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# SOME HISTORICAL EVIDENCE 1870-1933 ON THE IMPACT AND INTERNATIONAL TRANSMISSION OF FINANCIAL CRISES

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ABSTRACT

This study presents historical evidence for six countries (the U.S., U.K., Germany, France, Canada, Sweden) in the period 1870-1933 on the impact of financial crises on economic activity and on the international transmission of financial crises. The paper examines two approaches in the literature to the role and importance of financial crises as disturbances to domestic and international economic activity, that of the monetarists--Friedman and Schwartz and Cagan, and that of Fisher-Minsky and Kindleberger.

In a comparison of reference cycle contractions for the six countries over the period 1870-1933 severe contractions in economic activity were in all cases accompanied by monetary contraction, in most cases with stock market crashes, but not with the exception of the U.S., by banking crises. The unique performance of the U.S. can be attributed to the absence of a nationwide branch banking system compared to the five other countries examined, and the less effective role played by the U.S. monetary authorities in acting as a lender of last resort.

Our principal findings on the international transmission of financial crises are two. First, consistent with the monetarist approach, that under the Classical gold standard, in periods containing financial crises, nations' money supplies were linked by gold flows and changes in high powered money, while under periods of flexible exchange rates there is evidence of insulation of domestic monetary and real variables from foreign shocks.

Second, in sympathy with the Kindleberger-Minsky approach, 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 that arbitrage in stock prices was a channel for the international transmission of crises.

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# Some Historical Evidence (1870-1933) on the Impact and International Transmission of Financial Crises*

## 1. INTRODUCTION

Recent fears of insolvency of major U.S. banks and the threat posed to world economic stability has raised considerable interest in the topic of financial crises and in financial crises of the past.[1] This study presents historical evidence for six countries in the period 1870-1933 on the impact of financial crises on economic activity and on the international transmission of financial crises.

Two approaches to financial crises predominate in the literature.[2] The monetarist approach of Friedman and Schwartz (1963), Cagan (1965) and Schwartz (1985) identifies financial crises with banking panics viewing them as either producing or aggravating the effects of monetary contraction. The second approach identified with the work of Minsky and Kindleberger, following the seminal work of Fisher (1932), views financial crises as a key element of the upper turning point in the business cycle and as the inevitable consequence of the boom.

Many financial crises in the past two hundred years have occurred world wide (see Kindleberger, 1978) although they have differed markedly in degree of severity. Monetary and real channels have been emphasized in the two approaches to international transmission.

According to the monetarist approach, financial crises (and also business fluctuations) are transmitted internationally primarily through the monetary standard.[3] 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.

According to the Kindleberger-Minsky 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 treated as of secondary importance.

In some detail Section 2 examines these two approaches to the role and importance of financial crises as disturbances to domestic and international economic activity. The two approaches can in some sense be treated as complements rather than substitutes. Both emphasize the role of monetary and nonmonetary factors in precipitating and transmitting crises, with different weights placed by each approaches on each set of factors. In what follows we do not run a race between the two views but rather ascertain the extent to which historical evidence is compatible with elements of each of them.

Section 3 examines the evidence for six countries: the United States, Great Britain, France, Germany, Sweden and Canada on the relationship between monetary contraction, the sources of monetary change, declines in economic activity and the incidence of financial crises. In a comparison of reference cycle contractions for the six countries over the period 1870-1933 severe contractions in economic activity were in all cases accompanied by monetary contraction,

in most cases with stock market crashes, but not with the exception of the U. S., by banking crises. The unique performance of the U.S. can be attributed to the absence of a nationwide branch banking system compared to the five other countries examined, and the less effective role played by the U.S. monetary authorities in acting as a lender of last resort.

Section 4 examines the evidence for the six countries on the international transmission of financial crises. Our principal findings are two. First, consistent with the monetarist approach, that under the Classical gold standard, in periods containing financial crises, nations' money supplies were linked by gold flows and changes in high powered money, while under periods of flexible exchange rates there is evidence of insulation of domestic monetary and real variables from foreign shocks.

Second in sympathy with the Kindleberger-Minsky approach, 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 that arbitrage in stock prices was a channel for the international transmission of crises.

Finally section 5 contains a conclusion and discusses some implications of the historical record for the present situation.

## 2. THEORETICAL APPROACHES TO FINANCIAL CRISES

Of two main approaches to understanding the role and importance of financial crises, the approach of Friedman and Schwartz (1963a) and Cagan (1965) identifies financial crises with banking panics. Banking panics in turn may be a source of monetary contraction or may aggravate the effects of monetary contraction

on economic activity.[4] The second approach following the seminal work of Fisher (1932), views financial crises as a part of the normal functioning of the business cycle, and explains them as a natural consequence of "financial fragility" and "overindebtedness."

The Monetarist Approach to Financial Crises

In their monumental A Monetary History of the United States, 1867-1960, Friedman and Schwartz devote considerable attention to the role of banking panics in producing monetary instability in the United States. For Friedman and Schwartz, banking panics are important because of their effects on the money supply and hence on economic activity. Over the approximate one-hundred-year span studied, the United States had six severe contractions, of which four were marked by major banking or monetary disturbances (Friedman and Schwartz, 1963a, p. 677). Indeed banking panics "have greatly intensified (severe) contractions if indeed they have not been the primary factor converting what would otherwise have been mild contractions into severe ones" (1963a, pp. 441-442).

According to Friedman and Schwartz, 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 institution (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 the suspension of convertibility of deposits into currency and the issuance of clearing house certificates (as was often the case before the establishment of the Federal

Reserve in 1914) or by early intervention by the monetary authorities, will produce massive bank failures. Such failures will be the consequence of otherwise sound banks being forced into insolvency by a fall in the value of their assets induced by a mass scramble for liquidity.

Banking panics leading to widespread bank failures, such as occurred in the 1929-33 period, primarily by reducing the money stock through a decline in both the deposit-currency and deposit-reserve ratios, have deleterious effects on economic activity.

Friedman and Schwartz make an important distinction between the arithmetic and the economic aspects of a banking panic. In their discussion of the panic of 1893 they state "the panic had important effects on the banking structure,...; and it undoubtedly affected the detailed timing, form, and impact of the economic adjustment. At the same time, it was at bottom simply the way in which an adjustment, forced by other considerations, worked itself out. The price declines abroad and the distrust of the maintenance of the gold standard by the United States meant that there were only two alternatives: (1) a sizable decline in U.S. prices and a decline or a reduced rate of rise in money income; or (2) the abandonment of the gold standard and the depreciation of the dollar relative to other currencies. Given the maintenance of the gold standard, the adjustments in prices and income were unavoidable. If they had not occurred through the banking panic and the accompanying deepening of the recession underway, they would have taken place in some other way" (Friedman and Schwartz, 1963, pp. 110-11).

Indeed the peculiarities of the U.S. banking system as it developed in the nineteenth century with its unit fractional reserve banking system and

reserves pyramided in New York made it highly susceptible to banking panics. This vulnerability was finally ended by the introduction of federal deposit insurance in 1934 which served to remove the public's fear for its ability to convert deposits into currency.

Friedman and Schwartz highlight the importance in the pre FDIC system of strong and responsible leadership exercising timely judgment in intervening to allay the public's fears. Before the advent of the Fed, such intervention by the New York clearing banks in suspending convertibility and issuing clearing house certificates and, on occasion, in conducting open market purchases by the Treasury was generally successful, although not sufficient to prevent severe monetary contraction. The Federal Reserve System established in part to provide such leadership failed dismally in the 1929-33 contraction.

According to Friedman and Schwartz, had the Fed conducted open market operations in 1930 and 1931 to provide the reserves needed by the banking system, the series of bank failures producing the massive unprecedented decline in the money stock would have been prevented.

Finally according to Friedman and Schwartz, economic disturbances are spread internationally by the monetary standard. U.S. monetary disturbances during the 1929-33 contraction quickly spread abroad to other gold countries through the gold exchange standard. Only countries on flexible exchange rates with the U.S., such as China, and Spain, escaped its ravages.[5]

Cagan (1965) in Determinants and Effects of Changes in the Stock of Money, 1875-1960, carefully analyzed the role of banking panics in the cyclical behavior of the U.S. money supply. Cagan, like Friedman and Schwartz, explained the

incidence of panics by events such as the failure of prominent financial institutions or railroads. The resulting decline in the public's confidence in the banks, by raising both the public's currency-money ratio and the banking system's reserve-deposit ratio, led to a contraction in the money supply.[6] Cagan attributed the high incidence of banking panics in the U.S. experience "to the pre-World War I banking system with its inverted pyramid of credit resting on New York City banks and the absence of emergency reserves provided by a central bank..." and to "sharp outflows of gold which sometimes forced banks to contract credit too fast" (Cagan, 1965, pp. 226-227).

Finally, 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 the evidence of two severe cyclical downturns not associated with banking panics--1920-21 and 1937-38--and two mild cyclical downturns that were associated with panics--1890 and 1914--that panics were neither a necessary nor sufficient condition for producing a severe contraction.

Huffman and Lothian (1984) focus on the international transmission of business cycles under the pre-1933 gold standard. They view monetary shocks as the key sources of cyclical fluctuations, with the fixed-exchange-rate gold standard the primary mechanism for transmission of shocks abroad. An unexpected decline in the money supply in one country (say, the United States) will reduce income and prices and raise interest rates in that country leading to a balance of payments surplus and a gold and capital inflow from another

(say Great Britain). In Great Britain, the gold outflow will reduce the money supply, prices and real output and raise interest rates, leading to a new equilibrium. Empirical evidence based on Granger-Sims causality tests provides support for the paramount role of specie flows and money supplies in the pre-1933 gold standard transmission mechanism.

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. In a comparison of common cycles in the United States and Great Britain, 1830-1933, Huffman and Lothian found panics in only three of twelve common cycles. This leads them to conclude that little importance should be attached to panics as a direct channel of international transmission of cyclical fluctuations.

The Fisher-Minsky-Kindleberger Approach

In contrast to the monetarist approach which regards financial crises as important via their influence on monetary aggregates, a tradition going back to the nineteenth century regards 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. The modern proponents, Minsky and Kindleberger, basically extend the views Irving Fisher expressed in Booms and Depressions (1982).

