature on the Great Depression brings out the complexity of the relationship between monetary and nonmonetary forces. Though monetary forces are viewed as the key cause of the Great Depression, nonmonetary forces, especially institutional factors such as the regulations governing banking structure, emerge as having considerable importance. 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.

In addition to the literature directly spawned by the Temin's book, several new explanations of the causes, duration, and severity of the Great Depression have appeared. Some explanations amplify the importance of monetary factors, others support the importance of real factors.

On the basis of this research a clearer picture of the causes and processes of the Great Depression in the U.S. is emerging. Evidence on other countries' experience is much more limited. To tie together the alternative strands of evidence on the causes and processes of the Great Depression in the U.S. and the rest of the world three elements are required: a general equilibrium framework able to incorporate all the partial equilibrium stories; historical analysis within the theoretical framework; statistical tests both of the traditional structural and reduced-form equations and the less restrictive vector autoregressions. In addition evidence on monetary disturbances for other countries and other times would be of great value.

Fifth, the literature on financial crises raises issues concerning: (a) their existence; (b) their causes; (c) their propagation and (d) their resolution. Three approaches to these issues have been followed: that of the monetarists; that of Kindleberger; and that of rational expectationists. However the empirical evidence on each of the issues for each of the approaches is thin. It is mainly descriptive and anecdotal. One good reason for the lack of quantitative evidence on financial crises is their ephemeral nature. They occur in a matter of days making it difficult, even in recent times, to quantify.

Probable additions to our stock of knowledge would be provided by further case studies of individual financial crises using the recently developed rational expectations approaches of Garber and Flood, and Gorton; in addition to studies on the lines of the Batchelor and Desmond study of the Overend-Gurney and Baring crises or of the Neal and Schubert study of the South Sea and Mississippi Bubbles. Also, greater

use could be made of available weekly and daily data on stock prices, interest rates, and exchange rates which existed as far back as the eighteenth century (e.g., in Neal (1985)).

Old controversies in monetary history as to whether monetary or real forces were the primary causes of inflation have been revitalized by studies that have unearthed new evidence and new explanations. In addition, historical evidence for the new classical macroeconomics proposition of the short-run neutrality of money has been advanced..

The modern quantity theory view linking episodes of inflation to episodes of sustained monetary expansion has not been undermined but alternative explanations have found supporters. The sixteenth century price revolution has been explained both by monetary forces central to the monetary approach to the balance of payments and by the influence of population growth that raised velocity independent of money growth. However since both results hinge on primitive sets of data, the outcome is yet to be decided.

Recent work in line with the theory of rational expectations calls into question the traditional wage lag hypothesis of the debate on the standard of living. Evidence during the British Industrial Revolution on the termination of hyperinflations illustrates the importance of regime changes also in the context of recent developments in rational expectations theory. The apparent lack of real effects associated with monetary reforms introducing 'backed' currency monetary regimes agrees with neutrality in the short run.

The apparent paradox of the lack of observed correlation between the growth of paper notes and prices during the American Colonial experience has been explained by public willingess to hold notes backed by a pledge to raise future taxes. Again however the paradox may simply be a reflection of inadequate data on money and prices.

The agenda for new research in this area includes the need for data to resolve earlier controversies; studies of controversies and 'paradoxes' for other countries and times, and the analysis of previously overlooked periods of rapid inflation. In addition information on additional types of regime changes

should provide further evidence for the rational expectations hypothesis, including periods when specie payments were resumed; when the monetary standard was changed; and when a new monetary institution such as a central bank was established.

Seventh, although our understanding of the operation of the classical gold standard has improved, important questions still remain to be answered.

Whether the Hume mechanism or MABP best explains the operation of the classical gold standard remains unresolved. This evidence is consistent with the existence of a number of adjustment mechanisms, each operating within different time horizons--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. Thus running a race between the classical and MABP models only has limited value because of the complexity of the issue.

