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Working Paper

On the Great Depression

Working Paper, No. 130

Provided in Cooperation with:

George J. Stigler Center for the Study of the Economy and the State, The University of Chicago Booth School of Business

Suggested Citation: Telser, Lester G. (1996) : On the Great Depression, Working Paper, No. 130, The University of Chicago, Center for the Study of the Economy and the State, Chicago, IL

This Version is available at:

<https://hdl.handle.net/10419/262532>

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On the Great Depression

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13 June 1996

Preliminary draft circulated for comments and criticisms.
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Abstract

The severity of the Great Depression was due to the loss of confidence engendered by the collapse of the banking system in Winter 1933. Dissatisfaction with Federal Reserve actions led President Hoover and the Congress in January 1932 to create the Reconstruction Finance Corporation that was intended to lend primarily to banks. Jockeying for political advantage overcame good economic policy. The effects of two Federal authorities extending credit to the banking system became a catastrophe by March 4, 1933. A strong case can be made that John Nance Garner, Speaker of the House, who could have been a statesman but was instead a politician, bears responsibility for opening the last act of the tragedy in August 1932.

* *This work was supported by a grant from the Bradley Foundation to the Center for the Study of the Economy and the State, The University of Chicago.

It is a pleasure to acknowledge the help of my research assistant, Mark Guglielmo. I also wish to thank Randy Kroszner for giving me his figures on RFC loans and his advice on the RFC. I am particularly grateful to Milton Friedman for his valuable advice on a previous draft that led me to make extensive revisions. I also wish to thank Meyer Burstein, David Galenson, Robert Laurent, Michael Perlman and David Wheelock for their helpful comments on a preceding draft. For all remaining errors and defects, I assume sole responsibility.

1. Introduction

The Great Depression in the United States is an economic event unique in U.S. history by virtue of its severity, duration and tragic consequences. Because of the drastic changes that took place, it furnishes a record of an economy under severe stress. What began in the early summer of 1929 as an ordinary recession became an unprecedented financial calamity by March 1933. More than six years passed before the economy began a sustained recovery despite novel government interventions intended to revive it. To support this view it is instructive to look at Figure 5 that shows the Federal Reserve Board Index of Production by months from January 1919 to December 1940. From May 1933 to December 1940 production moved erratically. It rose from 59 in March 1933 to 100 in July only to fall back to 72 in November. A longer recovery began in September 1934 when it rose from 71 to 121 in December 1936. About 9 months later, production faltered and again was down to 76 in May 1938. The Federal Reserve Board's three increases in the required reserve ratio on August 16, 1936, March 1, 1937 and May 1, 1937 is perhaps one reason for the relapse to Depression. However, the role of the Federal Reserve as villain must not be overdone. Member banks did not reduce their loans to business until the first quarter of 1938. They met the higher reserve requirements by selling some of their holdings of U.S. Government securities. On April 16, 1938, the Fed changed course and lowered the reserve ratios by about 10 percent. Even so, steady recovery did not resume until June 1939. This uneven pattern of output is striking seen against the background of the steady upward movement of reserves at the Fed shown in Figures 7 and 22 notwithstanding the rise in the reserve ratios from August 1936 to May 1937.

These events have been the subject of many studies and widely different, even conflicting, interpretations. This essay is an attempt to draw some new lessons from the economic history of this event. A sequence of financial crises culminated in the collapse of the banking system in March 1933. These crises so undermined confidence that the economy stayed at a low level of activity despite stimulative fiscal and monetary policies. Fiscal policy was stimulative in the sense that the government spent more than it received by a widening amount beginning in early winter 1929 (Firestone, 1960, table A-3). The money supply rose steadily beginning in late spring 1933. As Henry Simons put it

(1942, pp.192-3), we had abundant money and high liquidity in the late thirties; investment lagged notwithstanding. (Currency Plus Demand Deposits rose from \$19 billion in March 1933 to \$27 billion in December 1935, an increase of more than 42 percent. By December 1940, it had risen an additional \$15 billion, more than a 55 percent increase!)¹ Government relief programs and the Works Progress Administration, though they did increase the income of the recipients, did not stimulate the economy as much as an equivalent increased demand for goods and services stemming from a higher level of employment in the private sector. Firms were reluctant to make longer term commitments. Investment was low and a larger portion was financed by borrowing than by issuing new equity. The onset of World War II and huge government war orders finally did raise employment and investment in the private sector to the pre-Great Depression levels. The point is this: More than the amount of the monetary and fiscal stimulus, the nature and direction of government actions affect the economy. This is not to say that World War II was necessary for economic recovery. Yet it did draw resources into the private sector to produce the material means for waging the war. This expansion of private industry laid a foundation for revival of the economy after the War ended.

The proposition that the state of individual and business confidence is crucial for explaining the slump of the '30's as well as the prosperity of the '20's offers a useful framework for understanding the historical material. Individuals who are more confident of their future act more boldly and make more longer term commitments. They borrow more and they buy more houses, autos, and other

¹ In May 1937 a committee formed by the National Bureau of Economic Research consisting of Winfield A Reifler, chairman, David Friday, Walter Lichtenstein and J.H. Riddle published its report A Program of Financial Research. Near the beginning it says "...virtual collapse of our major financial markets - for stocks in 1929, for bonds in 1931 and for mortgages in 1932. With the banking crisis of 1933 still fresh in our memories we have seen a growth of excess banking reserves to enormous volume, a decline of interest rates to exceptional levels, and more recently a striking revival of business activity without a corresponding revival in the demand for commercial credit. Taken individually, there are historical parallels for many of these phenomena. Taken collectively, they are without precedent." (p. 3).

About two years before, Wesley C. Mitchell, the founder and president of the National Bureau and Arthur F. Burns published an article (1935) describing the various measures of cyclical behavior used by the Bureau. Chart 6 gives their financial indicators: common stock prices, preferred stock prices, interest rates on prime commercial paper in New York City, interest rates on customers' loans in New York City, call loan rates in New York City and interest rates on customers' loans in the south and west. Conspicuously absent is any measure of any component of the stock of money.

durables. The wealthier individuals place more of their assets in riskier forms such as shares of common stock, longer term loans and venture capital. Businesses enlarge their physical capital, expand their stock of knowledge and seek new markets. Banks lend more freely and keep fewer reserves relative to their liabilities. There is abundant evidence of high and rising confidence from 1922 to 1929 although interrupted by a sharp recession for about one year ending in the spring, 1924. When confidence flags, individuals take more defensive positions and reduce their exposure to risks. The events of the five weeks from the end of January to the beginning of March 1933 so diminished confidence that few, if any, of the heroic measures designed to revive the economy during the New Deal were helpful and, indeed, some may have impeded recovery. Admittedly, not every recession is accompanied by such severe blows to the financial system as occurred between October 1929 and March 1933. It is not the purpose of this essay to assess the importance of monetary factors relative to real factors to explain fluctuations of business activity. For the Great Depression the evidence is plain. A series of financial shocks eventually caused widespread and unprecedented runs on banks starting in January 1933 culminating in so great a crisis in the first week of March 1933 that the whole economy tottered on the brink of total collapse. Nor is this all. After March 1933, the record shows that individuals and business took defensive, highly risk averse actions inimical to economic recovery. Not economic stagnation, not the absence of opportunity but lack of confidence explains the slow partial erratic recovery of the economy by the end of 1940. Neither the large increase of the money supply, the stream of Federal deficits starting in 1929 nor the New Deal policies were able to restore the economy to health.

The Reconstruction Finance Corporation (RFC) was a key factor leading to the collapse of the banking system in three weeks, from the beginning of the third week of February 1933 to the end of the first week of March 1933. This Federally chartered Corporation proposed by President Hoover and approved by Congress at the end of January 1932 was supposed to alleviate the financial distress of the banks primarily. One would think it should have helped not hindered the return to prosperity. But a Federal Corporation with \$1.3 billions available for loans to private firms in the first year of its operation, more than 2 percent of the Gross National Product, generated political pressures that

exacerbated the financial troubles of the banks it was designed to assist. The first president of the RFC, Charles Dawes, resigned on June 7, 1932 in order to return to his own distressed Chicago bank. Within 3 weeks he had obtained a \$90 million loan from the RFC for his bank which by then had deposits of only \$95 million. The news became public and led to tumult. Soon after Congress enacted legislation requiring the RFC to make public the identity and amounts of its loans beginning in August 1932. An article by John T. Flynn in Harper's Magazine, November 1932, identified some of the banks, especially the larger ones, that had borrowed from the RFC prior to August 1932. These included one of the two largest Detroit banks, Union Guardian. Flynn's article was republished in the Congressional Record of the Senate on December 22, 1932. When the list of all the banks who had borrowed from the RFC was published in the Congressional Record at the end of January 1933, it was no longer a surprise that this large Detroit bank was among them. One would think that knowing a bank had received a loan from the RFC would raise not lower the confidence of its depositors. However, refusal of a loan by the RFC to a distressed bank is another matter. Such a refusal would surely frighten the bank's depositors. The RFC did refuse an additional loan of \$65 million requested by Union Guardian on January 26, 1933, the same day that its name was on the official list in the Congressional Record. The loan request and the RFC rejection did not become public until February 15, 1933 when it was the subject of a front page story in the Detroit Free Press. However, Union Guardian began rapidly to lose deposits on January 26, 1933. Did this happen because some depositors did know the precarious state of Union Guardian's balance sheet? The panic spread to other Michigan banks. On February 14, the governor of Michigan declared an eight day bank holiday in his state. Thus began the fatal banking panic of 1933.

The misguided attempts of the RFC to stimulate recovery took a new path after the inauguration of President Roosevelt on Saturday, March 4, 1933. In response to criticism that the RFC could lend to banks only on the basis of sound collateral so that the banks most in need of loans could not get them, a new policy was begun under which the RFC could infuse capital directly in to banks by purchasing preferred stock in them. This was unusual preferred stock because it gave the RFC voting rights like shares of common stock. At one point RFC preferred stock equalled 38 percent of the par value of

FC, common stock in all U.S. banks. In this fashion a Federal government agency preserved the fiction that it was not an owner of the banks in law though it had all of the prerogatives of one.

d RFC replaced the chairman of Continental Illinois, one of the leading Chicago banks. It also began a
st similar tactic with two other leading banks, the Chase Bank in New York and First National in Chicago
but the publicity aroused by the Continental maneuver stopped the RFC from aggressive actions toward
these two banks. The preferred stock program did make the RFC a controlling partner in many banks.
e It is not hard to understand why the banks raised their holdings of U.S. government securities to high
levels. What RFC official would criticize a bank for buying safe Federal paper? The inevitable politics
as swirling around the first year of the RFC precipitated the banking panic of 1933. Its actions during the
mk New Deal era retarded recovery from the Great Depression.