According to Fisher (1932) and (1933) the business cycle is explained by two key factors: overindebtedness and deflation.

"Disturbances in these two factors--debt and the purchasing power of the monetary unit--will set up serious disturbances in all, or nearly all, other economic variables. On the other hand, if debt and deflation are absent, other disturbances are powerless to bring on crises comparable in severity to those of 1837, 1873, or 1929-33" (Fisher, 1933, p. 341).

The upswing in the cycle is precipitated by some exogenous event that provides new, profitable opportunities for investment in key sectors of the economy. Such "starters" can be new inventions, gold discoveries or wars. The exogenous shock encourages new investment in those sectors that increase output and prices. Rising prices by raising profits encourages more investment but also encourages speculation for capital gain. The whole process is debt financed, primarily by bank loans, which in turn by increasing deposits and the money supply raises the price level. An overall sense of optimism will raise velocity, fueling the expansion even further. Moreover the rising price level by reducing the real value of outstanding debt more than the increase in nominal debt encourages further borrowing. The process continues until a general state of "overindebtedness"--defined as 'whatever degree of indebtedness multiplies unduly the chances of becoming insolvent"-- is reached (Fisher, 1932, p. 9). A state of overindebtedness exists when individuals, firms, and banks have insufficient liquid assets to meet their liabilities. In such a situation a crisis can be triggered by errors in judgment by debtors or creditors. Debtors unable to pay debts when due and unable to refinance their positions may be forced by creditors to liquidate their assets

Such "distress selling" if widespread then triggers a "liquidity crisis" that could in turn lead to a "debt crisis," a "banking crisis," and a deep depression unless the process is averted by intervention by the monetary authorities. Distress selling if engaged in by the whole community produces a decline in the price level because, as loans are extinguished and not renewed, bank deposits decline. As the price level falls the real value of outstanding debt rises and, according to Fisher, based on the assumption of money illusion both by

debtors and creditors, it rises faster than nominal debt is extinguished. Thus creditors see the nominal value of their collateral declining with the price level and hence continue to call their loans, while the real debt burden of debtors rises so they continue to liquidate. A fallacy of composition takes over, each individual joining the liquidation to avoid being worse off, while the community as a whole by reducing the price level actually becomes worse off. The process can proceed to involve bank runs as fears for their solvency rise, and to raise the demand for money as a sense of pessimism spreads.

Real economic activity is affected by falling prices that reduce net worth and profits leading to bankruptcy. Both factors contribute to a decline in output and employment. In addition, while nominal interest rates fall with deflation, real rates are increased, worsening the situation. The process can continue until either widespread bankruptcy has eliminated the overindebtedness, or at any state a reflationary monetary policy is adopted. However, once recovery begins, the whole process will repeat itself. Finally, depressions are transmitted from country to country by the monetary standard.[7]

Minsky in a series of articles since 1957 has elaborated and extended Fisher's theory.[8] Basically Minsky has extended the notion of overindebtedness and the processes which produce it by his concept of fragility.

According to Minsky, as the economy proceeds through the upwsing of the business cycle, the financial structure becomes more fragile. A crisis occurs when a fragile financial structure is shocked by some event that triggers a sell-off of assets in a thin market producing a sharp decline in asset prices (Minsky, 1977, 140). The fragility or robustness of a financial structure is determined by three factors: a) the mix of hedge, speculative, and Ponzi

finance; b) the liquidity of the portfolio; c) the extent to which ongoing investment is debt financed.

Minsky's terms are defined as follows: "if a unit's cash flow commitments on debts are such that over each significant period the cash receipts are expected to exceed the cash payments by a significant margin, the unit is said to be engaged in hedge financing." Speculative financing is defined as "cash flow payments over some period--typically near term--that exceed the cash flows expected over this period." A Ponzi finance unit "is a speculative unit for which the interest portion of its cash payment commitments exceeds its net income cash receipts. A Ponzi unit has to increase its debt in order to meet its commitments on outstanding instruments" (1977, p. 143). The importance of speculative and Ponzi finance is that a rise in the interest rate can convert a positive into a negative present value, precipitating insolvency.

According to Minsky's approach, in the upswing of the cycle, the demand for new investment in response to improved profit opportunities leads to a demand for finance. Part of the new investment is directly financed by short-term bank loans, part by equity, and part by long-term debt. As the economy expands it generates an excess demand for finance, raising interest rates. However, the excess demand is partially and temporarily offset by financial innovation, which in turn fuels the finance of further investment.[9] Thus, the investment boom is fueled both by an endogenous (elastic) money supply and elastic velocity.

As interest rates rise, four factors work to create a fragile financial environment:[10]

a) an increase in debt finance
b) a shift from long term to short term debt
c) a shift from hedge to speculative to Ponzi finance
d) a reduction in financial institutions' margin of safety

Once a fragile environment is in place, a further rise in interest rates by shifting hedge to speculative to Ponzi financing can precipitate a refinancing crisis where firms are unable to "rollover" their debt. In that situation Fisher's "distress selling" process can be generated with all the attendant consequences. The crisis can be aborted however by the central bank acting as a lender of last resort to the money markets.[11]

Finally, Minsky's thesis can also explain the international transmission of crises. Commercial banks lending abroad face additional risks. The risks include greater economic and political uncertainty that increase the likelihood of default and capital losses from unexpected changes in exchange rates.[12, 13]

Kindleberger (1978) follows Minsky and Fisher, embellishing the story with pages of anecdotes from history. Basically some displacement 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 goods, "overtrading" and then "distress". At that point some event triggers a massive shift from goods to money and a "panic" results (Kindleberger, 1978, p. 5).

Kindleberger expands on the international transmission mechanism. In addition to the traditional links of gold flows, the balance of trade, and capital flows, he stresses the importance of psychological factors, commodity arbitrage, 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.

> Although Minsky's model is limited to a single country, overtrading has historically tended to spread from one country to another. The conduits are many. Commodity prices may rise and so may the prices of securities that are traded internationally. Speculation in exports, imports, or foreign securities furnishes direct links between markets of countries. By these means euphoria and overtrading in one country can be fed by capital inflows from foreign purchases of particular goods and assets. And if these capital flows lead to inflows of gold or silver, monetary expansion in the original country is enhanced as the boom is fueled by additional supplies of money on which higher pryamids of credit can be supported. In an ideal world, of course, a gain of specie for one country would be matched by a corresponding loss for another, and the resulting expansion in the first case would be offset by the contraction in the second. In the real world, however, while the boom in the first country might gain speed from the increase in the supply of reserves, or "high-powered money", it might also rise in the second despite the loss in monetary reserves, as investors respond to rising prices and profits abroad by joining in the speculative chase. In other words, the potential contraction from the shrinkage on the monetary side might be overwhelmed by the increase in speculative interest and the rise in demand. For the two countries together, in any event, the credit system is stretched tighter.

Kindleberger views a flexible exchange rate as an important conduit for the international transmission of financial crises--"exchange appreciation and deflation, or exchange depreciation and inflation...can be connected with bankruptcies, bank suspensions and changes in the money supply" (p. 119).

Finally, as do Fisher and Minsky, Kindleberger assumes a role to a lender of last resort to abort the crisis but, with his additional emphasis on the international nature of financial crisis, he stresses the need for an international lender of last resort.[14]

A Comparison of the Two Approaches

The two main approaches to the role and importance of financial crises differ in two ways. The first is over the importance of monetary change as the primary conduit through which financial crises affect economic activity. According to the monetarist approach, it is primarily by reducing money growth

more than otherwise that the banking system when affected by a crisis, has an impact on the economy. By contrast, the Kindleberger-Minsky approach sees financial crises as being important largely independent of effects on the money supply.

A second difference is the importance of monetary factors in the international transmission of financial crises. According to the monetarist approach, transmission should occur primarily via the monetary standard by precipitating gold flows (or changes in international reserves) between countries that affect monetary bases and hence money supplies. Under flexible exchange rates, transmission would be muted. By contrast, in the Kindleberger-Minsky approach, transmission can occur through a wide variety of channels including the monetary channel. One key channel stressed by Kindleberger and Minsky is the direct link between the banking systems of different countries. Moreover, flexible exchange rates may serve to accelerate transmission.

In what follows we examine the extent to which historical evidence for six countries in the period 1870-1933 conforms to each of these theories.

## 3. MONEY, ECONOMIC ACTIVITY AND FINANCIAL CRISES: THE INTERNATIONAL EVIDENCE

In this section is presented evidence in Table 1 for six countries in the period 1870-1933 on the behavior of real and monetary variables during cyclical contractions marked by financial crises. Because of data limitations for the majority of countries much of the focus is on annual data. The use of annual data, though the best available, makes it more difficult to discuss the influence of a phenomenon such as a banking panic or a stock market crash than would be possible with monthly or weekly data.

Six countries are included. The United States, Great Britain, Germany and France were the "core" countries in the period, with virtually all of the "crises" either originating in them or greatly amplified by them. The four countries were linked over much of the period by the gold standard and gold exchange standards as well as by close real trade and financial links. Unfortunately, reliable monetary data are available over the entire period for only two of the countries--the United States and Great Britain. For Germany coverage is limited to the pre World War I period and for France to the post World War I period, and even then the data are spotty. Two "peripheral" but important countries with reliable data were chosen in addition to the four core countries--Canada (for the period 1900-1933) and Sweden (over the whole period). The two were closely linked to the "core" countries--Canada to the U.S., and Great Britain; Sweden to Great Britain and Germany.

Real Variables

Twelve "common international" reference cycles are isolated by picking turning points in the NBER reference cycle chronology for each country that corresponded as closely as possible to the British reference cycle pattern. Thus for example, the second cycle for Great Britain has a peak in 1883 and a trough in 1886, the comparable cycle for the United States has a peak in 1882 and a trough in 1885. Moreover the five other countries (in fact) had more (the U.S. had 16) or fewer reference cycles (Germany had 11), than Great Britain, but all these deviations in dating occurred within or very close to the British cycle. These deviations are characterized as subcycles to the common international cycle and the dates are presented in parentheses under the common international cycle dates.[15] Thus e.g., in the third cycle Great

Britain has a peak in 1890, a trough in 1894, the comparable "common" U.S. cycle is designated as having a peak in 1890 and a trough in 1894. This dating involved combining for the U.S. three NBER reference cycles designated here as subcycles--taking the peak from the second NBER reference cycle and the trough from the third.