An important question raised by studies of the rules of the game is why the gold standard system worked for a number of advanced countries, while most countries on the gold standard, with or without central banks, violated the rules of the game. One possible answer is that the violations were only limited; cumulative deficits were financed by capital flows. Jonung's evidence for Sweden as well as the extensive literature discussed in Bordo (1984a) suggests that long-term capital flows played a key role for a number of developing countries in cushioning payments imbalances. Moreover, Bloomfield (1969) found short-term capital flows were a stabilizing influence on the balance of payments. These facts, plus the extensive holdings of foreign balances in London, suggests that most countries did not have enough leeway to do much harm, so long as they were primarily concerned with the maintenance of convertibility.

Another unsettled question is on whether and to what extent policies in various countries that violated the rules hindered or speeded up the adjustment mechanism. Modern studies of the operation of the gold standard in core countries such as France as well as of peripheral countries such as Australia remain to be undertaken.

Historical research on alternative monetary standards is not as extensive as that on the gold standard reflecting more limited concrete historical examples. Nevertheless recent studies of bimetallism, multiple currency areas, and Gresham's Law complement the theoretical interest by Hall (1982) and others, following the pioneering approaches of Jevons, Marshall, and Fisher, in a plural commodity-based monetary standard. Research on bimetallism and other commodity standards as they existed in many countries, on the lines of the Drake, Redish, and Rolnick and Weber studies, is needed.

Historical studies of floating rates complement the ongoing debate over the case for flexible versus fixed exchange rates. These studies suggest that flexible rates were not characterized by destabilizing speculation and that they effectively served to insulate domestic economies from external shocks. A comparison of the operation of 'clean floats' of the past with the present managed float may explain current problems of interdependence and large unexplained swings in exchange rates.

Free banking coupled with convertibility into specie was successful in Scotland but less so in other countries. The reason appears to be that legislation governing the banking system was crucial to the success or failure of free banking. To answer the questions why free banking was successful in some environments but not in others further studies of the operation of such a system, following the seminal works of White, King, and others, would be welcome. In addition, studies of alternative types of institutions, such as e.g., fractional reserve banking in grain, would provide new insights into the evolution of monetary institutions.

Finally, a line of research that has not yet been attempted is a search for historical evidence of the Barro-Gordon credibility thesis. The gold standard prevailed for well over a century in many countries and was only temporarily suspended (by major adherents) in the case of wartime emergency. Barro and Gordon suggest that many governments did not violate the gold standard constraint and periodically engage in inflationary finance on Kydland and Prescott lines because the cost of lost credibility outweighed the benefits of seigniorage. Thus presumably the public attached great importance to

the long-term price stability and predictability properties of the gold standard. By maintaining the standard in peacetime, governments could collect greater inflation tax revenues from a public that believed violation of the rules was only temporary. Using such a framework, investigators could analyze different countries' past experience with different monetary standards

This survey by focusing primarily on the macro relationships between money, prices, and real output has omitted important topics in both financial and monetary history. Of special importance is the extensive research on: the behavior of interest rates, e.g., the literature on Gibson's Paradox including work by Harley (1977), Friedman and Schwartz (1982), Shiller and Siegel (1977) and Benjamin and Kochin (1984); the literature on early policy debates e.g. the Currency Banking School debate Collins (1978); the literature on financial development, Neal (1971), Kindleberger (1984b); financial innovation, Sylla (1982); financial integration, Sylla (1977), Sushka (1984), Neal (1985); regulation, E. N. White (1982) (1983). The omission is no reflection on the importance of these topics. Further research in these areas is also worthy.

To conclude, the paths for future explorations in monetary history are myriad. If the research that has been successfully completed in the past decade is any indication, future research should be even more promising.

FOOTNOTES

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[1]However, Zarnowitz (1985) p. 551, argues that "The primacy of the monetary effects cannot be established by the less than compelling argument that, since money plays a key role in the major cycles, it should also be important in the minor cycles..."

[2]In addition, both Gordon (1982) and Mishkin (1982) have provided strong evidence against short-run neutrality.

[3]Other defects of the Economist data include: before 1891 it didn't distinguish between joint stock and private banks; it didn't distinguish between banks and nonbanks; it didn't adequately account for mergers; different banks structured their balance sheets differently; figures presented on different dates were grouped together. See Capie and Webber (1985).