A convenient and concise summary of some salient facts marking the onset of the Great
Depression is shown by the figures in the following table. During the 46 months from June 1929 to
April 1933, financial assets in the form of equity in the companies traded on the New York Stock
Exchange fell more than 42 percent in real terms, close to the percentage decline in production. In the
next 4 months the real value of these assets rose more than 50 percent, again close to the more than 51
percent rise in production. However, while financial assets in the form of demand and time deposits fell
ors sharply during the first 46 months, the rise in the next 4 months was very modest. Yet the FRB Index
1 of Production in July 1933 stood only 25 points below its previous peak 4 years earlier at 125. Since
us these 4 months are the celebrated 100 days of the New Deal, perhaps there was a rise in confidence that
bolstered the economy. However, if there was a boost in morale, it did not did not last. These facts
on bely exclusively monetary explanations of the Great Depression.
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Table 1: Summary of Salient Measures of the Great Depression

	M1	Demand Deposits	Currency	Time Deposits	Market Value of Stocks	Price Level	FRB Production Index
June 1929	26189	22278	3911	19729	84659	96.4	125
April 1933	19039	13837	5202	10708	17466	60.4	66
Percent Change June 1929-April 1933	-27.30	-37.89	33.01	-45.72	-79.37	-37.34	-47.20
July 1933	19087	14201	4886	11073	29635	68.9	100
Percent Change April-July 1933	0.25	2.63	-6.07	3.41	69.67	14.07	51.52

2. A Statistical Summary of the Principal Factors

Before examining the events in detail it is useful to summarize in the shape of simple regressions for the whole period, January 1919 to December 1940 and for pertinent subperiods using monthly data, the relations among 5 principal variables; industrial output (AIP), the price level (PRI), nominal output ($NOMY = PRI \cdot AIP$), demand deposits plus currency held by the public (M1), high-powered money (HPM) equals bank reserves plus currency and the interest rate (IUS).

AIP is the seasonally adjusted Federal Reserve Board Index of Production.

PRI is the Wholesale Price Index of the Bureau of Labor Statistics.

M1 and HPM are the estimates of Friedman and Schwartz (1963).

IUS is the 90 Bankers' Acceptance Rate in New York.

The elasticities of the first three variables with respect to the two components of money, M1 and HPM, is estimated from regressions with only one explanatory variable, either M1 or HPM. The subperiods are determined by significant events such as troughs or peaks in real output or important changes in Federal Reserve controls. The first subperiod, January 1919 to April 1921, starts with the first month for which the Federal Reserve Board's Index of Production is available and ends at the bottom of the Post-World War I Depression as determined by the trough of this index. The second period, April 1921 to June 1929, stops at the 1920's peak of the AIP Index. From June 1929 to the trough of the AIP Index in July 1932, the economy became increasingly depressed. The stock market and industrial production began showing signs of recovery in late spring 1932. Recovery was set back severely by the banking panic that began at the end of January 1933 and culminated in the national bank holiday in March 1933. The economy began moving up again in April 1933 but the recovery was unsteady. In August 1936, the Fed, using its new power over reserve ratios, obtained under the Banking Act of 1935, raised them in three steps. By May 1937, these ratios were twice the levels they had been from 1917 to August 1936. In April 1938 the Fed lowered reserve ratios about 10 percent. This marks the beginning of the last subperiod.

Table 2: A Summary of the Elasticities of AIP, PRI and NOMY with respect to M1 and HPM from January 1919 to December 1940 and for Selected Subperiods Using Monthly Data

Period		AIP	PRI	NOMY	NOBS
Jan 1919-Dec 1940	M1 Elasticity	0.670	-0.172	0.418	264
	Adj R ²	0.470	0.0181	0.0723	
	HPM Elasticity	0.144	-0.172	-0.0491	
	Adj R ²	0.131	0.133	0.003	
Jan 1919-Apr 1921	M1 Elasticity	1.094	2.013	3.082	28
	Adj R ²	0.225	0.363	0.349	
	HPM Elasticity	0.530	1.325	1.880	
	Adj R ²	0.0144	0.110	0.0843	
Apr 1921-Jun 1929	M1 Elasticity	1.466	0.248	1.628	99
	Adj R ²	0.720	0.166	0.653	
	HPM Elasticity	2.149	0.310	2.345	
	Adj R ²	0.536	0.086	0.469	
Jun 1929-Jul 1932	M1 Elasticity	2.294	1.578	3.753	38
	Adj R ²	0.851	0.826	0.812	
	HPM Elasticity	-3.203	-2.233	-5.057	
	Adj R ²	0.390	0.390	0.345	
July 1932-Aug 1936	M1 Elasticity	0.797	0.505	1.298	50
	Adj R ²	0.548	0.643	0.701	
	HPM Elasticity	0.763	0.507	1.256	
	Adj R ²	0.576	0.738	0.752	
Aug 1936 - Apr 1938	M1 Elasticity	6.456	1.347	7.688	21
	Adj R ²	0.774	0.512	0.785	
	HPM Elasticity	-3.173	-0.195	-3.227	
	Adj R ²	0.314	0.000	0.218	
Apr 1938-Dec 1940	M1 Elasticity	1.316	0.053	1.377	33
	Adj R ²	0.866	0.107	0.858	
	HPM Elasticity	0.933	0.037	0.974	
	Adj R ²	0.846	0.093	0.835	

The results in Table 2 are illuminating for several reasons. First, the relation between the money supply and the three dependent variables is smaller as measured by the elasticities for the whole period than for any of the subperiods and sometimes strikingly so. Second, the elasticity of real output, AIP,

with respect to M1 typically is much bigger than the elasticity of the price level with respect to M1. Third, the elasticity of nominal output, NOMY, with respect to M1 is bigger than the corresponding elasticities of its two components, the price level and real output during the subperiods but not for the whole period.

The elasticities of the three dependent variables with respect to high powered money are smaller than with respect to M1. The monetary authorities can control high-powered money directly but M1 is at least partly an induced variable determined by individuals' choices. Moreover, for the two subperiods containing the giant contractions, June 1929 - July 1932 and August 1936 - April 1938, the elasticities with respect to HPM are negative. Thus while high powered money was rising, output, prices and nominal output were falling. This happens because the public withdraw funds from the banks as shown by the rise of their cash holdings relative to their bank deposits. Elasticities for both high powered money and M1 agree in one important way; both are bigger for the subperiods than for the whole period. Not only do the magnitudes of the elasticities differ by subperiod but they also tend to be bigger during contractions than expansions.

While the relation between real output, the price level, nominal output and the two measures of the money supply, M1 and high powered money have lower R^2 for the whole period than for the subperiods, this is decidedly not so for one important relation. The correlation between velocity ($v = \text{NOMY}/\text{M1}$) and the interest rate is bigger for the whole period than for the subperiods. The elasticity of velocity with respect to the interest rate, based on the following regression, is 0.275.

$$(1) \quad \text{Velocity}_t = 0.24816 + 0.03846 \text{ IUS}_t$$

t-Ratios 39.0 19.0 Adjusted $R^2 = 0.570$ F-ratio 349

Regression (1) uses the nominal interest rate, IUS, supposing that it correctly reflects the percentage change in the price level. However, as the next regression shows, the monthly percentage change of the price level has a positive coefficient with a t-ratio nearly 6.6.

$$(2) \quad \text{Velocity}_t = 0.24431 + 0.04081 \text{ IUS}_t + 1.22327 \Delta p_t/p_{t-1}$$

t-Ratios 41.0 21.0 6.58

Adjusted $R^2 = 0.629$ F-ratio 224

Hence $\Delta p_t/p_{t-1}$ has a separate effect on velocity apart from the effect of the nominal interest rate so that a rising price level tends to raise velocity and a falling one to lower it. This would not happen if the nominal interest rate fully reflected the percentage change in prices.¹ There is a plausible explanation of this finding. The lower bound of the nominal interest rate is zero. A negative rate of interest is not possible even if prices are expected to fall as long as it is costless for a potential lender to hold cash. A borrower fulfills his obligation if he repays the same nominal amount as he had borrowed. When prices are falling, this places the real value of the nominal amount repaid above the real value of the original loan. To put it another way, the real interest rate exceeds the nominal interest rate by a positive amount proportional to the percentage decline in prices. Given a lower bound of zero on the nominal interest rate, this phenomenon could be avoided only if loans were in real terms. From May 1938 until December 1940, the Treasury Bill rate was virtually zero and even negative towards the end of this period. (see fig. 24). This explanation is buttressed by the very different results for a comparable regression using Post-World War II data. For most of this period prices were rising. Since there is no upper bound on interest rates in the absence of laws against usury, the nominal interest could be higher and thereby respond to the rate of inflation. Using monthly data for the period January 1951 to December 1991, the positive coefficient of IUS is highly significant while the coefficient of $\Delta p_t/p_{t-1}$ is nearly zero, its t-ratio is only - 0.5. Therefore, velocity depends positively on the interest rate without effects from rising prices that occurred for most of the Post-World War II period.²

¹The relation between the nominal interest rate and the percentage change in prices is actually negative and on the borderline of conventional levels of statistical significance.

² The Post-World War II regression for the period January 1951 to December 1991 is as follows:

$$\begin{aligned} \text{velocity}_t &= 9.83905 + 0.67592 \text{ IUS}_t - 5.08868 \Delta p_t/p_{t-1} \\ \text{t-Ratio} &\quad 89.0 \quad 40.0 \quad -0.53 \\ \text{Adjusted } R^2 &= 0.784, \quad \text{F-Ratio} = 887. \end{aligned}$$

The analysis in the text can be restated algebraically. Let i_t denote the nominal interest rate, ρ_t the "real" interest rate and ϕ_t^* the expected rate of change of prices. Let $i_t = \rho_t + \phi_t^*$, the usual relation among the three variables. The following argument is also valid for a more general relation among the three variables, $i = f(\rho, \phi^*)$, such that i is an increasing function of ρ and ϕ . Let ϕ_t denote the observed percentage change of prices between the end of month $t-1$ and the end of month t . The regression for velocity is $v_t = a_0 + a_1 i_t + a_2 \phi_t$. Suppose the observed ϕ_t has an effect on the expected ϕ_t^* so that $\phi_t^* = w_0 + w_1 \phi_t$. Therefore, w_1 is the weight of ϕ_t in ϕ_t^* and

Yet another variable affects velocity, the risk of default as measured by the difference between interest rates on 90 day New York Bankers' Acceptances and U.S. Treasury Bills, assuming the latter are default-free. Let RskPrm denote IUS minus the Treasury Bill Rate. The regression including this measure of the effect of risk on velocity is as follows:

$$(3) \quad \text{Velocity}_t = 0.25315 + 0.03749 \text{ IUS}_t + 1.16425 \Delta p_t/p_{t-1} - 0.05512 \text{ RskPrm}_t$$

t-Ratios	42.0	19.0	6.09	- 4.16
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$$\text{Adj } R^2 = 0.636 \quad \text{F-Ratio} = 147.4$$

In agreement with the theory, the higher the risk premium, the lower is the velocity. Inserting this measure of risk into the velocity regression does not change the estimates of the effects on velocity of the nominal interest rate and the percentage rate of change of the price level. A similar result also holds for the 492 months from January 1951 to December 1991. The regression for the latter period is

$$(4) \quad \text{Velocity}_t = 12.70052 + 0.67823 \text{ IUS}_t - 2.31188 \Delta p_t/p_{t-1} - 2.62999 \text{ RskPrm}_t$$

t-Ratios	23.0	41.0	- 0.25	- 5.24
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$$\text{Adj } R^2 = 0.795 \quad \text{F-Ratio} = 632.7$$

Taking into account this measure of the effect of risk on velocity reinforces the conclusion that during the post-World War II period when prices were usually rising (about 73 percent of the time), interest rates responded appropriately leaving no room for a separate effect of rising prices on velocity. Also, the higher the risk premium, the lower is the velocity just as is true for the period between the two World Wars.³

$$\frac{\partial v}{\partial \phi^*} = a_1 + a_2 \frac{\partial \phi}{\partial \phi^*} = a_1 + a_2 w_1$$

The full effect of ϕ^* on v would be measured solely by a_1 if either ϕ_t carried no weight in ϕ_t^* which is unlikely or if ϕ had no independent effect on velocity. The second alternative is not implausible under a regime of rising prices but not under one with falling prices and low interest rates.