In addition, following Burns and Mitchell (1946), six cyclical contractions are designated as severe denoted by (S)--cycles (1), (2), (3), (7), (9), and (12). Column (1) of Table 1 presents the annual, and the monthly, displayed in [], "common international" reference cycle chronology, for the peaks and troughs in business cycle contractions. Both annual and monthly data exist for all countries except Sweden, for which only annual data is available. Cyclical contractions are focused on since most financial, banking and stock market crises have occurred at or shortly after the reference peak and have been associated with the severity of the ensuing cyclical contraction.

Column (2) presents a measure of the severity of decline in real economic activity during cyclical contractions in each country--the deviation of the average annual percentage change in real output from the long-run trend growth rate.

In general the severity of contractions differed considerably across countries in the "common cycles" although the six NBER designated severe cyclical contractions had the greatest declines in real activity in all the countries.

Financial Variables

Columns (3), (4) and (5) show the incidence for the core countries based on various sources, of crises. Three definitions reflecting the literature are used. For the two peripheral countries, only minimal comparable evidence was available, shown in two columns for Canada, one for Sweden.

Column (3) cites the presence of "financial crises" according to Kindleberger's (1978) chronology of international financial crises.[16, 17] Column (4) cites the presence of stock market crises according to Morgenstern's (1959) chronology. In addition, following Morgenstern, superscripts indicate whether a crisis was a major or minor, and international or local in scope. Finally, column (5) cites, based on Thorp (1926), Friedman and Schwartz (1963a) and other sources, the presence of banking crises, classified by superscripts as banking panics (runs, failures, and suspension of payments) and banking crises (runs and or failures). Most banking crises and virtually all banking panics were confined to the U.S. in this period.

The qualitative evidence on the incidence of crises is supported by the timing of turning points in two key financial variables--the long-term-short-term interest rate differential, and Morgenstern's index of stock prices. Columns (6) and (7) show the peaks and troughs on a monthly basis of these two financial variables.

In column (6) the interest differential chronology is reversed, reflecting financial pressure at the specific cycle trough and ease at the peak. In general the troughs in this series are very close to the corresponding reference cycle peaks, tending to follow them by only a few months. At the same time peaks in the stock price index (column 6) tend to precede reference cycle peaks, reflecting the stock market's role as a frequent leading indicator of economic activity.

Monetary Variables

Columns (8) to (13) for the three core countries except France, and column (14) for the U.S. and Great Britain display monetary variables. Monetary variables for Canada appear in columns (5) to (10) and for Sweden in columns (4) to (8).

Column (8) for the core countries, columns (5) and (4) for Canada and Sweden, respectively, present a chronology of peaks and troughs of specific cycles in monetary growth corresponding to the reference cycle chronology of column (1). Annual or monthly (depending on the frequency of the available data) turning points were derived following procedures developed by Friedman and Schwartz (1963b).

For the U.S., turning points in money growth generally precede those in business by a calendar year. However, as can be seen from the monthly series in brackets, the use of annual averaged data greatly distorts the true measure of the lead. Nevertheless since monthly data are available only for Canada besides the U.S., the annual data is used as a crude measure of timing.

For the other countries, the turning points in money growth generally precede but in numerous cases coincide with the turning points in business.[18]

Column (9) shows the deviations from long-run trend of the average rate of money growth between peaks and troughs as a measure of the severity of monetary contraction. In virtually every case, with the principal exception of World War I in Great Britain, declines in money growth below trend are associated with declines in economic activity in the corresponding reference cycle contraction. Indeed the greater is the deviation of money growth from trend, the greater the decline in economic activitiy. The most severe declines in both money and real output occur in severe cycles characterized in many instances by financial and stock market crises. However, the greatest declines of all the countries examined here (with the exception of the 1920-21 episode) occurred in the U.S. in contractions associated with banking crises.

Columns (10) to (12) for the three core countries (excluding France), column (7) to (9) for Canada and (6) to (8) for Sweden show the contributions to the specific cycle contractions in monetary growth for the three determinants of the money supply: high-powered money; the deposit-currency ratio; and the deposit-reserve ratio.

Cagan (1965), in his pioneering study for the U.S., found the currency-money ratio to be the key determinant of cyclical movements in the money supply with high-powered money and the reserve ratio each having about one half of the influence of the currency ratio. For severe cycles, the order of magnitude remained the same but the influence of the currency ratio increased.[19] Both Cagan and Friedman and Schwartz present evidence for the U.S. that in severe cycles characterized by banking panics, declines in the deposit-currency ratio and hence in the deposit reserve ratio on several occasions led to declines in money growth sufficient to produce a severe contraction in economic activity. Such results for the U.S. can be clearly seen in column (12) for the banking panics of 1893, and the great contraction of 1929-33.

For Great Britain, in contrast to the U.S., high-powered money was the key determinant of cyclical contractions in money, followed by the deposit-currency ratio and the deposit-reserve ratio.[20] For Great Britain, again in contrast to the U.S., there were no banking crises in the period under consideration, yet the two ratios acting along or jointly produced significant declines in money in several severe contractions associated with major stock market crises: 1872-78; 1890-93; 1900-01; 1902-03; 1907-08; and 1928-31. However, none of the declines of the ratios, with the exception of 1930-31, were comparable to those observed in the U.S. case.

For Germany, the deposit-currency ratio was the most important determinant of cyclical changes in money in specific cycle contractions. However, in contrast to other countries, money only declined in one specific cycle contraction--1906-07. With the exception of that episode where a decline in D/C produced a decline in M, the Reichsbank caused H to vary countercyclically to offset the procyclical behavior of the ratios.[21] Similar to Great Britain, German experience was characterized by the absence of banking crises (with the exception of a mild crisis associated with several bank failures in 1901). Yet the decline in the ratios, especially the D/R, seemed to coincide with major stock market crises.

In both Canada and Sweden H and D/R were the key determinants of changes in M in cyclical contractions,[22] with D/C playing a minor role. Also both countries were characterized by stable banking systems and the absence of panics. In the Canadian case, the banking system's D/R declined significantly in three severe contractions associated with financial crises abroad: 1877-78; 1894-95; and 1927-31.[23]

Column (14) for the U.S. and G.B. presents the loan-earning asset ratio. This ratio reflects, in periods of financial stringency, the banking system's desire for liquidity. Thus in a severe contraction in an effort to increase liquidity, banks will convert loans into (primarily) government securities in order to reduce the ratio. As can be seen in the table, in both countries the ratio declined during several severe cycles characterized by crises.

The evidence in Table 1 suggests a number of conclusions on the relationships of money, financial crises, and real activity in the different countries.

First, severe declines in economic activity in all countries are associated with (prior) declines in money growth. Second, most severe cyclical contractions in all the countries examined are associated with stock market crises but not, with the exception of the U.S., with banking crises. Third, the junior partners to high-powered money as determinants of change in money--the D/R and D/C ratios--played an important role in reducing money growth in all countries but not to the extent they displayed in U.S. experience, especially the role played by the deposit-currency ratio in reducing the money supply during contractions involving banking panics.

Why was monetary contraction associated with financial crises more severe in the U.S. experience than in other countries? One explanation is the greater instability, compared to that of the five other countries, of the U.S. banking system--a system composed largely of unit fractional reserve banks with reserves pyramided in the New York money market. Though numerous institutional reforms were devised to strengthen the system in the period 1862-1934, none, until the advent of federal deposit insurance in 1934, removed the basic instability associated with potential threats to convertibility. Bank runs and panics occurred whenever a shock threatened the solvency of a few key banks or other financial institutions.

In contrast with the U.S. experience, the five other countries in the same period all developed nationwide branch banking systems consolidated into a few very large banks. The system of bank branching, first successfully developed in Scotland in the eighteenth century and emulated by other countries including Canada and Sweden,[24] represented a method of pooling risks which

proved quite effective in guarding against the type of "house of cards" effects common to the U.S. (and early nineteenth century British) banking system.

A second explanation for the relatively poor performance of the U.S.--stemming from the massive literature on the development of central banking and especially of the Bank of England[25]--is the absence of an effective "lender of last resort." Four of the six countries in our sample had central banks, which by the beginning of period had (in various degrees) learned in the face of a crisis to follow Bagehot's rule "to lend freely but at a penalty rate," and to a certain extent to cooperate amongst themselves in times of severe international crisis, such as the Baring crisis of 1890.[26] One exception, Canada, did not have a central bank until 1936, but the chartered banks had, by 1890, with the compliance of the government, established an effective self-policing agency, the Canadian Bankers Association, which acting in "locus parentis" successfully helped insulate the Canadian banks from the deleterious effects of U.S. banking panics in 1893 and 1907.[27] The existence of such a mechanism, whether provided by the government or by the private market, once it proved effective would educate and instill a sense of confidence in the public sufficient to prevent incipient crises.[28]

In sum the stark comparison of the U.S. with the other five countries suggests, consistent with the monetarist approach, that financial crises involving banking crises, had strong effects in aggravating (if not producing) the effects of monetary contraction on the real economy.

## 4. THE INTERNATIONAL TRANSMISSION OF FINANCIAL CRISES

In this section we present evidence on the international transmission of financial crises. According to the monetarist approach, financial crises (and also business cycles) are transmitted internationally primarily through

the monetary standard. Under the gold standard which characterized much of the period for all the countries (see the last column of each table for a chronology of monetary standards by cycle,) one would expect changes in the monetary gold stock to be the key source of change in high powered money over the cycle unless significant sterilization is occurring. Under perfectly flexible exchange rates no such link should prevail. Column (13) of Table 1 for the U. S., Great Britain, and Germany and column (10) for Canada show the percentage change in the monetary gold stock between the specific cycle peaks and troughs.