[4]Nishimura's series is based on Miscellaneous Statistics of the U.K.: British Parliamentary Papers 1882, Vol. LXXIV and Minutes of Evidence Taken Before the Select Committee on Banks of Issue B.P.P. 1875, Vol IX, Appendix No. 18.

[5]Bordo constructed a gold coin series based on benchmark estimates of gold coin provided to D. K. Sheppard by the Royal Mint. He extended a series of silver and bronze coins backwards from 1880 using Sheppard's method.

[6]Huffman and Lothian (1980) also estimated a high powered-money series for the U.K. from 1833-80 by extending backwards Sheppard's series accounting like Bordo for the minting, export and import of coin.

[7]Capie and Webber follow the approach of Nishimura (1976) in constructing a new deposit series for the U.K. They divide the U.K. banking sector into eight constituents and then calculate the

deposits for each constituent on the assumption that each category of banks with a similar number of branches had similar deposits per branch. Data from bank archives as well as from The Economist were used to get per branch estimates of deposits for each group. In addition a new currency series is derived based on the Jevons estimates of coin, and accounting (as previous researchers had not done) for the melting of coin and emigrant exports. Other new data include: a series of bank reserves; a series of interbank deposits; a series distinguishing between central banking and commercial banking functions of the Bank of England; and accounting for the division of Ireland in 1922.

[8]Recently Sims (1980) has extended the analysis to the multivariate case.

[9]The use of these techniques has been criticized by Zellner (1979) and Leamer (1985). The upshot of this criticism is that causality in the Granger-Sims sense is only evidence of temporal antecedence. To relate such evidence to causality in the usual sense an a priori theory is required.

[10]The authors argued that monetary policy cannot affect income under the gold standard. Friedman and Schwartz (1982) replied that "the exchange rate regime does not affect the existence of a 'causal' influence from money to income; it affects the forces determining the quantity of money and thereby whether the situation is one of a largely unidirectional influence from money to income or of simultaneous determination and interaction" (1982, p. 325).

[11]According to Huffman and Lothian (1984), movements in real income in both the U.S. and the U.K. were Granger-caused by lagged growth in high-powered money in each country.

[12]Such a pattern is evident for the United States, Canada, United Kingdom, Sweden, Norway, Denmark, Finland, Holland, France and Australia (Bordo and Jonung (1985)).

[13]Friedman and Schwartz's explanation for the observed decline in velocity (V2) in the U.S. from 1867 to just after World War II, based on Friedman's (1959) estimate of the permanent income elasticity of the demand for real cash balances of 1.8, was that money can be regarded as a luxury good.

[14]In a similar vein, Graves (1978) found that introducing demographic variables into the demand for money, using both long-run United States time-series data and post-World War II cross-section

data for a number of countries, lowered the income elasticity of demand. He argued that these demographic variables: e.g., urbanization, age, education, income equality, and household size, are highly correlated with real income and that regressions using real income (permanent and measured) excluding these omitted variables tended to be biased upwards.

[15]Riley (1984) however found that monetization cannot explain declining velocity in France 1650-1700, attributed it instead to increasing hoarding related to social status. Also see Riley and McCusker (1983).

[16]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.

[17]Lothian's (1981) criticism of the sample underlying Gordon and Wilcox's simulations was that it covered only a limited number of observations of business cycles. Using annual money and income data over the period 1893-1928 he found that money explained a substantial proportion of the fall in income until 1930 and all of the decline in the decade of the 1930's.

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

Also see Meltzer (1981) who argued that the monetary base couldn't 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 (c) Fed open market policy did not respond much to movements in income.

[18]Trescott (1984) found that Boughton and Wicker's demand for currency regression were unstable when divided at February/March 1933 and at January 1924. When the pre-1924 and post-March 1933 periods

are deleted (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.

[19]Wicker viewed the failure of the Bank of United States in December 1930 as highly 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.

[20]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 the elasticity was large enough to justify Temin's claim.

[21]See also Schwartz (1981) p. 20 and Meltzer (1976).

[22]Also see Temin (1983).