³ Measuring interest rates on short-term Treasury securities poses some problems. Regular trading in the present kind of Treasury Bills began in January 1931. The Treasury sold these Bills at a discount and redeemed them at face value if presented on or after maturity. Prior to 1931, all Treasury securities bore a coupon. One can link the old and new Treasury interest rate series together for the 37 month period January 1931 to January 1934 when figures for both are available. Let ITRN denote interest rates on Treasury Notes and Bills and ITBLN denote interest rates on the new Treasury Bills starting in January 1931. The regression for the overlapping period is as follows:

$$\text{ITBLN} = 0.17900 + 1.04450 \text{ ITRN}$$

t-Ratios	2.845	18.0
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$$\text{Adj } R^2 = 0.898 \quad \text{F-Ratio} = 306.5$$

Regression (3) shows why nominal income is not a linear function of the money supply. Since $v = \text{NOMY}/\text{M1}$ and v increases linearly with the interest rate and $\Delta p_t/p_{t-1}$ and decreases linearly with the risk premium according to regression (3), it follows that

$$\text{NOMY} = (0.25 + 0.04 \text{ IUS} + 1.16\Delta p_t/p_{t-1} - .055 \text{ RskPrm} + \text{residual}) \text{ M1}.$$

The absence of a simple relation between real output, the price level, nominal output and two measures of the money supply, M1 and high powered money, inspires the following detailed examination of the events before, during and after the Great Depression.

These findings that relate various measures of economic activity to M1 and high-powered money suggest that unexpected changes in the stock of money do have effects on production but anticipated and desired changes do not. Just as unemployment and the expected rate of inflation are not related so that only surprising departures from expectations underlay the Phillips curve so too unexpected deviations of the money stock from its normal course lead to changes in output and employment. It is an unexpected increase in the stock of money that inclines people to respond by buying commodities and financial assets. Both prices and output are higher, interest rates are lower and velocity is lower but not by enough to offset the effects of a larger stock of money.

3. The 1920's

By late summer 1921, the economy began a strong recovery from a severe but short post-World War I recession. Between 1922 and 1929, per capita GNP in 1929 prices rose from \$689 to \$857, an increase of more than 24 percent (Historical Statistics 1976, referred to as HS from now on, F-4) while

the price level was virtually constant.⁴ Banks had little idle funds. The usable reserve ratio of banks belonging to the Federal Reserve System (member banks) fell from just under 2 percent in June 1922 to about 1.3 percent at the end of 1929 (Cagan, 1965, F-12). (By contrast it reached 16.5 percent in June 1940!) The monthly rate of bank failures, while never above .3 percent, was still high compared to earlier experience. Not since the severe depression starting in 1893 had the number and rate of bank failures been as high. The failure rate of national banks had reached the highest levels in the 5 month period from June to October 1893 when it was 1.4 percent, a record since the establishment of national banks in 1863. In contrast, the high bank failure rate during the 1920's is due not to lack of prosperity but instead to the effects of the opposite that emboldened bankers during the prosperous '20's.

The stock market reflected a growing and prosperous economy. The Standard & Poor Index of stock prices rose with remarkable steadiness from 62 in January 1922 to 238 in September 1929, a monthly rate of increase of nearly 1.5 percent (Figure 1). In 1928, for the first time in the decade, the dividend yield of common stocks fell below the interest rate on high grade corporate bonds (HS, F333-

This regression is used to estimate Treasury Bill interest rates for the months before January 1931 using the available figures for the interest rates of the shortest term Treasury Bills and Notes. However, Banking and Monetary Statistics does not give interest rates separately for 3, 6 and 9 month Treasury Bills so figures for Treasury Bill interest rates are not comparable to the 90 day Bankers' Acceptance Rates for the period between the two World Wars. For the inter-war period, the estimated risk premium equals IUS - Estimated Treasury Bill Rate. There are several months during this period when the Treasury Bill Rate was very close to zero and even negative. The period January 1951 to December 1991 is free of these complications and the risk premium is estimated by the ratio IUS+Treasury Bill Rate.

⁴ Owing to a revision of the wholesale price index it is necessary to splice together the old and new indexes. The old index base is 1913, POld(1913) = 100, and the new index base is 1926, PNew(1926) = 100. The old index is available monthly until October 1925 and the new index starts in January 1923. Hence they overlap for 34 months. Let newpri denote the new index and oldpri the old one. Fitting the new price index to the old one by least squares for the 34 months in which they overlap gives the regression as follows:

$$\begin{array}{ll} \text{NewPri} = -2.8058 + 0.6366 \text{ OldPri} & \text{adjusted } R^2 = 0.781 \\ \text{t-ratios} \quad 0.295 \quad 10.8975 & \end{array}$$

Estimates of the new price index for the months when only the old price index is available are from this regression.

F335).⁵ Perhaps this alarmed the Federal Reserve, who may have attempted to rein in stock prices by raising the rediscount rate. A sensitive indicator of credit market conditions is the Bankers' Acceptance Rate in New York for 90 day loans, referred to as the interest rate from now on. From 3.13 percent in August 1927 these interest rates rose to 5.5 percent in June 1929 (Figure 3). However, the level of interest rates does not show whether money is "tight" or "easy" because interest rates, being determined in the market place, depend on both the forces of demand and supply. Higher rates in New York drew funds from London. It is doubtful whether the Federal Reserve's action had much effect on the stock market (see figs 13 and 1).⁶

The number of issues traded on the New York Stock Exchange rose steadily from 494 in January 1926 to 691 in October 1929 (fig 2). Although there was a drop to 679 in November 1929, the month after the Crash, the upward trend resumed and continued throughout 1930. Parallel to the rise in the number of issues traded and the rise in share prices, the market value of the equity of the firms traded on the New York Stock Exchange grew from \$38 billion in January 1926 to its peak, nearly \$106 billion in September 1929, a rise of more than \$67 billion, nearly 176 percent.⁷ This record would stand for nearly three decades.

The trend of production was mostly upward beginning in November 1921 as Figure 5.1 shows. A short and sharp recession began in the summer of 1923 and lasted for about one year. From March to July 1924, the Federal Reserve Board Index of Production fell by 16 percent. The newly

⁵ The dividend yield stood above the 90 Bankers' Acceptance rate during the 1930's both because of generally falling prices, especially from the fall of 1929 to the spring of 1933 and because of the perception of rising risk.

⁶ For a discussion of the relation between the two money centers, New York and London, see Keynes (1930, vol. II, pp. 314-9). The high correlation between bankers' acceptance rates in London and New York is plain in Figure 5.

⁷ According to the Reifler report (1937), some corporations lent money on call to traders in the stock market. At the same time new stock issues were rising. This opened an opportunity for some corporations to float new stock issues and use some of the proceeds to lend on call to the buyers of these issues as well as to buyers of other stocks. When the call money rate was above the dividend yield, this activity could be profitable to the corporation and its shareholders, indeed even to the buyers of its new issue.

formed Open Market Policy Committee of the Federal Reserve bought government securities during this period and thereby injected more reserves into the member banks (Figure 14). The recovery from the 1924 recession was rapid and modest economic growth resumed.⁸

Because the Federal Reserve System began operations in the latter half of 1914 so that it had accumulated only 15 years of its own experience by 1929, caution is advisable while interpreting with contemporary understanding what it then said or did. Although the Federal Reserve could not affect the *ratio* of required reserves to deposits until 1933, it could control *total* member bank reserves by means of open market operations and by the interest rates it could charge member banks who wished to borrow from the Federal Reserve.⁹ Therefore, scrutiny of the reserves and vault cash of the member banks needs no apology.

All required reserves of the member banks are kept in deposits at their District's Federal Reserve Bank. Member banks also held vault cash that was not part of their legal reserves but such that any portion of which could be deposited into their Federal Reserve accounts and thereby increase their reserves. Under normal conditions a member bank wishes to minimize the total cost of its vault cash so it would hold as little relative to its total deposits as would be optimal given the interest rate, transactions cost and the nature of its streams of receipts and disbursements. Vault cash plus reserves

⁸ A remarkably perceptive understanding of open market operations, appreciation of the key role of Benjamin Strong in shaping Federal Reserve policy during the '20's and of the need for reform aimed at constructing a stable banking system is in a letter from Henry A. Wallace, Secretary of Agriculture, to President Roosevelt, dated March 23, 1933 (Phillips, 1995, pp.198-9).

Irving Fisher says, "It would have been still easier to have prevented the depression altogether. In fact, in my opinion, this would have been done had Governor Strong of the Federal Reserve Board of New York lived, or had his policies been embraced by other banks and the Federal Reserve Board and pursued consistently after his death." (1933, p.347)

⁹ The Thomas Amendment to the Agricultural Adjustment Act gave the Fed emergency power to change reserve ratios with the permission of the President. The Banking Act of 1935 increased its power over reserve ratios by allowing the Fed to change the ratio between the lower bound set by the Act of 1917 and twice that level. (Friedman and Schwartz, 1961, p 447). According to Phillips (1995), the power to control reserve ratios was put into the Act by Lauchlin Currie, the responsible Treasury official and a proponent of the Chicago Plan for banking reform because he wanted to move toward 100 percent reserves for demand deposits, a key proposals of the Chicago Plan.

on deposit at the Federal Reserve Banks constrain the total amount of the loans of the member banks. Federal Reserve Banks were also subject to constraints in the form of gold reserve requirements both on Federal Reserve Notes and on their reserves behind the member bank deposits. High-powered money includes cash held by the public in addition to these two components. Currency included various U.S. Treasury issues such as gold and silver certificates, U.S. Notes (Greenbacks) as well as Federal Reserve Notes.

It must be understood that legally required reserves are not all available for use by the member banks. These reserves impose an upper bound on bank loans. It would be more accurate to describe most but not all of the legally required reserves as the *false* reserves. The *true* reserves are the reserves that banks can use as they please so these are available for emergencies. Reserves above the legally required amount and perhaps some of the legally required reserves are the true reserves.

Consider the behavior of high powered money and member bank reserves month by month during the 1920's. As Figure 6 shows, from January 1922 until December 1929, high powered money moved narrowly around \$6.8 billion. Figure 7 shows that reserves at the Fed rose gradually from about \$1.7 billion to about \$2.4 billion while vault cash (not shown) remained close to about \$270 million. Moreover, apart from a spike in November 1929 of \$135 million, reserves at the Fed stayed close to this level in every month until July 1931. From February 1931 to February 1932 reserves at the Fed fell at the rate of 1.9 percent per month. However, it must not escape attention that for the next 12 months reserves *rose* at the rate of 3.2 percent per month. Nor is this all. At the end of January 1933, reserves at the Fed were \$537 million above the level a year earlier. (By contrast, in the post-World War I depression, reserves at the Fed fell 0.9 percent per month from February 1920 to August 1921.) The trough is between February and March 1932. The steady *growth* of member bank reserves until February 1931 should be viewed against the background of the more widely fluctuating Fed's holdings of government securities that are the result of its open market operations (fig. 14). A careful study of these numbers allows only one plain conclusion. Member bank reserves plus vault cash grew moderately from January 1922 until July 1931. The sharp drop starting in July lasted for 9 or 10 months until about February or March 1932. After May 1933, member bank reserves rose without

interruptions until the end of this chronicle, December 1940 (fig. 22). It is very important to keep in mind this picture of member bank reserves when observing total output as measured by the Federal Reserve Index of Production from May 1933 to December 1940 (fig. 19).