For the U.S., for every specific cycle contraction, except that of 1871-78 under flexible exchange rates, there is a close correlation between changes in the monetary gold stock and changes in high-powered money; however, the link is far from one-to-one, reflecting periodic sterilization especially of gold outflows during contractions.

For Great Britain the association though positive is much weaker, in accordance with the evidence of Bloomfield (1959) and others that the Bank of England engaged in active sterilization.

For Germany, the association, though positive, is also weak. According to McGouldrick (1984), this reflects the deliberate policy of the Reichsbank to shield the domestic money market from external influence.

For Canada, for the few observations we have, the association is positive and quite strong. During this period, Canada did not have a central bank and with the exception of the operation of the Finance Act in in the interwar period (see Shearer and Clark, 1984) did not engage in extensive intervention.

Such evidence, though rough, shows, in agreement with Huffman and Lothian (1984) linkages between the money supplies of the different countries through gold flows and high-powered money.[29]

Finally, the last column in each table distinguishes between periods of fixed and flexible exchange rates. There are too few degrees of freedom to make other than very casual comparisons. The two significant periods of floating: 1862-78 for the U.S. and the early 1920's for all countries except the U.S. provide some ground for comparison of the insulation properties of fixed and flexible rates. Thus, for example, in the 1873-79 contraction we observe both the interest differential and stock price index cycles for the U.S. to be more out of phase with those of the European countries than in the rest of the period, and the U.S. contraction to be considerably milder than its European counterpart. However, the U.S. was affected by various European crises. Similarly in the 1920's when both France and Germany floated over much of the period, we can observe more cycles for France and fewer for Germany than for other countries. Also France in 1926 experienced a major financial crisis that was not transmitted abroad.

According to the Kindleberger-Minsky approach financial crises are transmitted primarily through nonmonetary channels such as link portfolios of financial institutions. Evidence for this approach can be seen in an international comparison of the peaks and troughs of the interest differential (column (6)) and the stock price index (column (7)) for the four core countries. First, troughs in the interest differential series are more closely related between countries than are the peaks (as discussed in detail in Morgenstern (1959), and closer links are found between the three European countries than between any of them and the U.S. In addition, Morgenstern demonstrates that movements

in the differential are largely explained by movements in short-term interest rates. The behavior of this series according to Morgenstern is evidence for a tightly linked European short-term capital market. Morgenstern's evidence, as well as that of Lindert (1969) on the relative pulling power of the discount rate in different financial centers, suggests that in time of financial pressure, securities markets were especially closely linked.

Second, turning points in the stock price index are very closely related between the four countries, although the links between the European countries are closer than those between the U.S. and Europe.[30] A comparison of the peaks in this series and Morgenstern's chronology of stock market crises, shown in column (4) shows a remarkable coincidence for major crises, that are international in scope. Such crises often originated in the U.S. and then spread quickly to Europe.

Third, a comparison of the turning points in the two financial variables in columns (6) and (7) with the chronology of financial, banking, and stock market crises in columns (3), (4), and (5) suggests that crises in the gold standard era often tended to be international in scope but, the way in which they manifested themselves in different countries differed considerably, especially comparing the response of the banking system in the U.S. to that of the other countries.

A final piece of evidence consistent with the Kindleberger-Minsky view of transmission is based on the behavior of the deposit reserve ratio in a number of countries and the incidence of stock market crises. In four countries, Great Britain, Germany, Canada and Sweden, declines in the deposit reserve were key determinants of cyclical contractions in the money supply and such contractions often occurred at the same time as stock market crises. The apparent

association between declines in the D/R ratio and the incidence of stock market crises suggests a possible additional channel of influence whereby financial crises link money supplies between countries. The evidence indicates a link between turning points in money growth and stock price indexes (seen for the U.S. monthly data in Table 1.A by comparing columns (8) and (7)).[31] The link in turn may reflect early signs of the effects of changes in money growth on real economic activity. In combination with the evidence on the D/R, the link suggests the following hypothetical scenario:

A sharp decline in the money stock in one country, e.g. the U.S., produced initially by say a gold outflow, leads to a sharp decline in stock prices (a 'crash'). The stock market crash in turn could produce, as described in sections 1 and 2 above, in the absence of intervention, both a liquidity crisis and a banking panic, resulting in declines in the deposit-currency and deposit-reserve ratios. Concurrently, reflecting the tight linkage between stock exchanges in different centers shown by Morgenstern, e.g. through a decline in the prices of U.S. securities traded in foreign markets, the decline in securities prices of the initiating country are transmitted to the stock market of other countries. The decline in securities prices in these countries could impact quickly on commercial banks that have extended call loans and brokers' loans to the stock market and attempt to strengthen their liquidity by calling these loans and thus reducing the loan earning asset ratio. At the same time they increase their precautionary reserves, hence lowering the deposit-reserve ratio.

In other words, arbitrage in stock market securities may link national money supplies directly via their effects on commercial bank reserve ratios. Such effects may occur before the monetary shock has had time to spread its influence abroad via the traditional price specie flow mechanism.[32]

## 5. CONCLUSION

This paper has examined two main theoretical approaches to financial crises and provided some historical evidence sympathetic to each of them based on the relationship of financial crises to the money supply, the financial system, and real activity over the period 1870-1933 in six countries. The evidence though highly suggestive yields the following conclusions.

The first is the important role of monetary institutions, particularly the banking system, in explaining why some countries had more serious monetary and real contractions in the face of crises. The absence of a nationwide branch banking system in the United States compared to five other countries examined, and the less effective role played by the U.S. monetary authorities in acting as a lender of last resort may explain why the U.S. experienced banking panics in a period when they were an historical curiosity in other countries.

The second is an apparent connection in all the countries examined between crises in the stock market and a decline in the commercial banking system's deposit reserve ratio. Such a relationship may provide an alternative link between the money supplies of different countries in addition to the traditional linkages through gold flows and the balance of payments. A possible avenue for fruitful further research might be to examine, using monthly data and time series analysis, the timing of the relationship between different international monetary linkages--on the one hand, between the stock market and other asset markets and commercial bank portfolios, and on the other hand between gold and international reserve flows and the monetary base.

In sum we can ask what lessons does the record of financial crises from 1870 to 1933 have for the present day situation? Key differences in institutional

arrangements suggest that most of the factors conducive to financial crises, especially banking crises, and their international propagation have declined in importance.

First the domestic banking systems of most major countries are more stable--less likely to be subject to runs and panics--than they were before 1933. This is especially the case of the United States following the adoption of FDIC in 1934 and acknowledgement by the Federal Reserve System of its role as lender of last resort. Second, we are no longer part of the fixed exchange rate gold standard which tended to transmit economic disturbances from country to country (although there is increasing evidence that flexible exchange rates may not be as effective insulators as were believed).

This is not to say that financial crises can no longer occur but that the likelihood of events such as the recent near failure of the Continental Illinois bank producing a worldwide series of financial crises (as often occurred before 1933) is less likely.

FOOTNOTES

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[1]Indeed this interest has in the last three years spawned three conference volumes (Kindleberger and Laffargue (1983), Wachtel (1982), and Capie and Wood (1985)) and a number of important journal articles.

[2]A third recent approach is that of rational expectations that views financial crises as a consequence of rational behaviour. According to this approach, "manias" are viewed as examples of speculative bubbles. (Flood and Garber, 1982, Blanchard and Watson, 1982), "runs" are defined as a speculative attack on an asset price fixing scheme (Garber, 1981) and "panics" characterize a run whose timing was not perfectly foreseen. (Garber, 1981).

[3]See Fisher (1935) and Huffman and Lothian (1984).

[4]A recent approach taken by Bernanke (1983) and Diamond and Dybvig (1983) argues that financial crises including bankruptcies have direct effects on economic activity over and above their effects on the money supply. To the extent that financial crises produce losses in the financial sector of the economy, this raises the cost of financial intermediation and hence reduces the efficiency of resource allocation.

[5]See Choudhri and Kochin (1980) for evidence of the insulation properties of flexible exchange rates in the Spanish case and Jonung (1981) for the case of Sweden.

[6]According to Gorton (1982) banking panics are not a unique event but represent a rational response by depositors wishing to smooth out their consumption flows over time. Rational depositors wish to dissave in periods of expected low consumption such as 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.

[7]See Fisher (1935) for evidence on the transmission of economic disturbances in the great depression.

[8]See Minsky (1957, (1963), (1977), (1979), (1980), (1982a, b, c).

[9]Minsky (1957).

[10]Minsky (1982a).

[11]Ibid.

[12]Minsky (1979).

[13]Minsky's thesis has been criticized by Sinai (1979) for not yielding any testable hypotheses, and by Goldsmith (1979) on the ground that the evidence of history is against a key implication of Minsky's view--that financial development and financial fragility are positively correlated. Melitz (1979) argues that Minsky's thesis is inconsistent with evidence on the behavior of the term structure of interest rates and the experience of countries with universal lenders of last resort such as Sweden. Finally, Flemming (1979) argues that one implication of Minsky's thesis--that the boom lulls economic agents into taking a risky financial position conducive to a crisis--leads to the implausible suggestion that central banks should increase the amount of risk in the economic system.

[14]In his discussion of the 1873, 1920-21 and 1931 crises, Kindleberger (1978) and (1973) argues that the crises could have been aborted by the effective operation of a supernational monetary authority. However, Moggridge (1982) effectively argues that in the case of 1920-21, there was no crisis hence no need for the lender of last resort and in 1931 that though there was a considerable amount of international cooperation, the fundamental disequilibrium of the international monetary system could not have been alleviated by an international lender of last resort.

[15]The use of the common international cycle is purely descriptive to facilitate international comparisons. The discussion which follows for each country alone is based on the NBER reference cycle chronology.

[16]Also included are a number of extra "financial crises" based on Thorp (1926), Yeager (1972), and others.