[23]See Bordo and Schwartz (1977) p. 102.

[24]Anderson and Butkiewiez (1980) find similar results using quarterly data.

[25]For a survey of recent literature emphasizing real causes of the Great Depression see Galloway and Vedder (1985).

[26]Streefkerk (1983) constructs 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 story.

[27]However according to Vaubel (1984a) Bernanke's results may imply that bank failures led to a risk induced rise in the demand for money or else be 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 to bank failures.

[28]According to Gordon and Wilcox (1981) monetary contraction in 1928 and 1929 was unrelated to the deflationary effects of the gold standard because the U.S. didn't follow the rules of the game but sterilized gold outflows.

[29]Eichengreen and Sachs (1985) presented evidence for beneficial effects of currency depreciation by a number of European countries in the 1930's and against a commonly held view that competitive devaluations produced deleterious effects on the world as a whole.

[30]Kindleberger and Laffargue (1982), Wachtel (1983) Capie and Wood (1985).

[31]Cagan presented strong evidence that panics in the U.S. experience did not precipitate cyclical downturns since they all followed peaks in economic activity. Moreover, though panics were important in several cycles in reducing money growth more than would otherwise have happened and in converting mild contractions into severe contractions, he concluded based on U. S. experience that panics were neither a necessary nor sufficient condition for producing a severe contraction.

[32]According to Miron (1985), 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 used its open market operations 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. Miron linked the incidence of banking panics after 1929, on grounds similar to Trescott (1982), Field (1984), to a shift to a restrictive policy and the reduction of seasonal accommodation.

[33]See Huffman and Lothian (1984).

[34]For a detailed discussion of the Fisher-Minsky-Kindleberger view see Bordo (1985).

[35]Eichengreen (1981) reached a similar conclusion based on a quarterly regression equation explaining the Bank of England's international reserves according to the monetary approach to the balance of payments (MABP).

[36]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.

[37]The Creditanstalt crisis thus appears to be a good example of the recently developed speculative attack models developed by Flood and Garber (1983).

[38]See Bonelli (1982) on the successful resolution by lender of last resort of the 1907 crisis in Italy and Marz (1982) of the crisis of 1873 in Austria.

[39]Levy-Leboyer (1982) described a similar international transmission mechanism for the crisis of the 1830's.

[40]The U.S. experienced considerably more banking panics than other countries presumably reflecting the greater instability of the U.S. unit banking system, compared with nationwide branch banking elsewhere which allowed the successful pooling of risk. The existence of an effective lender of last resort in the other countries also instilled a sense of confidence in the public sufficient to prevent incipient crises.

[41]See Bordo (1975).

[42]See the references to Rostow's work in Bordo and Schwartz (1981).

[43]Initially they experimented with regressions for each country taken in isolation. However under the classical gold standard, to which both countries adhered, it would be incorrect to treat each country as if it were a closed economy since each country in such a monetary system must be viewed as an open economy with its money supply tied to the world price level through its balance of payments.

[44]A similar test using the same data (see Bordo and Schwartz 1980) correlated across commodities the residuals from a regression of different agricultural prices on the money-output ratio and the residuals of velocity as a function of real output and the interest rate. These residuals would represent that part of the variation in the price level not explained by aggregate forces. The insignificant correlation between the residuals of the wheat price and other agricultural commodity prices again rejects the Rostow and Lewis view.

[45]He also found the contribution of the reserve deposit ratio to money growth was less than that of the deposit currency ratio and high powered money, again inconsistent with the theory. These results are similar to those of Cagan (1965) for the U.S.

[46]Rockoff also provided evidence on the other aspects of controls: (a) based on a comparison of expenditure by the wartime price control administrations with that of the post office, wartime price controls in the U.S. did not create inordinately large bureaucracies; (b) in the periods of controls total factor productivity and labor productivity did not decline but increased slightly; (c) based on court case loads, black market activity, at least in World War II, increased markedly; and (d) evidence of widespread evasion of controls may reflect nonprice ways of resource allocation which in turn may explain the observed rise in productivity. See Rockoff (1984) for a thorough discussion of these issues.