Real estate was an outstanding feature of the prosperity during the period from 1922 to 1929.¹⁰ There was a remarkable rise in the stock of buildings for both residential and nonresidential use. Owner-occupied housing rose from 40.9 percent of all housing units in 1920 to 46 percent in 1930. It was 36.9 percent in 1890, 36.5 percent in 1900 and 38.4 percent in 1910. From 1922 to 1930, total real estate loans by banks rose by 105 percent while all commercial loans increased by 40 percent. Real estate loans were a large share of all commercial bank assets, more than the loans secured by equity shares traded on the New York Stock Exchange. By 1929, real estate loans were more than 17 percent of total loans of all commercial banks. The rise of this ratio was especially large for national banks going from 3.9 percent in 1922 to 9.5 percent in 1929. One should also not overlook a popular new financial instrument in the economy, real estate bonds, secured by mortgages and issued in denominations as small as \$100. These bonds were bought by individuals as well as institutions such as building and loan associations (now called savings and loan associations), the biggest single source of residential real estate credit. In 1922, the estimated total of these bonds was only \$682 million. It rose to \$4.2 billion in 1929 (Parsons, 1930), a big number relative to total real estate loans in 1929 of at least \$20 billion, excluding real estate bonds. Although real estate bonds probably lowered the cost of financing real estate by enlarging the market for loans secured by real property, the market for these bonds was ill organized and illiquid.¹¹

¹⁰ Mills (1932, pp 452-4) stresses the growth of real estate and mortgage indebtedness.

¹¹ An excellent history of the real estate market in Chicago giving many details about the 1920's is in Hoyt's doctoral dissertation published in 1933. Despite the many problems in estimating real estate prices, there can be little doubt of dramatic rises between 1920 and 1929, perhaps as much as doubling (Table XX, p. 255). Hoyt's explanation of the rise and fall of real estate prices in that decade is notable. He emphasizes the fragmented nature of the Chicago real estate market. Links among local markets were sparse. Traders in one area knowing little about what was going on in another, indulged their fantasies and fueled their speculations on wild rumors about huge profits others had supposedly obtained.

A prudent bank matches the term to maturity of its assets to its liabilities. Demand deposits are short-term liabilities. A bank lowers its risk if it uses its demand deposits to finance short-term loans. Likewise it lowers its risk if the average duration of its longer term loans matches the average duration of its time deposits. Not only does such hedging with respect to term to maturity reduce the chance of a gap between its payments and its receipts but it also stabilizes the stream of net revenue from its interest receipts and payments. To the extent that banks raised the proportion of their assets in real estate without a commensurate increase in the average term to maturity of their liabilities, they increased their risk.

In 1927 Congress enacted the McFadden Act that removed a restriction on mortgage lending by national banks. Prior to the Act the maximum term of a mortgage loan was one year. Since banks could renew their real estate loans annually even before the passage of the Act, interest rates on real estate loans by national banks were set for not more than one year at a time. By removing this restriction the Act allowed national banks to increase the risk on their real estate loans if they lengthened the duration of these loans. This is so because interest rates could be set for a longer period than the average amount of time that banks held the funds used to finance these loans.

The main point about the rise in mortgages pertinent to the later fate of the banks is this. Mortgages impose a fixed obligation on the borrower in the form of interest payments and amortization for the term of the loan. Whether amortization is required by the mortgage or is chosen by the borrower does not matter. Depending on the particular circumstances, mortgages ran from 50 to 80 percent of the value of their real estate collateral. Hence a borrower had equity from 20 to 50 percent of the value of the property to be protected from loss by foreclosure. An adverse shock would allow the borrower few costly alternatives capable of protecting his equity in the collateral of the mortgage. First, he could sell the property and use the proceeds to repay the loan. Second, he could try to cover his fixed obligations by reducing other outlays or by increasing income from other sources. Third, he could try to gain time by more borrowing on a second mortgage. The success of any of these depends on how many borrowers are in difficulty. A fall in employment, a drop in total production or a decline in the stock

market affects many borrowers and depresses the demand for real estate at the same time it raises the supply thrown on the real estate market. The inevitable result is lower real estate prices.

Lenders are also in a bind when the borrowers are in distress. The decline in the lenders' receipts from interest payments together with the drop in real estate prices that lowers the value of the collateral backing their real estate loans makes them more vulnerable as well because these lenders have borrowed from others. Once the troubles begin, they persist, grinding down borrowers and lenders alike. Thus the rising tide of real estate debt during the 1920's weakened the ability of the banks to withstand unexpected adverse shocks. As a consequence the economy became increasingly vulnerable to such shocks. This fact is critical. It helps explain why a moderate recession starting in Spring 1929 led to the banking crisis that turned into the Great Depression.

4. The First Crisis - the Stock Market Crash of October 1929

The first signs of a sputtering economy in June 1929, shown by a drop in the Federal Reserve Board's Index of Production, did not arouse concern by comparison with the recession 9 years before. In June, interest rates fell from 5.5 to 5.13 percent and remained there until the end of October. Stock prices began to fall in September *after* a summer of decreasing industrial output. In October 1929 the stock market crashed. In both size and rapidity this drop in share prices had no U.S. precedent. The nadir came in July 1932 when the market value of all stocks traded on the New York Stock Exchange was \$13.6 billion, a decrease of more than \$92 billion, that is more than 87 percent of the value at its peak. Moreover, the market value of stocks in July 1932 was \$25 billion lower than in January 1926, a fall of more than 35 percent. Despite the October crash, the banking system remained intact and above all the New York banks at the nation's financial center weathered the storm. Interest rates fell from 5.13 percent in October to 4.90 percent in November and again in December to 3.88 percent. Rates rose slightly to 3.94 percent in January 1930 and stock prices also rose moderately. In January 1930 there were small signs of economic recovery; industrial production was up, interest rates rose somewhat but the price level continued to fall. So far prices were not falling as much or as rapidly as they had during the 1920-1921 recession. From January 1920 to April 1921, a 15 month interval, prices fell by a third and the Federal Reserve Board's Index of Production fell by 42 percent. By August 1921 recovery was well under way. It was reasonable to expect the same would happen in 1930.

Many believe that the October Crash is the bursting of a speculative bubble. Keynes is perhaps the best known and most influential proponent of this view (1936, chap. 12 and for his earlier views on speculation, 1930 vol II p. 361. See also Galbraith, 1961.) Whether the evidence supports this belief is not clear. Consider the distribution of the monthly rates of return on stocks traded on the New York Stock Exchange on some pertinent dates. The monthly rates of return are measured by the dividend yield plus the percentage change in the price per share from the beginning to the end of the month. Table 2 shows the means and the standard deviations of the deciles of the distribution of the rates of return from January 1926 to December 1989. It also shows the deciles of the distribution by month for May to August 1929. The means of the deciles for these 4 months are close to the population means but

much volatility is visible. These figures give no hint of unusual speculative activity preceding the October Crash. Put differently, you could pick many samples of 4 successive months and see similar numbers. The caveat is necessary because in crisis months such as October 1929 and October 1987, the distributions do exhibit distinctive and unusual patterns.

Table 3: Deciles of the Monthly Rates of Return on Stocks Traded on the New York Stock Exchange: the Population Mean and Standard Deviation for January 1926 to December 1989 and Selected Months Preceding the October 1929 Crash

Decile	Population Means & Std Deviations	August 1929	July 1929	June 1929	May 1929
1st	-.0879 (.0726)	-.097	-.106	-.044	-.225
2d	-.05428 (.0676)	-.054	-.058	-.005	-.167
3d	-.03169 (.0654)	-.029	-.030	.015	-.137
4th	-.01257 (.0657)	-.007	-.004	.035	-.112
5th	.00534 (.0679)	.013	.010	.058	-.086
6th	.02409 (.0726)	.036	.031	.082	-.061
7th	.04567 (.0802)	.067	.059	.119	-.038
8th	.07345 (.0922)	.110	.093	.149	-.009
9th	.12047 (.1186)	.160	.143	.209	.033

The proposition that the Crash was not the bursting of a speculative bubble means that average stock prices preceding the Crash were in line with rational expectations. Stock prices were consistent with a prosperous economy. Acceptance of this proposition raises the hurdle of explaining why the stock market crashed. No explanation commands wide agreement.¹³

Let us see whether stock prices can rise given a constant money supply. It is desirable to perform this mental experiment because the money supply was approximately constant from the beginning of 1926 to the end of 1929. In order to focus on the key issue, say the stock market has only

¹³ Bittlingmayer (1992) offers an interesting one. He attributes the Crash to statements made by President Hoover's Attorney General that were interpreted as a change in government antitrust policy unfavorable or hostile toward mergers.

two traders, One and Two, who must perform trade only with each other. Assume that there is only one stock. The following table shows what can happen in six trading sessions in which prices rise in the first three sessions and fall in the last three.

Time	P_t	Trader One				Trader Two			
		ΔS_t	ΔM_t	Debt _t	Credit _t	ΔS_t	ΔM_t	Debt _t	Credit _t
1	100	1	-100	0	0	-1	100	0	0
2	110	-1	100	0	10	1	-100	10	0
3	120	1	-100	10	0	-1	100	0	10
4	110	-1	100	0	0	1	-100	0	0
5	100	1	-100	0	0	-1	100	0	0
6	90	-1	90	0	0	1	-90	0	0

The price per share is 100 in the first session. Trader One buys one share from Trader Two, pays for it with cash so One's cash balance goes down by 100 and Two's cash goes up by 100. In the second session Trader Two buys the share from Trader One at the price 110. Since the inventory of cash is constant at 100, Trader Two must borrow 10. He can borrow 10 from a bank using the stock as collateral or he can borrow from his broker who in turn gets the funds in the form of a call loan from a bank. In either case a loan equal to 10 is needed to complete the transaction. It simplifies the exposition to pretend that the loan of 10 comes from Trader One. The essential point is that the size of the loan stays the same over the sequence of trades while the price of the stock rises. Let us say that Trader One now has a credit of 10 due from Trader Two who has incurred a debt of 10. In period 3, Trader One buys the share from Trader Two at a price of 120. He pays 100 in cash, 10 with the note due from Trader Two and 10 by borrowing from Trader Two to cover the remaining balance. Trader Two receives the cash, cancels the outstanding 10 debt and has a credit of 10 due from Trader One. It is evident that stock prices can rise indefinitely even with a constant stock of money. The increment of the market value of the stock in each trading session equals the loan. In this example, or more generally, when the market value rises by a constant amount in each trading session, the outstanding loans needed to support the increase in market value is constant and stays so from one trading session to the next. It must be emphasized that rising stock prices under these conditions can occur with a constant amount of

call loans. It is only if the market value rises at an increasing rate and the money inventory is constant that the outstanding call loans must increase as well. This would require banks to shift more of their loans to the stock market. It is important to note in this example that the debt of each buyer as a fraction of the price per share goes down as the share price goes up. This analysis would remain valid if there were more traders and more stocks.