[17]This demarcation of crises begs the question of whether all these events really were crises. On this point, see Schwartz (1985)

[18]The observed lead from the turning points in money growth to the reference cycle for the U.S. has been widely cited as an important piece of evidence for "causality" from money to business. See Friedman and Schwartz (1963b), Poole (1975). For a counter view, see Tobin (1970) and Friedman's (1970) reply. Recent advances in the methodology of testing "for causality" Sims (1972) confirm Friedman and Schwartz's evidence for a U.S. monetary cycle (the traditional quantity theory approach) but the case is mixed for other countries. Mills and Wood (1979) and Williams, Goodhart & Gowland (1976) provide evidence for the U.K. of "causality" running from business to money in both the gold standard and subsequent Bretton Woods era. These authors explain reverse

causality by arguing that the U.K. under fixed exchange rates operated as a small open economy, according to the monetary approach to the balance of payments, with changes in its money supply via reserve flows caused by changes in money demand which in turn effect changes in economic activity. This is compared to the U.S., viewed essentially as a closed economy in this period, in which changes in the money supply, interact with a stable money demand to produce changes in activity according to the traditional quantity theory approach. However, Cassese and Lothian (1982) present convincing evidence for a number of countries under fixed exchange rates consistent both with a dynamic stock adjustment version of the monetary approach to the balance of payments and a monetary theory of the cycle.

[19]For the 16 reference cycles displayed here, the relative contributions of the determinants to cyclical contractions were: H, 67.6; D/R, 3.9; and D/C, 30.1. For six severe cycles, it was H, 38.7; D/R, 16.2; and D/C, 47.6.

[20]Over the 12 British cycles the relative contributions of the determinants to cyclical contractions were: H, 79.3; D/C, 18.9; and D/R, 9.1. For severe contractions, they were: H, 109.0; D/R, 19.7; and D/C, -28.7.

[21]See McGouldrick (1983).

[22]See Hay (1968) and Jonung (1976).

[23]In the gold standard period, the Canadian chartered banks kept a large proportion of their gold reserves in the New York, and to a lesser extent, London money markets. These outside reserves provided a direct link between financial conditions in these countries and Canada through the D/R ratio. See Hay (1967, 1968) and Rich (1983).

[24]For the Scottish banking experience, see Cameron (1967) and White (1983); for Canada, see Jamieson (1959); for Sweden see Jonung (1977). For a comparison between the U.S. and Canadian experiences, see White (1982).

[25]See e.g. Sayers (1957).

[26]See Sayers (1936) and Presnell (1967).

[27]This was done by quickly arranging mergers between sound and failing banks, by encouraging cooperation between strong and weaker banks in times of stringency, and by establishing a reserve fund to be used to compensate deposit holders in the event of failure. Friedman and Schwartz (1963) argue that the New York Clearing House performed a somewhat similar role in stemming incipient crises before 1914 through the issue of clearing house certificates and by arranging for syndicates of strong banks to assist those in trouble. As Schwartz (1985) argues, in most cases the system worked but in two important exceptions, 1893 and 1907, it did not. These may be explained, she argues, by bad timing of relief in 1907 and public misinformation in 1893.

[28]See Schwartz (1985).

[29]Additional evidence is provided by significant correlations between five successive pairs of countries, in periods characterized by severe cyclical declines in economic activity, of the year to year rates of change of high powered money. The correlations are: U.S.- G.B. .45; U.S.-Germany .53; U.S.-Sweden .49; and Germany-Sweden .79.

[30]Morgenstern's indices include many securities which today would be called bonds. Also a significant fraction of the securities in the samples underlying the indexes for the European exchanges were foreign securities (both government and private). See Morgenstern (1959), pp. 507-528 for an extensive discussion of the several direct linkages between stock exchanges in the gold standard era.

[31]See Sprinkel (1971) for additional U.S. evidence.

[32]Or even possibly before raising short-term interest rates and causing short-term capital to flow. This would be consistent with Morgenstern's finding that peaks in the short-term interest rates cycle tended to follow peaks in business whenever the stock market index would precede it.

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TABLE 1.A. - United States

| Common International Reference Cycle Trough to Trough | Real Variables (1) Annual [monthly] Reference Cycle Contractions (subcycles) Peak | Trough | Real Variables (2) Deviations from Trend of Average Annual Real Output Growth[1] Peak to Trough | Financial Variables (3) Financial Crises | (4) Stock Market Crises | (5) Banking Crises | (6) Monthly Specific Cycle Long-term Interest Differential Trough | Peak | (7) Monthly Specific Cycle Stock Price Index Peak | Trough | Monetary Variables (8) Annual [monthly] Specific Monetary Growth Cycle Contractions (subcycles) Peak | Trough | (9) Deviation from Trend of Average Annual Monetary Growth Rate[2] Peak to Trough | Percentage change in M if determinants indicated alone had changed (10) High Powered Money | (11) Deposit Reserve Ratio | (12) Deposit Currency Ratio | (13) Percentage Change in Monetary Gold Stock | (14) Percentage Change Loan Earning Asset Ratio | (15) Exchange Rate Regime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I. 1866-1879 | 1873 (S) [10/73 | 1879 3/79] | 0.5 | 9/73 | 73[c]; 75[b]; 79[b] | 9/73[e] | 9/73 | 8/78 | | | | | | | | | | | |
| | | | | | | | 9/73 | 8/76 | 5/72 | 6/77 | | | | | | | | | |
| | | | | | | | 10/77 | 8/78 | | | 1871 | 1878 | - 4.7 | - 1.9 | 4.2 | 2.7 | 64.9 | 1.7 | Flexible |
| | | | | | | | | | | | [ 7/71 | 5/77] | | | | | | | |
| | 1879 1886 | 1882 (S) [ 3/82 | 1885 5/85] | - 3.2 | | 90[a]; 81[a]; 82[b]; 84[a] | 6/83 | 9/85 | 6/81 | 1/85 | 1880 [ 5/81 | 1884 12/83] | 2.6 | 23.8 | 2.8 | 5.2 | 45.7 | 7.2 | Fixed |
| II. 1890-1894 | 1890 (S) [ 7/90 | 1894 6/94] | - 2.6 | | | | 12/90 | 10/94 | 5/90 | 3/95 | 1890 [12/89 | 1893 12/92] | - 2.6 | 11.6 | - 3.8 | 0.5 | -21.0 | - 1.4 | Fixed |
| | 1887 [ 4/87 | 1888 4/88] | - 6.7 | | 37[b]; 89[a] | | 7/87 | 11/88 | 5/87 | 6/88 | 1886 [12/85 | 1888 12/87] | - .78 | 8.3 | 0.6 | 0.3 | 18.5 | 5.8 | |
| | | | | | | | 12/90 | 6/92 | 5/90 | 12/90 | | | | | | | | | |
| | | | | | | | 7/93 | 10/94 | 8/93 | 3/95 | | | | | | | | | |
| | 1890 [ 7/90 | 1891 5/91] | .78 | | 90[b]; 91[b] | 1890[f] | | | | | 1890 [12/89 | 1891 12/90] | - 1.4 | 5.0 | - 1.4 | 0.5 | - 8.6 | 0.3 | |
| | 1893 (S) [ 1/93 | 1894 6/94] | - 9.5 | 5/93 | 93[d] | 7/93[e] | | | | | 1892 [12/92 | 1893 12/93] | - 9.3 | 1.8 | - 1.5 | - 4.3 | -14.2 | - 1.2 | |
| III. 1894-1901 | 1895 [ 6/99 | 1900 12/00] | .03 | | | | 3/00 | 11/00 | 4/99 | 9/00 | 1899 [12/98 | 1900 12/99] | 2.6 | 7.5 | 1.3 | - 0.8 | 6.4 | - 1.7 | Fixed |
| | 1896 [12/95 | 1897 6/97] | 6.0 | | | | 10/96 | 1/99 | 9/95 | 8/96 | 1895 [12/94 | 1896 12/95] | - 7.8 | - 3.25 | 1.2 | 0.2 | - 8.6 | - 1.1 | |
| | | | | | | | 3/00 | 11/00 | 4/99 | 9/00 | | | | | | | | | |
| | 1899 [ 6/99 | 1900 12/00] | .83 | | 99[a]; 1900[b] | | | | | | 1899 [12/98 | 1900 12/99] | 2.6 | 7.5 | 1.3 | - 0.8 | 6.4 | - 1.7 | |
| | 1903 [ 9/02 | 1904 8/04] | - 5.4 | | 1901[a]; 1904[a] | | 8/03 | 1/05 | 9/02 | 10/03 | 1901 [12/00 | 1903 12/03] | 2.0 | 8.3 | 4.5 | 1.9 | 11.4 | 0.1 | Fixed |
| IV. 1904-1908 | 1907 (S) [ 5/07 | 1908 6/08] | -14.7 | 8/07 | 1907[c] | 10/07[e] | 12/07 | 7/09 | 9/06 | 11/07 | 1905 [12/04 | 1908 12/08] | - 1.7 | 21.7 | - 8.3 | - 2.65 | 27.7 | - 0.6 | Fixed |
| V. 1908-1914 | 1913 [ 1/13 | 1915 12/14] | - 6.9 | | 1912[b]; 1914[c] | 8/14[f] | 6/13 | N/A | 12/09 | 12/14 | 1912 [11/11 | 1913 6/13] | - 1.5 | 2.2 | 1.0 | 0.1 | 2.9 | 0.9 | Fixed |
| | 1909 [ 1/10 | 1911 1/12] | - 1.5 | | | | 6/10 | 11/11 | 12/09 | 7/10 | 1909 [10/08 | 1910 4/10] | - .33 | 1.65 | 1.8 | 1.6 | - 0.4 | 2.3 | |
| | 1913 [ 1/13 | 1915 12/14] | - 6.9 | 8/14[5] | | | 6/13 | N/A | 9/12 | 12/14 | 1912 [10/11 | 1913 6/13] | - 1.5 | 2.2 | 1.6 | 0.1 | 2.9 | 0.9 | |
| VI. 1914-1919 | 1918 [ 8/18 | 1919 3/19] | 6.8 | | | | N/A | N/A | N/A | N/A | 1916 [12/16 | 1918 5/18] | 7.0 | 39.3 | -14.8 | 3.7 | 25.9 | - 4.5 | Fixed |
| VII. 1919-1921 | 1920 (S) [ 1/20 | 1921 7/21] | - 7.6 | Spring 1921 | | | 10/20 | 8/22 | 7/19 | 8/21 | 1919 [12/18 | 1921 1/21] | - 2.5 | - 1.35 | 4.2 | 2.8 | 4.6 | 8.6 | Fixed |
| VIII. 1921-1926 | 1923 [ 5/23 | 1924 7/24] | - 0.4 | | | | 5/23 | 10/24 | 3/23 | 10/23 | 1923 [ 4/22 | 1924 6/23] | - .13 | 2.7 | - 0.2 | 2.8 | 10.5 | - 0.1 | Fixed |
| IX. 1926-1928 | 1926 [10/26 | 1927 11/27] | - 2.2 | | | | | | | | 1925 [ 7/24 | 1927 12/26] | - 2.3 | 1.6 | 1.6 | 2.9 | 4.8 | - 0.3 | Fixed |
| X. 1928-1933 | 1929 (S) [ 8/29 | 1932 3/33] | -16.7 | 10/29, 3/31 | 1929[c]; 1931[c] | 1930[f]; 1931[f]; 1933[e] | 8/29 | 9/34 | 9/29 | 6/32 | 1928 [11/27 | 1932 10/32] | -11.7 | 8.1 | - 8.3 | -27.4 | - 6.3 | -15.9 | Fixed |
| | | | | | | | 6/29 | 9/31 | | | | | | | | | | | |
| | | | | | | | 11/31 | 9/34 | | | | | | | | | | | |