[47]Capie (1985), who surveyed historical episodes of rapid inflation, concluded that hyperinflations occured only in the twentieth century, were always associated with the issue of unbacked paper currency, in situations of extreme social unrest or civil war. In such periods the authorities use the inflation tax to finance their expenditures. Faced with a decline in revenue, the authorities because of the threat to their continued existence, are willing to risk the loss of future credibility by expanding the note issue.

[48]Cagan's model has been criticized by inter alia Jacobs (1975) and Khan (1975). For a survey of this literature, see Webb (1983).

[49]Protopapadakis (1983) challenged the assumption of linearity in Sargent and Wallace's causality tests. Using a nonlinear time series process in similar tests he found that money Granger-caused prices and not the reverse.

[50]Also see Smith (1983, 1985). Calamaris (1985) provides evidence consistent with the Sargent view for the American Revolutionary War period and the post-civil war greenback episode.

[51]See the Report to the Congress of the Commission on the Role of Gold in the Domestic and International Monetary Systems, Volume 1, March 1982, Schwartz (1982), Cagan (1984) and Bordo (1984b) for a thorough discussion of criteria for evaluating alternative monetary standards with special reference to the performance of the gold standard.

[52]For a more detailed description of the operation of the gold standard see Bordo (1981b) and Schwartz (1985b). For a discussion of the literature on the traditional approach to the gold standard from the seventeenth century to the present see Bordo (1984a).

[53]Callaghan (1984), measured price predictability by the variance of forecast errors of the price level, generated by a Lucas-type aggregate demand and supply model. Her measure of price predictability, which differed from Klein's (based solely on past prices), shows a higher degree of price uncertainty over the gold standard period 1884-1914 than the post-World War II period 1946-81. Within the gold standard period price uncertainty was higher from 1884-1895 than from 1896-1914, reflecting the effects of the free silver movement. Meltzer (1984), using Kalman filter techniques, also found a higher degree of price uncertainty in the gold standard than in the postwar period. Also see Cooper (1982) pp. 10-12 who argued that evidence of a positive correlation between interest rates and the price level in Britain and the U.S. suggests that the public did not correctly foresee the long-term price changes that were to take place and was slow in adjusting expectations (as reflected in interest rates) to the price movements that had actually taken place.

[54]Hirsch's (1968) econometric study of the world gold industry shows positive supply elasticities slightly less than one for the U.S., South Africa and other major gold producers in the early twentieth century, a result consistent with the classical approach. Based on a cross section study of 14 U.S. states for the years 1889 and 1902, Eichengreen and Mclean (1985) found regional specific nonprice factors including: unemployment, the level of settlement and profitability in gold production; to be significant determinants of gold production.

[55]Dornbusch (1982) calculated the standard deviation of monthly changes in prices for the U.S. as 5.6% 1879-1912 vs. 4.3% 1960-79.

[56]According to Meltzer (1983), the number of business cycles in the U.S. was greater under the gold standard, 1879-1913, than since World War II. Moreover, in the postwar period, peacetime expansions were one-third longer and peacetime contractions were less than one half their average duration under the gold standard. Also see Cagan (1984).

[57]However Rush (1985) found that neither expected nor unexpected changes in the domestic component of the monetary base affected real output during the gold standard era 1880-1913 in the U.S. The association was rather between output and the money multiplier, lending support, he believes to recent real cycle theories (King and Plosser (1984)) and to approaches which stress the importance for economic activity of financial intermediation (Bernanke 1983).

[58]This was also the case in Argentina and numerous other countries in the gold standard period. See e.g. Ford (1960).

[59]Jonung (1984) tested the arbitrage assumptions of McCloskey and Zecher's (1976) version of the MABP, finding similar correlations of wheat prices between Swedish cities similar to those between Sweden and other countries in the eighteenth and nineteenth century, similar covariation between Swedish and British aggregate price indexes in the 1871-1913 period and a close relationship between Swedish and British interest rates. The findings suggested rapid arbitrage in the goods and asset markets.

[60]Also see Tullio and Sommariva (1984).

[61]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.