The Table also shows what happens if share prices are falling. In session 4, the price is 110. Trader 1 sells one share to trader 2 who pays 100 cash and 10 with his note. Prices continue to fall in sessions 5 and 6. The figures show that with falling prices, the necessary payment can be made without incurring debt. Nevertheless there is an important difference between rising and falling prices. When prices are high enough, some of the payment must be borrowed since the buyer lacks enough funds to pay cash for the whole purchase. When prices are low enough, a buyer can pay for the whole purchase in cash but may choose not to.

Before resuming our study of the events after the October Crash, it is useful to pause for a brief description of the composition of money and near-money in the U.S. economy of that time. According to Friedman, the money stock has three major components, currency, demand deposits and time deposits.

Currency is distinguished from the other components of money in several ways. First, the nominal price per unit is fixed. A currency holder usually does not fear it will become worthless by default. Short of defeat in war or too rapid a rise in the money stock leading to inflation, a nation's currency remains widely acceptable¹⁴. Although the nominal price per unit of demand and time deposits is constant like currency, their relevant price reckoning the risk of default is not constant. The expected

¹⁴ Whether a currency is legal tender is neither necessary nor sufficient to determine whether the public will accept it. The quantity of money, not a legal formula, together with certain other pertinent economic variables determines the value of money. Moreover it does not seem possible to settle a priori what the public may be willing to accept as a means of payment. Carl Menger says, 'But it appears to me to be just as certain that the function of being a "measure of value" and a "store of value" must not be attributed to money as such, since these functions are of a merely accidental nature and are not an essential part of the concept of money.' (1994, p. 280). Menger argues that money must be widely accepted in trade (p. 260 and passim).

price per unit of demand or time deposit is lower than the unit price of currency owing to the risk that the bank holding the deposit can refuse to redeem it for cash temporarily or permanently. In the latter case the bank has defaulted. Second, currency furnishes a means of payment independent of the identity of the parties to a transaction. Assuming a stable price level, the main worry for those who receive cash is whether the currency is counterfeit. Genuine currency is useful for transactions among strangers. Offsetting these advantages are some costs of using cash as a means of payment. It is inconvenient to pay large sums in cash. (At present banks keep records of large cash deposits and withdrawals for inspection by law officers so that a user of a bill of a large denomination may surrender anonymity and so on.) Legitimate businesses use cash mostly for their transactions with the public and seldom for transactions among themselves. Households use currency both as a means of payment as well as a store of value. The figures for currency used here, money in circulation, include vault cash held by the banks. Vault cash is typically less than 10 percent of the cash held by the nonbanking public. It rose sharply during March 1933, the month of the national bank holiday, in itself a visible sign of the banks' perceptions that the public had less confidence in the safety of the banks.

Demand deposits are liabilities of the banks on which the public writes checks. These checks are usually accepted as payment by sellers of goods, services or assets. Therefore these bank liabilities constitute a part of the stock of money. Unlike currency, a check lacks universal acceptability. Its acceptability as a means of payment is up to the party who receives it and who may require the check writer to prove there are enough funds in his checking account to cover the amount of his check. It seems likely that business firms held most of the demand deposits during the '20's and '30's but there are no reliable figures to prove this.

Time deposits cannot be used directly as a means of payment. The owner of a time deposit cannot write a check on it in order to pay someone. Funds in a time deposit cannot be withdrawn on demand and banks can require notice of withdrawal depending on the terms agreed to in advance between the owner of the account and the bank. However, these provisions were honored more in the breach than the observance. Because most time deposits were probably held by households, there is particular interest in studying the relation between the currency holdings and the amount of time

deposits. A good indicator of individual confidence is the ratio of currency holdings to time deposits. We shall examine this below (see fig 8).

Some of the demand deposits are the result of bank loans. When a bank lends to someone, the borrower gets the loan in the form of an addition to his demand deposit by the bank on which he can write checks. For this reason demand deposits can move up and down with bank loans. Monetary authorities can place an upper bound on the amount of bank credit by means of their control over bank reserves but they cannot prevent banks from lending less than the bank reserves would allow because banks can decide to have more reserves than are legally required. Therefore, it does not follow that demand and time deposits can be regarded as completely under the control of the monetary authorities. They can affect the size of bank reserves for their own purposes by open market operations and in other ways, sometimes in an effort to offset the effects of shocks on the financial system. Consequently, the money supply can be both a policy variable controlled by the monetary authority and an endogenous variable to the banks. The fractional reserve banking system, the link between credit creation and destruction to changes in the money supply and each individual's illusion of liquidity that the system as a whole cannot gratify led Henry Simons to conclude, writing in 1936 while the economy was recovering but still depressed, that the financial and banking system of the United States was inherently unstable.

The close relation between bank credit and bank deposits underlies Simons' conclusion. It is worth elaborating this. Banks make loans secured by collateral the value of which exceeds the amount of the loan. If the borrower cannot repay the loan, if the collateral is fungible and if the price of the collateral falls, the bank may still be able to sell the collateral and recover some or perhaps all of the loan. Depending on the difference between the size of the loan and the initial value of the collateral, the bank hopes to have a tolerable lower bound on its loss. Also, to weather storms the bank has some earning assets, akin to secondary reserves, that are highly marketable, that are less profitable and that are less likely to default. Such assets are still risky because their market prices may change unexpectedly. U.S. Treasury securities are such assets. One bank with one bad loan that sells one asset backing the loan and perhaps with Treasury Notes or Bills can survive plans gone awry. Many banks

with many bad loans trying to sell much collateral and many Treasury securities must suffer losses. Simons concludes that liquidity in the aggregate is an illusion¹⁵.

The relation between the stock of money and the level of economic activity has always been problematic owing to their different dimensions. Economic activity is a flow of transactions with the dimension of a rate per unit of time while money is a magnitude at a point in time. Velocity is defined so that the money stock times velocity is commensurate with a flow -- nominal income. Without a sound theoretical foundation velocity is a mere tautology akin to the number converting yards to meters. It is not the purpose of this essay to discuss the complications inherent in attempts to relate the stock of money to the flow of economic activity measured in nominal terms. However, at least one objection deserves mention because it is so wide of the mark. The same coin or banknote can be used in many transactions so it can have a literally high velocity. This is seldom true of a check. The checkwriter uses it once, the person receiving the check deposits it into his bank account and so very often the check has a velocity of one. Yet it is the rapidity of transfer of funds from one bank account to another that governs velocity, not the number of times a piece of paper or a coin changes hands.¹⁶

Resuming the history, the price level, production and stock prices continued their downward movement in January 1930 so that at year-end, the price level had fallen by 16 percent, output had fallen by nearly 21 percent and stock prices had fallen by 30 percent (figs. 1, 4 and 5). The falling price level weakened the banks increasingly by lowering the current value of the collateral backing their loans. As business conditions worsened, more bank loans were in default. There is a revealing effect

¹⁵ The vulnerability of the banks owing to falling prices is the main theme of a remarkably prescient essay by Keynes (1931, pp 168 - 78) published in August 1931 before the major wave of bank failures.

¹⁶ D. H. Robertson's example of the two men who jointly own a keg of beer and one who has a penny is instructive. The one with the penny offers it to the other in exchange for a glass of beer. The second then does the same and so the penny passes back and forth between them. Soon the keg of beer is empty and the penny remains. Velocity is simply the number of pennyworth of beer in the barrel (Robertson, 1948, p. 83). A better theory of the demand for money is a branch of the theory of portfolio selection. All the components of the portfolio are stocks of various assets, including tangible commodities such as consumer durable, so perplexing dimension problems are absent. Keynes' version is among the first clear statements of this approach. See his "Essential properties of interest and money" (1936, chap 17).

on confidence. The ratio of money in circulation to time deposits is lower, for given interest rates, the more confidence households have in the safety of their bank savings. During the 1920's this ratio had fallen steadily (fig. 8). It began to rise moderately in October 1929 partly owing to the falling interest rates. The interest rate went from 3.94 percent in January 1930 to 1.88 percent by December 1930. Since the rate of national bank failures was also rising (fig. 9), there is at least plausible reason for reduced public confidence in the safety of the banks. The lessened confidence was reinforced by a sharp rise in the bank failure rate in December 1930.¹⁷ The failure rate of national banks continued to rise with disconcerting regularity in every month of 1931. The same held for the failure rate of all commercial banks. As the bank failure rate rose so too did the ratio of currency to time deposits. Figure 8 shows the ratio of currency to time deposits, Figure 10 the currency and time deposits together, then Figures 11 and 12 show each separately. The conclusion from these Figures is clear. The rise in the ratio of currency to time deposits is explained both by withdrawals of time deposits and by a rising demand for the safer abode of buying power, cash.

5. The Second Crisis - Britain Leaves the Gold Standard

The second major crisis came from abroad. In September 1931, Great Britain left the gold standard. Figure 13 shows the dramatic effect of this on interest rates in New York and London. Because Federal Reserve liabilities that included its Notes as well as the reserves of member banks had

¹⁷ Friedman and Schwartz emphasize the adverse repercussions of the failure of the Bank of the United States in 1930 (pp. 309-11). One aspect is pertinent here; that New York banks that had promised help to the Bank of the United States then reneged led General Dawes, facing a similar crisis in his much bigger Chicago bank, to insist that the New York banks put in writing their commitments to his bank. The New York Clearing House backed out of the effort to save the Dawes' Bank. (Jones, 1951, pp. 77-8). However, this 1930 failure of a New York bank was only one episode in the growing bank crisis and its immediate effects, while serious, do not seem to have been as dire as depicted by Friedman and Schwartz. The final act of the main banking crisis began in January 1933. Temin's (1976, pp. 90-4) criticisms of the Friedman-Schwartz narrative are well-founded judging from our own research. The events following the collapse of Union Guardian in Detroit at the end of January 1933 stands in striking contrast to the mild repercussions of the Bank of the United States three years before.

to be backed by gold, the Federal Reserve had little choice but to defend its gold reserve. Following accepted central banking practice, it raised its discount rate. Interest rates which were 0.88 percent in September 1931 rose to 2.25 percent in October. Even so, the stock of U.S. gold fell by \$700 million from August 31 to October 31, a drop of over 15 percent in two months (\$4.708 billion to \$4.005 billion). From August to October stock prices fell nearly 26 percent. Prices and production continued to decline. By late 1931 it was becoming increasingly clear that the U.S. was in a major depression like the 1890's or 1920-21. Signs of trouble in the banking system began to mount. The bank failure rate in December 1931 rose to nearly 1 percent and went over 1 percent in January 1932. The ratio of currency held by the public to time deposits continued to rise toward 40 percent by December 1932, nearly double the level of the decade before. Interest rates which had peaked at over 3 percent in November 1931 began to drop, slowly at first and then more rapidly.

The higher interest rates, resulting from the attempt by the Fed to defend U.S. gold reserves, lasted for almost 6 months, from October 1931 to around March 1932 when rates began to drop. The serious consequences for the economy were the combined effect of these higher rates and the falling price level. Between June 1929 and July 1932, the price level fell almost 32 percent. Even if one could have borrowed a nominal amount at a zero interest rate in June 1929, which was surely not true, and had to repay the same nominal amount three years later, the real burden of the loan on the borrower would have been almost one-third more than anticipated. Against this background of falling prices, the sharp rise in interest rates in the autumn of 1932 would reduce the demand for credit. The problem is not that interest rates have a lower bound of zero and no upper bound. The problem is that loans are made in nominal terms. For such loans, falling prices harm borrowers more than rising prices would harm lenders because interest rates can go up to reflect rising prices but they cannot go below zero to reflect falling prices as long as money is costless to store. If there were good measures of the price level, if borrowers had to repay the same real principal as they had borrowed and if interest payments were also in real not nominal terms then neither inflation nor deflation would disturb the credit market. However, indexed loans were then the rare exception in the U.S. economy.