Data Sources. See Data Appendix

Notes: a) crises affecting the U.S. and other countries
b) U.S. not affected but major
c) major international crisis sharply affecting the U.S.
d) U.S. affected alone
e) banking panic--runs, failures, suspension of payments
f) banking crisis--runs and/or failures
g) Sprague (1915)
h) Severe cycle contraction

[1] The trend growth rate in real output was 3.22 percent over the period 1870-1941. It was calculated as the difference between the natural logs of real output between initial and terminal year divided by the number of years.

[2] The trend monetary growth rate was 5.40 percent over the period 1870-1941. It was calculated as in 1 above.

TABLE 1.A. - Great Britain

| | Common International Reference Cycle Trough to Trough | Real Variables (1) Annual [monthly] Reference Cycle Contractions (subcycles) Peak | Trough | (2) Deviations from Trend of Average Annual Real Output Growth[1] Peak to Trough | Financial Variables (3) Financial Crises | (4) Stock Market Crises | (5) Banking Crises | (6) Monthly Specific Cycle Long-Term Short-Term Interest Differential Trough | Peak | (7) Monthly Specific Cycle Stock Price Index Peak | Trough | Monetary Variables (8) Annual [monthly] Specific Monetary Growth Cycle Contractions (subcycles) Peak | Trough | (9) Deviation from Trend of Average Annual Monetary Growth Rate[2] Peak to Trough | Percentage change in M if determinant indicated alone had changed (10) High Powered Money | (11) Deposit Reserve Ratio | (12) Deposit Currency Ratio | (13) Percentage Change Monetary Gold Stock | (14) Percentage Change Loan Earning Asset Ratio | (15) Exchange Rate Regime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 1868-1879 | 1873 [ 9/73 (S) | 1879 6/79] | - .09 | 7/70[T] | 73[a], 75[a], 78[d] | | 11/73<br>N/A<br>11/73<br>8/78 | 9/79<br>8/71<br>10/76<br>9/79 | 10/73 | 7/79 | 1872 | 1878 | - 3.12 | 7.1 | -4.8 | -5.2 | N/A | N/A | Fixed |
| 2. | 1879-1886 | 1883 [12/82 (S) | 1886 6/86] | -1.2 | | 80[a], 82[a], 84[a] | | 7/83 | 6/85 | 1/80 | 11/87 | 1881 | 1886 | - 2.77 | 2.4 | -0.2 | 2.3 | -15.8 | -4.1 | Fixed |
| 3. | 1886-1895 | 1890 [ 9/90 (S) | 1894 2/95] | - .19 | 11/90 | 87[a], 90[c], 92[a] | | 7/90<br>7/90<br>8/93 | 10/94<br>9/92<br>10/94 | 10/89 | 4/92 | 1891 | 1893 | - 2.51 | 2.7 | -0.1 | -2.2 | 7.9 | -0.9 | Fixed |
| 4. | 1895-1901 | 1900 [ 6/00 | 1901 9/01] | 2.5 | | 95[c], 1900[d] | | 12/99 | 10/01 | 2/00 | - | 1900<br>1894<br>1900 | 1901<br>1897<br>1901 | - 3.70<br>.09<br>- 3.70 | 0.5<br>5.6<br>0.5 | -1.9<br>0.5<br>-1.9 | 0.4<br>-2.3<br>0.4 | 7.2<br>3.7<br>7.2 | -1.2<br>1.0<br>-1.2 | Fixed |
| 5. | 1901-1904 | 1903 [ 6/03 | 1904 11/04] | - .65 | | 01[a], 04[a] | | 5/03 | 10/04 | - | 8/04 | 1902 | 1903 | - 4.02 | 0.5 | 2.2 | -3.8 | - 3.4 | 0.7 | Fixed |
| 6. | 1904-1908 | 1907 [ 6/07 (S) | 1908 11/08 | -4.7 | | 07[b] | | 11/07 | 4/09 | 2/07 | 3/09 | 1906 | 1907 | - 1.57 | 2.3 | 0.1 | -1.0 | 4.4 | -0.1 | Fixed |
| 7. | 1908-1914 | 1913 [12/12 | 1914 9/14] | -1.1 | 1914[T,S,B] | 12[a], 14[c] | | 7/13<br>4/10<br>7/13 | N/A<br>3/11<br>- | 4/11 | 6/14 | 1910 | 1912 | .89 | 3.1 | -0.1 | 4.2 | 5.0 | 2.4 | Fixed |
| 8. | 1914-1919 | 1917 [10/16 | 1919 4/19] | -8.9 | | | | N/A | N/A | - | 1/19 | 1917 | 1919 | 14.25 | 35.5 | 2.5 | -3.9 | 44.7 | 6.2 | Pegged/ Controls |
| 9. | 1919-1921 | 1920 [ 6/20 (S) | 1921 6/21 | -6.9 | Spring 1921 | | | 5/20 | 5/23 | 1/20 | 10/21 | 1919 | 1922 | - 5.06 | -13.7 | 2.0 | 4.5 | 0.2 | -1.6 | Flexible |
| 10. | 1921-1926 | 1924 [11/24 | 1926 7/26] | - .9 | | | | 5/25 | - | 6/23 | 7/24 | 1924 | 1925 | - 3.72 | 0.0 | -1.8 | 7.8 | 1.7 | 4.1 | Fixed* |
| 11. | 1926-1928 | 1927 [ 5/27 | 1928 5/28] | .46 | | | | - | 7/26 | - | - | 1926 | 1928 | - .49 | - 2.2 | 2.9 | 1.6 | 9.0 | 1.9 | Fixed |
| 12. | 1928-1933 | 1929 [ 7/29 (S) | 1932 8/33] | -3.7 | 9/31 | 29[a], 31[c] | | 10/29<br>10/29<br>1/32 | 7/33<br>9/20<br>7/33 | 2/29 | 5/32 | 1928<br>1928<br>1930 | 1931<br>1929<br>1931 | - 4.27<br>- 4.20<br>- 8.95 | - 4.1<br>- 2.1<br>- 0.8 | 0.6<br>0.7<br>-1.7 | -1.3<br>-0.2<br>-3.7 | -15.4<br>-10.6<br>-10.2 | -6.1<br>-0.1<br>-3.0 | Fixed** |

Data Sources. See Data Appendix

Notes: a) affecting G.B. and other countries
b) G.B. not affected but major
c) major international crisis sharply affecting G.B.
d) G.B. affected alone
T) Thorp (1926)
S) Sprague (1915)
B) Brown (1940)
* G.B. returned to gold in April 1925
** G.B. left gold in September 1931

[1] The trend growth rate in real output over the period 1870-1939 was 1.48 percent. It was calculated as described in Table 1.A.

[2] The trend monetary growth rate over the period 1870-1939 was 2.71. It was calculated as in [1] above.