[62]Also see Timberlake (1978) who made a similar argument without the simulations.

[63]Garber (1985) treated dollar bonds under bimetallism 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.

[64]Also see Patrick (1965).

[65]Also see Nwami (1975).

[66]The principal new data series for the U.S. consist of Berry's (1968) real GNP, and GNP deflator, and an extension of Friedman and Schwartz's money supply data (which begins in 1867) back to 1860 based on interpolation of data in Friedman and Schwartz (1970). For the U.K. the new series are real GNP and the GNP deflator from Feinstein (1972), and the money supply data for 1870-1913 from Bordo (1981). For the period 1862-1870 Officer constructed a money supply series using the following procedure. He estimated a monetary base series for 1862-1913 using the same data as in Huffman and Lothian (1980), regressing the money multiplier of 1871-1913 on GNP and predicting it backwards to 1862. Finally he generated the money supply series from the predicted multiplier and estimated base series.

[67]To justify not accounting for expectations he cited Roll's (1972) evidence that expectations affected only the day-to-day or month-to-month fluctuations in the exchange rate, and to justify not accounting for speculation he cited evidence of stabilizing speculation in this period (Wimmer (1974) and Friedman and Schwartz (1963a)).

[68]See the discussion on Choudhri and Kochin (1980) on p. 33 above on the insulation properties of flexible exchange rates for Spain during the Great Depression.

[69]See Frenkel (1976) (1980) and Frenkel and Clements (1980) (1981).

[70]Though Italy attempted unsuccessfully on a number of occasions in the period 1866 to 1913 to remain on the gold standard, Spinelli (1984) treated its exchange rate as a floating one, and found that the monetary approach explained it.

[71]White (1984b) argued that all these schemes are pure inside money. To ensure a determinate price level, inside money must be made convertible into some 'outside' money. Hayek (1976) argued for competition among the issuers of base money.

[72]See Friedman (1960) p. 7. For arguments against this view, see Vaubel (1984b). Also see Friedman and Schwartz (1985).

[73]See Vaubel (1984c) for the experiences of other countries.

[74]See Klein (1974) for a pioneering study that applied his concept of brand name capital to money.

[75]Sweden from 1830-1902 had a system of competitive note issue and unlimited liability. According to Jonung (1977), there is evidence neither of overissue nor of banking runs. According to Fratianni and Spinelli (1984), Italy, in the period 1861 to 1914, had a competing central bank industry which eventually evolved into a monopoly with the victory of the dominant firm, the Banca Nazionale.

[76]However, according to Goodhart (1984), Scottish banks were always able to turn to the Bank of England as lender of last resort in a crisis. Gorton (1985c) attributed the absence of panics in Scotland to the fact that bank notes rather than demand deposits were the principal circulating bank liability. Bank notes have the desirable property that information on them can be easily ascertained through secondary markets (e.g., counterfeit detectors) whereas demand deposits are agent specific and information on them is difficult to assess.

[77]Citing very high losses in Michigan and the fact that free banking losses were high by modern standards, Rockoff (1985) criticized Rolnick and Weber's reliance on failure rates in the four states they studied to make their case in support of ante-bellum free banking. He argued that high failure

rates occurred primarily in frontier states with low degrees of financial sophistication. Furthermore, the experiences of more developed states with more effective safety nets e.g. New York and Ohio, as well as evidence comparing the rates of return on the capital of free banks to other banks in those states biased the case for free banking.

[78]For Timberlake (1978b) central banks evolved from private commercial banks because they also engaged in public banking functions. Thus the Bank of England and the First Bank of the United States began to intervene in monetary affairs and accept a public responsibility to help out other commercial banks in time of crisis.

[79]Its constraints were: it lent to the government at below market interest rates so that any increase in inflation would raise interest rates and reduce its profits; its notes issue was restricted to an amount less than or equal to its stockholders capital; and its notes had to be convertible into gold at a fixed exchange rate.

[80]Based on a regression of the real price of bank stock on the business cycle, the interest rate, and a dummy variable for the suspension period, the dummy variable indicated an eleven percent decline in the real price of bank stock.

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