Borrowing by the Federal government to cover its deficit exacerbated this problem. Not only did this borrowing attract lenders who could obtain a default-free real return above the nominal interest rate on Federal securities owing to the falling prices but also this borrowing may have lifted the cost of credit to nongovernment borrowers.

While all this was happening Congress enacted and President Hoover signed one of the biggest increases in income tax rates in U.S. history. The effective rates for 1932-33 rose for all incomes above \$2000, indeed by a factor of about 10 for incomes between \$2,000 and \$6,000. The apparent reason was alarm at the mounting Federal government deficits. (See HS Y412-Y425). This tax increase would retard recovery not by reducing the deficit but by reducing each individual's after tax return from any effort that would raise his income.

6. The Third Crisis: The RFC Fiasco

On January 22, 1932, President Hoover signed the act passed by Congress creating the Reconstruction Finance Corporation (RFC). This Federally chartered corporation was designed to lend directly to banks, railroads, states and local governments. One reason for establishing the RFC was dissatisfaction with the size of Federal Reserve actions to support the member banks. Another reason was the absence of a lender of last resort for those banks that were not members of the Federal Reserve System. Nearly half the U.S. banks, not being members of the Federal Reserve System, could not borrow directly from the Federal Reserve. Although these were the smaller banks still they accounted for over 30 percent of the total deposits in June 1929. This proportion fell steadily from that date. By June 1932, it was just under 25 percent (Cagan, Table F-9). By December 1940, it had fallen to 16 percent of total deposits.

Perhaps the most important reason for the creation of the RFC was a combination of the effects of the constraints on the lending power of the Federal Reserve Banks and the frozen state of member bank assets. Member banks could borrow directly from the Fed in two ways, by rediscounting their commercial loans or by presenting their own promissory notes to the Fed (Banker's Acceptances). However, both types of loans had to be short term, usually less than 90 days. Banker's Acceptances

also required high quality collateral, typically Federal securities. Since the assets of many member banks were close to default, short term credit would not solve their problems. The RFC seemed to promise a way out of the difficulties.

The RFC began work early in February. Simultaneously, between February and August 1932, perhaps succumbing to Congressional and Presidential pressure in the form of the Glass-Steagall Act of February 27, 1932 that allowed Federal Reserve Banks to count their holdings of Government securities as part of their required reserves, the Federal Reserve bought more than \$1.1 billion U.S. Treasury obligations.¹⁸ These purchases immediately raised the monetary base. While the Federal Reserve was actively buying in the open market as shown by the rise of their holdings of government securities in Figure 14, the RFC lent \$1 billion. The sum of the seasonally unadjusted monthly Federal deficits from February to December 1932, namely the increase in the Federal debt, was nearly \$2.5 billion (Firestone, 1960, Table A-4). Of this total increment of the Federal debt, the Federal Reserve bought \$1.1 billion and holders outside the Federal government acquired the rest, more than \$1.382 billion, which is \$160 million more than the RFC loans. Next we consider the effects of the RFC's actions on the banks and on the economy.

Four characters are in this tale; the Treasury, the RFC, the banks and the nonbanking public. Before the passage of the RFC Act, the Treasury had promised the RFC to buy its stock and its notes. By the end of 1932, the Treasury had bought \$500 million in stock and over \$810 million in notes from the RFC.¹⁹ The Treasury paid for its purchases by depositing funds into its account at the Federal Reserve Banks for use by the RFC. Since the Treasury was running a deficit and since the Federal Reserve bought no Government securities after August 1932, the Treasury had to borrow from banks or the public. As just noted, the total amount the Treasury had to borrow in order to cover the Federal deficit was nearly \$1.4 billion. These borrowed funds obtained by the Treasury and deposited in the RFC account returned to the economy in the form of RFC loans, mostly to banks in trouble. These RFC infusions replaced the funds withdrawn by bank depositors. Nor is this all. Those who bought

¹⁸ For the details of the Federal Reserve open market purchases during 1932 see Friedman and Schwartz (1963, pp 384-389).

¹⁹ See RFC Quarterly Report December 31, 1932, Table 8.

the Federal debt acquired an asset, Treasury obligations, that they must have preferred to what they had given in exchange. People who kept their deposits in those banks that borrowed from the RFC should have become more confident in the safety of their deposits since the Federal government was now effectively a fellow depositor. These activities should have alleviated public anxiety about the banks.

The RFC - Treasury operations had another important effect. Federal debt is not defined as part of the money supply. Even so it is the behavior of people that counts, not definitions. The shorter the term to maturity of a Treasury obligation, the nearer it is to money. A 90 day Treasury Bill is as safe as cash as a store of value if interest rates are constant. It is even used as money for some financial transactions, for example, as margin in trading accounts.²⁰ The increments in Federal debt held by the public should have had some effects on the economy like an increase in the stock of money broadly defined to include near money, especially if the average maturity of the Federal debt decreased. Table 3 has the relevant figures showing the composition of the Federal debt by term to maturity.

Table 4: Relative Composition of Federal Debt by Term to Maturity in Selected Years*

Date	Bonds	Treasury Bills	Treasury Notes	Special Issues
6/30/31	0.819	0.136	0.027	0.018
6/30/32	0.744	0.174	0.066	0.016
6/30/33	0.642	0.138	0.205	0.015
6/30/34	0.623	0.110	0.251	0.015

*Derived from Historical Statistics 1957, Tables Y376-Y397.

The shift in the composition of the debt from the longer term maturities, Bonds, to the shorter term maturities, Notes, is striking. The share of Notes rose steadily, Bonds fell steadily, and Bills first rose, then fell. Hence the Federal debt became more like money by virtue of its shorter average term to maturity.

These RFC and Federal Reserve operations were very large. In 1932, the Gross National Product was just over \$58 billion in 1932 dollars, (HS F-1), the Federal Reserve infusion of high

²⁰ If banks' holdings of Federal government securities count as part of their reserve requirements then borrowing by the Treasury can raise the money supply. This was true during the Civil War because National Banks could include Federal debt as legal reserves.

powered money alone was 1.9 percent of GNP. It was 5.46 percent of currency and demand deposits at the end of December 1932. The replacement of private debt by Treasury debt in the form of the RFC loans, which were \$1.225 billion, is over 2 percent of 1932 GNP and is more than 6 percent of currency and demand deposits at the end of December 1932.

The economy did respond with a short lag to these infusions as measured by the rise in industrial production and stock prices. From July 1932 to December 1932, production rose by 13.8 percent (from 58 to 66) and stock prices rose by 32 percent (from 37.9 to 50.1).

One might suppose that two Federal agencies lending to the banks would be twice as good as one, but it did not turn out that way. First, responsibility was divided creating an excuse for less action by each, especially the Federal Reserve. Second, the RFC had less resources and was more constrained than the Federal Reserve though it could lend to all banks, not just the member banks. Third, the RFC was subject to even more political pressure than the Federal Reserve System. The greatest difficulty came from trying to keep secret the identity of the banks who had requested loans or had borrowed from the RFC. Secrecy was standard for the Federal Reserve Banks who obeyed ancient central bank tradition but such was not the case for the RFC. Partly to stop political favoritism from becoming a criterion to get an RFC loan and partly to silence accusations that this was indeed happening, the identity of the banks who borrowed from the RFC was made public each month beginning August 22, 1932. A contributing factor may have been the \$90 million loan made on June 27 to the Central Republic Bank in Chicago, headed by Charles Dawes, 3 weeks after he had resigned his position as first president of the RFC. The Dawes' Loan was 18 percent of the initial capital of the RFC. The total deposits of Central Republic were \$95 million so the RFC loan covered almost all of them. (Dawes had been Vice President in Coolidge's second term and was the author of the famous Dawes plan to settle German reparations that were required by the terms of the Versailles Treaty. As a consequence of this work Dawes won the Nobel Peace Prize in 1925.) One may even argue that the Dawes' loan averted a national banking panic in July and August 1932. It strains credulity to claim that the loan to Central Republic had nothing to do with Dawes' position as former head of the RFC.

The story of the Dawes bank loan told by Jesse Jones (1951, chap. 4) who became chairman of the RFC in May 1933 and remained in this post until 1946 is of considerable interest and importance for understanding the politics of the situation. Jones, a leading Democrat and a member of the RFC Board appointed by President Hoover, has nothing but praise for General Dawes. Writing almost two decades later he vividly describes the atmosphere in Chicago on June 25, 1932 two days before the start of the Democratic Convention, as he "watched the tail end of the terrible runs on the big downtown banks. Thousands of frantic, rumor-spreading depositors were still milling about every bank entrance in La Salle, Clark and Dearborn streets. Bank lobbies swarmed with nervous customers. Many of these people had already lost heavily in the collapse of several outlying neighborhood banks which had dotted almost the entire city." (p. 73)

Dawes' attempt to rescue his Chicago bank, one of the 5 largest in the city, may have reckoned on the disastrous national consequences of its collapse. Jones himself recommended to President Hoover that the RFC make the unusually large loan to Central Republic. The President, after consulting his leading advisors, agreed. Seemingly politics did not affect the RFC loan to Central Republic since it was recommended by a prominent Democrat to the Republican President but this fact was unknown to the public at the time of the loan. Whether the loan was in the public interest is debatable. It was surely in the private interest of the owners of the bank and its depositors. Dawes himself announced the loan publicly ostensibly to calm fears about the safety of the deposits in his bank. The Dawes' loan led to a political uproar in Congress. A consequence was an amendment to the RFC Act passed by Congress on July 17, 1932. This Amendment required the RFC to make public the amounts of their loans in each previous month but not the identity of the borrowers.²¹ As Jones put it, the debate in Congress was bitter and the House evenly divided 169 to 169. The Speaker, John Nance Garner, cast the deciding vote in favor of the amendment. By then he was already the Democratic candidate for Vice President. (At the Democratic Convention Garner had been nominated for President as the favorite son of Texas by his fellow Texan, Jesse Jones.) This legislation applied only to new borrowers starting in August 1932 and did not apply to earlier loans. In view of this, it is indeed amazing that in February 1933, at

²¹ The Board of the RFC opposed unanimously this legislation and for the correct reasons (Congressional Record-Senate, 1932, pp. 15612-3).

the height of the final banking crisis, Garner said, "There is no place now under the flag where a man can deposit \$100,000 to check against and be sure he can get it. The banks are afraid to make loans, even on adequate security. I have contended consistently that there has been too much secrecy about what has been going on in the past twelve months. If the truth scares people, let it come. Let the people know all about everything the government does." (Jones, 1951, p. 83)

The identity of no borrower during the first six months of RFC operations was revealed in August 1932. Moreover, even the revelations starting in August had no effect on the number of bank failures from August to December 1932. Perhaps knowing that their loans from the RFC would be made public, banks were reluctant to tap this resource, fearing that to do so would worsen, not improve, their financial position by inciting runs (Olson, 1977, pp. 98-100). The record shows that the number of bank applications for loans from the RFC fell uninterruptedly from the peak in April 1932. The drop was especially big in August 1932. From August to March 1933, the number held steady. The number of approved loans closely matches the number of loan applications.