TABLE I.C. - Germany

| Common International Reference Cycle (Trough to Trough) | Real Variables (1) Annual [monthly] Reference Cycle Contractions (subcycles) Peak | Trough | (2) Deviations from Trend of Average Annual Real Output Growth Peak to Trough | Financial Variables (3) Financial Crises | (4) Stock Market Crises | (5) Banking Crises | (6) Monthly Specific Cycle Long-Term Short-Term Interest Differential Trough | Peak | (7) Monthly Specific Cycle Stock Price Index Peak | Trough | Monetary Variables (8) Annual [monthly] Specific Monetary Growth Cycle Contractions [subcycles] Peak | Trough | (9) Deviation from Trend of Average Annual Monetary Growth Rate Peak to Trough | Percentage change in M if determinants indicated alone had changed (10) High Powered Money | (11) Deposit Reserve Ratio | (12) Deposit Currency Ratio | (13) Percentage Change Monetary Gold Stock | (14) Exchange Rate Regime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. 1870 1878 | 1872 (5) [ 1/82 | 1878 2/79] | - .08 | 6/73 | 73[c] | | - | 5/79 | 11/72 | 6/77 | 1872 | 1877 | - 2.9 | -9.8 | 5.5 | 18.0 | 6.5 | Fixed[a] |
| | | | | | | | | | | | 1872 | 1875 | - 0.6 | 0.1 | 3.4 | 9.6 | 15.3 | |
| | | | | | | | | | | | 1876 | 1877 | - 8.5 | -8.3 | 0.9 | 4.1 | -10.2 | |
| 2. 1878-1886 | 1882 (5) [ 1/82 | 1886 3/86] | .27 | | 80[a], 82[c] 97[a] | | 2/82 | 9/86 | 8/81 | 1/85 | 1881 | 1885 | - 1.7 | -2.0 | -0.9 | 17.4 | - 2.9 | Fixed |
| | | | | | | | 2/82 | 2/84 | | | 1879 | 1880 | - 2.6 | 2.0 | -0.1 | 3.0 | - 0.7 | |
| | | | | | | | 4/85 | 9/86 | | | 1881 | 1882 | - 4.1 | -5.9 | -1.1 | 3.0 | - 1.0 | |
| | | | | | | | | | | | 1884 | 1885 | - 7.5 | -3.5 | -0.1 | 6.7 | - 0.5 | |
| 3. 1886-1894 | 1890 (5) [ 1/90 | 1894 2/95] | - .55 | | 90[c] 91[a] 93[a] | | 2/90 | 12/94 | 12/89 | 11/91 | 1889 | 1893 | - 2.5 | 4.3 | -0.7 | 7.4 | 4.5 | Fixed |
| | | | | | | | 2/87 | 1/88 | | | 1886 | 1887 | - 2.6 | -0.4 | -0.2 | 3.4 | 1.7 | |
| | | | | | | | 2/90 | 5/92 | | | 1889 | 1890 | - 3.4 | -1.5 | -0.3 | 3.8 | - 1.6 | |
| | | | | | | | 8/93 | 12/94 | | | 1892 | 1893 | - 2.5 | -0.1 | -0.2 | 3.4 | - 0.7 | |
| 4. 1894-1902 | 1900 [ 1/00 | 1902 3/02] | -2.04 | 1901[a,T] | 95[c] | 1901[a] | 3/00 | 7/02 | 5/99 | 10/01 | 1898 | 1900 | 0.45 | 8.2 | -6.0 | 3.8 | 7.2 | Fixed |
| | | | | | | | 8/96 | 5/97 | | | 1895 | 1896 | - 1.5 | -0.3 | -3.1 | 7.5 | 1.9 | |
| | | | | | | | 3/00 | 7/02 | | | 1898 | 1900 | 0.45 | 8.2 | -0.5 | 3.8 | 7.2 | |
| 5. 1902-1904 | 1903 [ 8/03 | 1904 2/05] | 2.5 | | 00[a], 04[d] | | 8/03 | 4/05 | | | 1902 | 1903 | 1.1 | 4.0 | 0.4 | 2.0 | 2.1 | Fixed |
| 6. 1904-1908 | 1907 (5) [ 7/07 | 1908 12/08] | -2.2 | | 07[c] | | 7/07 | 11/08 | 9/05 | 8/08 | 1906 | 1907 | -17.1 | -0.2 | -0.3 | -8.7 | - 2.6 | Fixed |
| | | | | | | | | | | | 1908 | 1910 | 2.1 | 3.2 | -0.1 | 4.3 | 1.1 | |
| 7. 1908-1914 | 1913 [ 4/13 | 1914 8/14] | | | 12[a], 14[c] | | 2/13 | - | 9/12 | 12/13 | 1910 | | | | | | | Fixed |
| | | | | | | | 8/10 | | | | | | | | | | | |
| | | | | | | | 2/13 | | | | | | | | | | | |
| 8. 1914-1919 | 1918 [ 6/18 | 1919 6/19] | | | | | - | 7/11 | | | | | | | | | | Flexible |
| 9. 1919-1923 | 1922 (5) [ 5/22 | 1923 11/23] | | | | | | | | 6/24 | | | | | | | | Flexible |
| 10. 1923-1926 | 1925 [ 3/25 | 1926 3/26] | | | | | | 7/25 | 1/25 | 12/25 | | | | | | | | Fixed[**] |
| 11. | | | | | | | | | | | | | | | | | | Fixed |
| 12. 1926-1932 | 1929 (5) [ 8/29 | 1932 8/32] | | 8/31 | 29[a], 31[c] | 1931[f] | 5/29 | 6/32 | 4/27 | 6/32 | | | | | | | | Fixed |
| | | | | | | | 3/28 | 7/29 | | | | | | | | | | |
| | | | | | | | 5/29 | 8/30 | | | | | | | | | | |
| | | | | | | | 7/31 | 5/32 | | | | | | | | | | |

Data Sources: See Data Appendix

Notes: a) crisis affecting Germany and other countries
b) Germany not affected but major
c) major international crisis, sharply affecting Germany
d) Germany alone
e) McGouldrick (1983) p. 19
f) Kindleberger (1973)
T) Thorp (1926)
* Germany was on a silver standard until 1873, on gold thereafter
** Germany stabilized the mark in 1924

[1] The trend growth rate in real output over the period 1870-1913 was 8.01 percent. It was calculated as described in Table I.A.

[2] The trend monetary growth rate over the period 1870-1913 was 5.24 percent. It was calculated as in [1] above

TABLE 1.D. - France

| Common International Reference Cycle (Trough to Trough) | Real Variables (1) Annual [monthly] Reference Cycle Contractions (subcycles) Peak | Trough | (2) Deviations from Trend of Average Annual Real Output Growth[1] Peak to Trough | Financial Variables (3) Financial Crises | (4) Stock Market Crises | (5) Banking Crises | (6) Monthly Specific Cycle Long-Term Short-Term Interest Differential Trough | Peak | (7) Monthly Specific Cycle Stock Price Index Peak | Trough | Monetary Variables (8) Annual [monthly] Specific Monetary Growth Cycle Contractions (subcycles) Peak | Trough | (9) Deviation from Trend of Average Annual Monetary Growth Rate[2] Peak to Trough | (10) Exchange Rate Regime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. 1868-1879 | 1873 (S) [ 8/73 | 1879 9/79] | | 1871[T] | 73[a], 75[a] | | | 6/79 | | | | | | Fixed * |
| | 1869 [ 8/70 | 1871 2/72] | | | 79[d] | | | | | | | | | |
| | 1873 [ 9/73 | 1876 8/76] | | | | | | | | | | | | |
| | 1878 [ 3/78 | 1879 9/79] | | | | | | | | | | | | |
| 2. 1879-1887 | 1882 (S) [12/81 | 1887 8/87] | | 1/82 | 81[a], 82[c] | 1882[e] | 1/82 | 6/86 | | | | | | Fixed |
| 3. 1886-1894 | 1890 (S) [ 1/91 | 1894 1/95] | | | 87[a], 88[d], 90[c], 91[a], 95[c] | 1889[f] | 12/88 12/83 3/91 8/93 | 8/95 2/89 6/92 8/95 | | 1/98 | | | | Fixed |
| 4. 1894-1902 | 1900 [ 3/00 | 1902 9/02] | | | 00[b] | | 1/00 | 9/01 | 4/00 | | | | | Fixed |
| 5. 1902-1904 | 1903 [ 5/03 | 1904 10/04] | 6.43 | | 04[a] | | 7/03 | 8/04 | | 2/04 | 1904 | 1905 | -3.1 | Fixed |
| 6. 1904-1908 | 1907 (S) [ 7/07 | 1908 2/09] | - .64 | 8/07 | 07[a] | | 8/07 | 5/09 | 2/07 | 10/07 | 1906 | 1907 | -3.4 | Fixed |
| 7. 1908-1914 | 1913 [ 6/13 | 1914 8/14] | | 1914[T] | 12[a], 14[c] | | 8/13 | N/A | 9/12 | 7/14 | 1911 | 1912 | -4.6 | Fixed |
| | | | | | | | | | | | 1908 | 1910 | 4.1 | |
| | | | | | | | | | | | 1911 | 1912 | 4.6 | |
| 8. 1914-1918 | 1917 [ 6/18 | 1918 4/19] | | | | | | | | 3/19 | | | | Flexible |
| 9. 1918-1921 | 1920 (S) [ 9/20 | 1921 7/21] | -9.1 | | | | | | 4/20 | 4/22 | 1920 | 1921 | -7.1 | Flexible |
| 10. 1921-1925 | 1924 [10/24 | 1925 6/25] | - .58 | 1926[Y] | | | 4/25 | 11/25 | 10/24 | 5/25 | 1923 | 1924 | -3.9 | Flexible |
| 11. 1925-1927 | 1926 [10/26 | 1927 6/27] | -4.9 | | | | 10/26 | 10/27 | 9/26 | 12/26 | 1925 | 1926 | 2 8 | Flexible** |
| 12. 1927-1932 | 1930 (S) [ 3/30 | 1932 7/32] | -7.2 | | 29[a], 31[a] | 1930[g] | 6/29 | 6/33 | 2/26 | 5.33 | 1928 | 1929 | -4 6 | Fixed |

Data Sources: See Data Appendix

Notes:
a) crises affecting France and other countries
b) France not affected but major
c) major international crisis, sharply affecting France
d) France alone
e) failure of Union Generale Source Kindleberger (1978)
f) suspension of payments - Comptoir D'Escompte. Clapham (1966) p. 384
g) bank failures in Paris Kindleberger (1978), pp. 136-137
T) Thorp (1926)
Y) Yeager (1976)
* France was on a bimetallic silver standard until 1878, although gold was de facto the standard after 1872
** France restored de facto gold convertibility at the end of 1926

[1] The trend growth rate in real output over the period of 1900-1939 was 1.36 percent. It was calculated as described in Table 1.A.

[2] The trend monetary growth rate over the period 1900-1939 was 7.34 percent. It was calculated as in [1] above.

TABLE 1.E. - Canada

| Common International Reference Cycle (Trough to Trough) | Real Variables (1) Annual [monthly] Reference Cycle Contractions (subcycles) Peak | Trough | Real Variables (2) Deviations from Trend of Average Annual Real Output Growth [1] Peak to Trough | Financial Variables (3) Financial Crises | Financial Variables (4) Banking Crises | Financial Variables (3) Financial Crises | Financial Variables (4) Banking Crises | Monetary Variables (5) Annual [monthly] Specific Monetary Growth Cycle Contractions (subcycles) Peak | Trough | Monetary Variables (6) Deviation from Trend of Average Annual Monetary Growth Rate[2] Peak to Trough | Percentage change in M if determinants indicated alone had changed (7) High Powered Money | (8) Deposit Reserve Ratio | (9) Deposit Currency Ratio | (10) Percentage Change in Monetary Gold Stock | (11) Exchange Rate Regime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | | | | | | | | | | | | | | | |
| 2. | | | | | | | | | | | | | | | |
| 3. | | | | | | | | | | | | | | | |
| 4. | | | | | | | | | | | | | | | |
| 5. 1901-1904 | 1903 [12/02 | 1904 6/04] | 1.7 | 1902[T] | | 1902[T] | | 1901 [ 4/01 | 1903 8/07] | 2.8 | 21.8 | - 6.6 | 1.5 | 38.4 | Fixed |
| 6. 1904-1908 | 1907 (S) [12/06 | 1908 7/08] | - 6.7 | 1907[T,J] | | 1907[T,J] | | 1906 [ 1/06 | 1907 10/07] | 9.7 | 4.0 | - 6.5 | - 1.8 | 11.7 | Fixed |
| 7. 1908-1915 | 1913 [11/12 | 1915 1/15] | - 7.5 | | | | | 1911 [ 4/12 | 1914 5/13] | -1.1 | 21.6 | -10.3 | 2.1 | | Fixed |
| | [1910 | 1911 | 2.5 | 1910[T] | | 1910[T] | | [1909 | 1910 | 2.8 | 7.8 | 0.1 | 0.4 | 11.8 | |
| | [ 3/10 | 7/11] | | | | | | [12/08 | 10/10] | | | | | | |
| | [1913 | 1915 | - 7.5 | 1914[J] | 1914[a] | 1914[J] | 1914[a] | [1911 | 1914 | -1.1 | 21.6 | -10.3 | 2.1 | | |
| | [11/12 | 1/15 | | | | | | [ 4/12 | 5/13] | | | | | | |
| 8. 1915-1919 | 1917 [ 3/17 | 1919 4/19] | 1.25 | | | | | 1917 [10/17 | 1918 4/18] | 0.8 | 13.9 | - 5.4 | - 2.2 | | Flexible |
| 9. 1919-1921 | 1920 (S) [ 6/20 | 1921 9/21] | -16.8 | 1921[T] | | 1921[T] | | 1919 [ 9/21 | 1921 9/22] | -7.1 | -14.3 | 5.8 | 4.9 | | Flexible |
| 10. 1921-1924 | 1923 [ 6/23 | 1924 8/24] | - 6.9 | | 1923[a,b] | | 1923[a,b] | 1922 [ 9/22 | 1923 9/23] | -4.5 | - 9.1 | - 2.5 | -20.0 | - 6.6 | Fixed* |
| 11. | | | | | | | | | | | | | | | Fixed |
| 12. 1924-1933 | 1929 (S) [ 4/29 | 1932 3/33] | -10.9 | 1931[J] | | 1931[J] | | 1927 [10/27 | 1931 11/31] | -7.8 | -20.6 | 9.1 | 2.0 | -35.1 | Flexible** |

Data Sources: See Data Appendix

Notes: a) minor bank runs
b) major bank failure
J) Jamieson (1959)
T) Thorp (1926)
* Canada returned to gold de jure 1926
** Canada left gold de facto in 1929, de jure 1931

[1] The trend growth rate in real output over the period 1900-1939 was 3.10. It was calculated as described in Table 1.A.

[2] The trend monetary growth rate over the period 1900-1939 was 5.49 percent. It was calculated as in 1 above.

TABLE 1.F - Sweden

| Common International Reference Cycle (Trough to Trough) | Real Variables (1) Annual [monthly] Reference Cycle Contractions (subcycles) Peak | | Trough | Real Variables (2) Deviations from Trend of Average Annual Real Output Growth[1] Peak to Trough | Financial Variables (3) Financial Crises | Monetary Variables: Percentage change in M if determinants indicated alone had changed (4) Annual [monthly] Specific Monetary Growth Cycle Contractions (subcycles) Peak | Trough | (5) Deviation from Trend of Average Annual Monetary Growth Rate[2] Peak to Trough | (6) High Powered Money | (7) Deposit Reserve Ratio | (8) Deposit Currency Ratio | (9) Exchange Rate Regime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. 1866-1876 | 1872 | (S) | 1878 | - 1.1 | | 1876 | 1878 | -8.4 | -11.8 | - 8.0 | 15.7 [-250.4] | Fixed |
| | 1872 | | 1875 | - 1.3 | | | | | | | | |
| | 1876 | | 1878 | - 5.0 | | | | | | | | |
| 2. 1878-1886 | 1883 | (S) | 1886 | - 1.4 | | 1880 | 1886 | -1.6 | 1.9 | 18.1 | 3.7 | Fixed |
| | | | | | | 1880 | 1882 | -1.3 | - 7.0 | 14.5 | 0.6 | |
| | | | | | | 1883 | 1886 | -2.3 | 8.2 | 0.9 | 0.3 | |
| 3. 1886-1895 | 1889 | (S) | 1895 | - 0.6 | | 1891 | 1894 | -2.9 | 9.4 | - 1.0 | 0.8 | Fixed |
| | 1889 | | 1890 | - 1.5 | | 1889 | 1890 | -3.5 | - 0.1 | 1.7 | 0.4 | |
| | 1891 | | 1892 | - 3.7 | | 1891 | 1892 | -5.1 | - 1.0 | 0.4 | 0.9 | |
| | 1894 | | 1895 | - 5.6 | | 1893 | 1894 | -3.2 | 5.1 | - 1.1 | - 1.7 | |
| 4. 1895-1902 | 1900 | | 1902 | - 3.3 | | 1899 | 1902 | 2.7 | 36.4 | 5.4 | -16.7 | Fixed |
| 5. 1902-1905 | 1903 | | 1905 | - 1.4 | | 1903 | 1904 | -1.5 | 9.0 | 0.5 | - 5.6 | Fixed |
| 6. 1905-1907 | 1906 | (S) | 1907 | - 2.7 | 1907[T] | 1907 | 1910 | -1.2 | 1.1 | 3.6 | 7.6 | Fixed |
| 7. 1907-1914 | 1913 | | 1914 | - 5.2 | 1914[T] | | | | | | | |
| 8. 1914-1917 | 1916 | | 1917 | -11.9 | | | | | | | | Flexible |
| 9. 1917-1921 | 1920 | (S) | 1921 | -15.4 | | 1918 | 1923 | -5.3 | -10.1 | 2.6 | 16.6 | Flexible* |
| 10. | | | | | | | | | | | | |
| 11. 1921-1926 | 1925 | | 1928 | .22 | | | | | | | | |
| 12. 1928-1931 | 1929 | (S) | 1931 | - 6.1 | 1931, 1932[d,k] | 1930 | 1932 | -6.2 | 8.7 | -11.0 | 0.8 | Fixed* |

Data Sources: See Data Appendix

Notes: k) Kreuger Collapse
T) Thorp (1926)
J) Jonung (1981)
* Sweden returned to gold de facto in 1922, de jure in 1924
** Sweden left gold in 1931

[1] The trend growth rate in real output over the period 1871-1939 was 2.77. It was calculated as described in Table 1.A.

[2] The trend monetary growth rate over the period 1871-1939 was 5.39 percent. It was calculated as in [1] above.

## APPENDIX: DATA SOURCES

A. United States 1870-1933

Reference Cycle Turning Points: Burns and Mitchell (1946). Table 16, p. 78
Real Output: NNP Variant III in 1929 prices. Friedman and Schwartz (1982) Table 4.8, p. 121.
Money Supply and Determinants: $M_2$ definition. Friedman and Schwartz (1982) Table 4.8, p. 121.
Long-Term, Short-Term Interest Differential: Morgenstern (1959), Table 125, p. 501.
Stock Price Index: Morgenstern (1959), Table 132, p. 531.
Monetary Gold Stock: Cagan (1965), Table 5-7, p. 340.
Loan Earning Asset Ratio: Ratio of Loans to Loans plus Investments, Federal Reserve Board (1944), p. 20.
Federal Reserve Board (1955), pp. 35-36.

B. Great Britain 1870-1933

Reference Cycle Turning Points: Burns and Mitchell (1946), Table 16, p. 78.
Real Output: NNP in 1929 prices. Friedman and Schwartz (1982), Table 4.9, p. 130.
Money Supply and Determinants: $M_2$ definition. Friedman and Schwartz (1982), Table 4.8, p. 30 and data supplied by A. J. Schwartz.
Long-Term, Short-Term Interest Differential: Morgenstern (1959), Table 125, p. 501.
Stock Price Index: Morgenstern (1959), Table 132. p. 531.
Monetary Gold Stock: Bordo (1981), Table 4, Sheppard (1971), Table A 1.12.
Loan Earning Asset Ratio. Ratio of Loans plus discounts to loans plus discounts plus investments: Bordo (1977) and Sheppard (1971), Table A 1.1.

C. Germany 1870-1913

Reference Cycle Turning Points: Burns and Mitchell (1946), Table 16, p. 78.
Real Output: NNP in 1913 prices. Hoffman (1965), Table 249.
Money Supply and Determinants: $M_2$ definition. Tilly (1972) Table 5. p. 347.
Long-Term, Short-Term Interest Differential: Morgenstern (1959), Table 125. p. 501.
Stock Price Index: Morgenstern, (1959), Table 132, p. 513.
Monetary Gold Stock: Tilly (1972), Appendix 1, p. 359.

D. France 1900-1933

Reference Cycle Turning Points: Burns and Mitchell (1946), Table 16, p. 78.
Real Output: GNP in 1938 prices. Sauvy (1954).
Money Supply: $M_2$. INSEE (1966).
Long-Term, Short-Term Interest Differential: Morgenstern (1959), Table 125, p. 501.
Stock Price Index: Morgenstern (1959), Table 132, p. 531.

E. Canada 1900-1933

Reference Cycle Turning Points: Hay (1966), Table III, p. 362.
Real Output: GNP in 1949 prices. Data used in Bordo and Jonung (1977).
Money Supply and Determinants: $M_2$ definition. Data used in Bordo and Jonung (1977).
Monetary Gold Stock 1900-1913: Rich. (1980), Table , 1920-33. Data supplied by R. A. Shearer.

F. Sweden 1870-1933

Reference Cycle Turning Points: Calculated from turning points in annual rates of change of real GNP.
Real Output: Real GDP in 1913 prices. Data used in Bordo and Jonung (1977).
Money Supply and Determinants: $M_2$ definition. Jonung (1975), Table A-1.