A banks' promise to pay depositors on demand can induce runs because it must redeem deposits as long as it can. A depositor worried about the solvency of a bank will close his deposit as soon as possible. A fearful depositor wants to be first in line so that he can get his funds before the bank runs out of cash. A less stable arrangement can hardly be imagined. Under a different rule where all depositors would get the same fraction of their deposits, runs would be less likely. Such a rule now applies to some large financial institutions. Open-ended mutual funds promise their customers payment on demand an amount determined by the current net asset value of the funds. A drop in the net asset value affects all customers in proportion to the size of their holdings. This makes runs less likely on open-ended mutual funds. Even so it is possible that such funds may be forced to raise cash by selling assets unpropitiously. To lessen the chance of this, an open-ended mutual fund usually keeps cash reserves. Even so, an open-ended fund is vulnerable albeit in lessened degree to the same danger as a bank with demand deposits. Closed-end funds are less vulnerable to this pressure because their holders can get cash only by selling their shares in these funds on the open market. A promise of redemption on

demand by banks can be fulfilled if their reserves equal 100 percent of their liabilities or if some perfectly trustworthy outside entity stands behind the banks' promise.

7. The Fourth Crisis - Winter 1933

The lame duck Congress began its final session in December 1932. The fourth crisis began in the last week of January 1933. It was to become fatal in 5 weeks. The governors of Iowa, Tennessee and Kansas had declared bank holidays in their states. Political attacks on the RFC by influential Senators and Representatives mounted. Now Congress required the RFC to reveal the names of all banks who had received loans between February 2 and July 31, 1932. The identity of some of these banks, especially the larger ones including Union Guardian of Detroit and the amounts of their loans had been published in an article by John T. Flynn in the November 1932 issue of Harper's Magazine. It was republished in the Congressional Record of the Senate on December 22, 1932 at the insistence of Senator Norris. However, there was still no official list of banks that had borrowed from the RFC prior to August 1932. This list appeared on January 26, 1933 in the Congressional Record and in the New York Times. The presence of Union Guardian Trust Company of Detroit on this list was as no surprise. It had borrowed more than \$16 million from the RFC six months before, a sum equal to about 25 percent of the bank's resources. It still owed more than \$9 million in January 1933. This stale news cannot explain the large withdrawals from Union Guardian that were threatening its survival.¹³ However, what was presumably not known to everybody was the RFC's refusal of an additional \$65 million loan on January 26, 1933, the same day that Union Guardian was on the list in the Congressional Record. This information, the refusal of a loan by the RFC, would surely worry

¹³ The Union Guardian Group involved 178 banks. On January 26, 1933 Union Guardian requested a loan of \$65 million from the RFC which refused. The reasons for the refusal are in dispute. Some claim it was because Union Guardian did not have enough collateral to satisfy the legal requirements for such a loan by the RFC. Others claim that the refusal was due to pressure from James Couzens, U.S. Senator from Michigan and a bitter enemy of Henry Ford. Union Guardian was a Ford bank. It had deposits from the Ford Motor Company, its president was a former Ford lawyer, Edsel Ford was one of its directors and Edsel Ford's brother-in-law was its chairman. Henry Ford had been asked to freeze his deposits in the bank so that they could be used as collateral for an RFC loan. Although Ford had helped the bank in December, he refused to continue his efforts unless other large depositors joined him. Couzens threatened to embarrass the RFC and Ford by using the floor of the Senate as his forum to reveal details of any RFC attempts to save the bank. Additional attempts during the next 19 days by various officials including President Hoover to extricate Union Guardian from its difficulties were all unsuccessful. The February 15, 1933 issue of the Detroit Free Press headlined this sensational story. Couzens later denied some of the details as, of course, was to be expected in view of the terrible consequences.

depositors much more than existing indebtedness to the RFC. The details of the loan request and denial was the sensational lead story in the Detroit Free Press on February 15, 1933, the day after the governor of Michigan declared a state-wide 8 day bank holiday. Can it be that no one knew the facts or, even worse, rumors, before the story was told in Detroit's leading newspaper?

Meanwhile soon after January 26, 1933, a second large Detroit bank, First Wayne, though not a borrower from the RFC, faced the same crisis as Union Guardian, large scale net withdrawals. As parts of holding companies with many correspondent banks and owing to their close connections with the auto industry, the struggles of Union Guardian and First Wayne were catastrophic. It led the governor of Michigan to declare an 8-day statewide bank holiday beginning on Valentine's Day, February 14. Neither bank reopened after the bank holiday ended.¹⁴ In three weeks, panic spread through the nation like wild fire. By the first week of March, the entire U.S. banking system stood on the brink of total collapse. On March 4, Inauguration Day, the governors of New York, New Jersey, Illinois, Massachusetts and Pennsylvania had declared statewide bank holidays. President Roosevelt in his inaugural address on the morning of March 4 said, "The only thing we have to fear is fear itself" to a nation in which nearly all the states had already closed their banks. At 11 PM Sunday, March 5, one of FDR's first official acts was to declare a national bank holiday¹⁵. From January 26 to March 5 only

¹⁴ Einzig (1933, pp. 67-8) gives a nearly contemporary account of this but asserts the Senate decided to make RFC loans public. In fact it was the House that was decisive. Hodson's (1938, pp. 208-9) more accurate and detailed history describes how the House revelations planted the seeds of panic in Detroit that spread throughout the nation. See also Friedman and Schwartz (1963, p. 329).

An intriguing area of research is the effect of this US banking crisis on Hitler's rise to power in Germany. The Reichstag fire occurred on the evening of February 27, 1933. The last democratic election in Germany before the Nazi regime took over was on Sunday, March 5, 1933. In this election, the Nazis got only 44 percent of the popular vote and were able to assume power nevertheless owing to the divided opposition. Shirer describes how during January 1933 leading German businessmen threw their support to the Nazis (Shirer, 1960, pp. 188-96). I am indebted to J.A. Telser for pointing out this connection.

¹⁵ Neither President Hoover nor Carter Glass were in favor of closing the banks. Smith and Beasley (1939, pp. 340-2) have an interesting account of the discussion a few days before the end of Hoover's term conducted by Glass as an intermediary between President Hoover and President-Elect Roosevelt on the economic arguments for and against closing the banks. Whether the President even had the legal authority to declare a national bank holiday was in doubt. Roosevelt relied on the Trading with the Enemy Act to proclaim a national bank holiday. No one can read contemporary newspaper

five weeks had passed between the revelations in the House and this unprecedented Federal action. More than 17 percent of all the national banks closed their doors that March never to reopen. Interest rates, which had been falling, rose from 0.44 percent in February to 2.38 percent in March. The cash-to-time deposit ratio reached its apogee in March, over 61 percent. As Figure 8 shows so vividly by means of this ratio, the sharp peak in March was followed by a sharp drop but still far above the levels of the 1920's. It climbed again in 1937 to well over 50 percent. The public's reduced confidence in the safety of their time deposits is plain in Figure 10. Another clear expression of the public's attitude is the rise in postal savings accounts (F&S, 1963, Table A-1). These savings accounts were as safe as the Federal debt. From only \$161 million in October 1929, the funds in these accounts rose to nearly \$1 billion by January 1933.¹⁶

The proposition that bank failures transformed an 'ordinary' depression into the Great Depression faces an objection raised by Friedman and Schwartz who point to Canada that had no bank

stories before and during the bank holidays without dismay at the evil consequences of a bank holiday. For the Federal government to stand ready to pay cash to all bank depositors would seem to have been much better than closing the banks and would have the same dubious legal standing as the proclamation of a national bank holiday.

¹⁶ In describing the major factors in the fluctuations of bank deposits between 1929 and 1936, the Reifler report asserts (1937, p. 13) that of the 30 per cent decline in deposits, bank failures accounted for half, security loans liquidations for one quarter and the contraction of other bank assets for the remainder. The report goes on to describe the situation from 1933 to 1936 as follows.

"Equally as challenging as the decline in available bank deposits from 1929 to 1933 is their subsequent rise of more than one-half from 1933 to 1936. Paralleling this rise, there occurred; (a) an unprecedented increase in banking reserves; (b) a sharp decline in interest rates; (c) a bond market boom [sic!]; (d) a doubling of stock prices; (e) a relatively modest increase in commodity prices; (f) a gradual recovery in production and trade. Granting that extraordinary forces, precipitated by the emergencies of 1932-33 and leading to gigantic fiscal operations on the part of the Treasury as well as far reaching innovations in monetary organization and policy, dominated the rapid change in financial conditions, it still presents many significant angles for inquiry. Theoretically, this rapid growth of deposits should have induced simultaneously a veritable boom in production and trade, a rapid expansion of money incomes, a marked stimulation of capital formation from savings and from bank expansion, and a sharp and extended rise in commodity prices. Indeed, this should have happened on the basis of orthodox theories as well as on those of more modern schools. Under classical theory, the sheer impact of a greater quantity of credit on the economic system should have had irresistible accelerating effects; under modern analysis, the primary and secondary impact of funds introduced into trade by governmental relief and public works expenditure should have found prompt expression in like effects." (Reifler, 1937, p. 13)

failures, that had a huge decrease of its money supply and that also suffered the Great Depression (F&S, p.352 ff). Since the common factor for Canada and the U.S. is the drop in the stock of money, Friedman and Schwartz conclude that this drop is the primary factor, not the collapse of the U.S. banking system. However, the fate of Canada is not independent evidence of the primacy of the drop in the money supply. Canada is a major exporter to the U.S., hard hit by the deepening slump in the economy of its main customer. It is more plausible to take the Canadian evidence as showing how much the money supply itself is a creature of the level of bank credit. The argument that the collapse of the banking system caused the Great Depression could be refuted by showing an instance where a similar collapse in an advanced economy did not have a similar effect. I know of no such instance.

After the national bank holiday the economy briefly showed a remarkable recovery (see Table 1). From April 1933 to July 1933, production rose by more than 51 percent, from 66 to 100 (it was 125 in June 1929), stock prices rose even more, from 50.2 to 85.0, a rise of more than 69 percent and the money supply, M1, was nearly constant. One cannot claim that this recovery was a lagged response to a bigger money supply. No other 4 month period in U.S. history shows such large increases in output and stock prices. The economy then faltered and relapsed into depression. There is no plausible explanation for the relapse that began in the summer of 1933. The economy was not to reach as high a level of production until the last half of 1936.

8. The RFC during the New Deal Era

The RFC launched by Hoover became a leading actor in the New Deal. It embarked on an unprecedented venture early in 1934 when it was authorized to buy \$823 million in preferred stock from 4,524 banks. This RFC preferred stock was not the usual preferred stock. It gave the RFC voting rights equal to common stock in the banks. The immediate effect of this new program was a large infusion of capital into these banks without requiring them to have acceptable collateral in return. The results of this program sadly confirm that he who pays the piper calls the tune. The most striking instance is shown in a series of news items in the New York Times starting January 3, 1934. A small news item with a Washington January 2 date line reported that a subcommittee of directors of the

Continental Illinois National Bank of Chicago in which the RFC owned [sic!] a controlling interest was planning to come to Washington to discuss with Jesse Jones who would become the new chairman of this bank. Jones had been elevated from RFC board member to head of the agency by President Roosevelt. Another item in the same issue of the New York Times reports that the \$75 million common stock of Continental Illinois had been reduced by \$50 million and replaced by an equal amount of preferred stock owned by the RFC. In this way the RFC by virtue of a two to one majority got voting control over Continental Illinois. It used its power to make Walter J. Cummings, the first head of the Federal Deposit Insurance Corporation (FDIC), the chairman of Continental despite opposition from many directors of Continental. The January 12 New York Times quotes Jones as denying that the RFC would use the same tactic on the First National Bank of Chicago although it had bought \$25 million of preferred stock in that bank. The RFC had also bought \$50 million of preferred stock in the Chase National Bank of New York and once again denied that it would exercise its power as it had in Continental Illinois. However, Mr. Aldrich, the chairman of Chase, is quoted in the New York Times as follows: "In spite of a definite published statement of the President of the United States to the contrary, there seems still to remain in the minds of many the feeling that the sale by a bank of preferred stock to the Reconstruction Finance Corporation will place in that corporation undue control over the affairs of that bank, and that such undue control may be exercised to the detriment of the interest of holders of common stock."

Fears about the control of the RFC over business were reinforced by a New York Times story, July 3, 1934, quoting Jesse Jones, "We are not bothered much about management," who then went on to say "when a corporation comes to the government for money it ought to be required that the salaries it pays are reasonable."¹⁷

RFC preferred stock as a percentage of total common stock in all member banks was nearly 38 percent by the third quarter of 1935. This conferred substantial voting power to the RFC. The share fell

¹⁷ Jones (1951, pp.50-1) ingenuously describes a "rather ticklish reconstruction job" on the First National Bank of Amarillo Texas in which the largest shareholder and owner, W.H. Fuqua, was replaced by Tully Garner, the son of Vice President Garner after an evening meeting between Jones and T. Garner's parents. Jones says that while the father was silent, the mother approved the choice of her son to run the bank.

gradually to about 13 percent by the last quarter of 1941 (see Figure 15). Figure 16 shows bank holdings of Federal obligations relative to their loans to private business by quarter from 1919 to 1941. This ratio fell from 33.5 percent at the end of the first quarter of 1919 to below 25 percent in just one quarter. It remained low throughout the 1920's, between 15 and 20 percent. The ratio began to rise in 1931. From the end of the first quarter of 1931 to the end of the last quarter of 1932, it rose from 22 to 43 percent. By the end of the second quarter of 1933, only three months after the New Deal began, it was up to 53 percent. By July 1, 1936, banks had 10 percent more U.S. obligations than loans to private business. That is, more than half of the bank loans were to the Federal government. The ratio of bank holdings of Federal securities relative to their loans to private business fell during the last half of 1936 and continued falling throughout 1937, touching a low barely above 88 percent in the last quarter of 1937. At that point and to the end of 1941, when the U.S. entered World War II, the ratio began to climb, reaching 108 percent by the end of the sample period.

U.S. obligations being default free are safer than loans to private business. While it is true that banks began to shift more of their loan portfolios to Federal government paper two years before the start of the RFC's preferred stock program, one can hardly doubt that potential government control over bank affairs must have had an effect on their lending policy. What RFC official would criticize a bank for taking undue risk by purchasing U.S. government securities?

The least intrusive tool in the hands of the monetary authority for changing the money supply is by means of open market operations. When a Federal Reserve Bank lends to a member bank in return for the banker's acceptance or rediscounts the bank's commercial paper, it can control the channels of bank credit. It thereby affects the direction of bank credit more than would purchases or sales of Federal securities by open market operations. Bank lending to private business, even when backed by collateral, depends on information about the credit standing of the borrower so that it must obtain more details about the borrower's business. The Reconstruction Finance Corporation purchases of preferred stock in commercial banks placed requirements on these banks by an agency of the Federal government that had no peacetime precedent. It could not have a neutral effect on bank lending.

9. Loss of Confidence

Before describing the many symptoms of the loss of confidence owing to these events, we need a simple framework for interpreting the evidence. For this purpose it is convenient to use the market for credit in which the price is the interest rate and the quantity is the amount of loans. Say that the buyers of credit, the borrowers, perceive that borrowing has become riskier because they believe themselves less able to repay loans and they fear its adverse consequences, the loss of their equity in the collateral backing their loans. Therefore, at every interest rate, the demand for credit will decrease. If the suppliers of credit also become less confident that their loans will be repaid then this lowers the supply of credit at every interest rate. Moreover, lenders fearful of default will seek the safest harbors for their wealth. The demand for the highest grade private short-term securities and for U.S. Treasury securities will rise. Therefore, interest rates on government securities fall relative to private securities. The spread widens between the interest rate on the higher and the lower grades of private securities. While the effect of a decrease of both the supply and demand for credit on the market clearing interest rate is indeterminate, the effect on the amount of credit that clears the market is unambiguous -- a reduction.¹⁸ A person fearful of the future takes the advice of Polonius, "Neither borrower nor lender be."

The effects of reduced confidence appear in markets for anything that exposes either buyers or sellers to more risk. Many car buyers also borrow to finance their purchases. Less confidence in the

¹⁸ This analysis ignores the distinction between real and nominal interest rates. A lender has the alternative of deferring purchases to a later period and lending the amount of the purchases at an interest rate i to be repaid then. Let S be the present spot price and $E(S)$ the present expected price at the time of purchase. The lender would be indifferent between buying spot and deferring the purchase if $1+i = E(S)/S$ where i is the nominal rate of interest. This calculation omits the storage cost. It also ignores differences of price expectations among different commodities. A nominal interest rate common to many commodities depends on a common element affecting all prices. What this should be is hard to say, an arithmetic average, a weighted average, a geometric mean or the like. As noted above (sec. 2), while interest rates can readily adjust to rising prices, they cannot do so when prices are falling because the nominal interest has a lower bound of zero. No lender would accept a negative interest rate on a nominal loan even if prices are falling as long as holding money is costless. When prices are rising interest rates can adjust appropriately. At such times a borrower and a lender can arrange mutually satisfactory terms reflecting their particular circumstances. Hence measurement problems surrounding the price level become irrelevant. We would observe different interest rates for loans of the same maturity, risk of default and amount.

ability to repay auto loans reduces auto demand. The same holds for housing, furniture and similar consumer durables. It holds for capital goods and it holds for real estate. It explains the slow recovery despite the huge rise in high powered money (fig 19), the rise in member reserves (fig 20) and in M1 (fig 21), all commencing in spring 1933.

One way to measure these effects is by seeing which industries show the largest drops of employment. The biggest drops and the slowest recovery should take place in those industries that make the commodities most likely to be financed with consumer credit. Table 5 has some relevant figures.

Table 5: The Level of Employment Relative to the Pre-Crash Peak and the First Quarter and Year that Employment Returned to this Peak from the First Quarter 1927 to the Last Quarter 1940 by Two-Digit Manufacturing Industry

Industry	Trough	Quarter & Year of Trough	Quarter & Year Index Regained 100
Food Products	75.4	1, 33	3, 36
Textiles	58.5	2, 32	3, 36
Iron & Steel	47.4	1, 33	4, 36
Lumber Products	35.3	1, 33	not during period
Leather	73.5	4, 32	4, 36
Paper & Printing	73.4	1, 33	1, 37
Chemicals	64.6	3, 32	3, 36
Stone, clay, glass	39.3	1, 33	not during period
Nonferrous metal	39.8	1, 33	3-4, 36
Tobacco Products ^a	55.8	1, 36	not during period
Autos	33.8	1, 33	1, 35
Other	49	1, 33	not during period
Total	58	1, 33	2, 36

Source: Bernstein (1987, pp.155-65).

a. Employment in the tobacco industry stayed level after the trough perhaps owing to higher productivity.

The industries in order of the biggest drops of employment are autos, lumber, stone, clay and glass and nonferrous metals. Food products, leather, paper and printing show the smallest drops. Table 5 also shows the quarter and year in which employment returned to its pre-Depression peak. Two major industry groupings that had not yet done so even by the end of 1940 were the construction

industries, lumber, stone, clay and glass. However, the hypothesis of decreased confidence cannot explain the failure of tobacco products to return to their pre-Depression peak. The miscellaneous category, other industries, also failed to recover but without a more detailed study of its components one cannot say whether loss of confidence is the explanation.

The level of the reserve ratio held by the banks in excess of their requirements is yet another sign of reduced confidence. This ratio climbed from .2 percent in 1930 to 7.1 percent by 1940 (Cagan, 1965, Table F-14). How else to explain this rise than that the banks were more fearful of lending during these 7 years than at any previous time, including the depressed 1890's?

Common stocks are a riskier form of investment for an individual than either bonds or preferred stocks. The latter, despite the name, are bonds without a finite maturity date. To those seeking more capital, the reverse is true. A corporation incurs less risk by issuing stock than by borrowing. Some argue, however, that corporations, unlike individuals, are risk neutral. Therefore it is the attitude of individual investors toward risk that explains how additions to physical capital will be financed. If investors in corporations became less confident and more fearful then they will prefer bonds to stocks. Figure 17 shows that from 1920 to 1929, corporations steadily increased their capital by issuing stocks and bonds. This halted at the end of 1929. From then the decline is precipitous, net additions to capital nearing zero by 1933. From 1933 to the end of 1940, more capital was retired than was newly issued. Figure 18 shows the loss of confidence in another way. Common stock was a rising fraction of the total amount of new capital from 1920 to 1929. Also, for the first time, in 1929, stocks accounted for nearly twice as much of new capital than did bonds. The decline beginning in 1929 was rapid and deep. After 1931, new stock issues were a very junior partner, reaching as high as 18 percent of the amount raised from new bond issues in only one year - 1937. In nearly every other year of that decade, new stocks were less than 10 percent of the amount financed by bonds. Combining the figures for bonds with preferred stocks emphasizes the relative decline of stock issues as a source of new capital.

Retained earnings are usually a main source of new capital. It was not during the '30's. Retained earnings for all corporations were actually negative in every year from 1931 to 1938. They did not become positive until 1939 when they reached \$294 million and then again in 1940, \$792 million.

Loss of confidence may also affect the term structure of interest rates. As stated above, fearful investors will seek the safest assets. An asset is safer, the less the risk of default. Assuming it is easier to anticipate the nearer than the more distant future, the risk of default is less, the shorter the term to maturity of the security. Therefore, at equal interest rates, more fearful lenders would prefer shorter to longer term bonds. There would be a shift in the composition of the supply of loans by maturity so that relatively more are shorter term than is normal. On the demand side borrowers more fearful of the consequences of their own default would prefer longer-term to shorter-term loans. Longer-term loans give borrowers more time to amortize their debt and to overcome temporary setbacks. The combined effect of less confidence by lenders and borrowers on the term structure of interest rates tilts the longer-term interest rates above the shorter-term rates. This is what we find (F&S, 1982, table 6-17).

Share prices furnish the best single summary barometer of confidence. The stunning 50 percent drop in the middle of 1937 speaks for itself (fig 20). It occurred despite the rise in high-powered money (fig. 21), the rise in member bank reserves (fig. 22) and the rise in M1 (fig. 23).

10. Conclusions

That the money supply in the form of cash and demand deposits rose by 63 percent from March 1933 to March 1937 is no less true than that it fell by 27 percent from June 1929 to March 1933 (fig 21). To claim that the Great Depression was the result of the 27 percent contraction begs the question of why no Great Recovery emerged from the 63 percent expansion of the money supply. This essay seeks an answer to this question by studying the 1920's and the main economic events from 1929 to 1933.

One important lesson from this study is the importance of both sides of the banking system's balance sheet. A focus on the money supply that ignores the asset side of the balance sheet fails to see changes in bank credit can cause changes in the stock of money. Of course, assets and liabilities are equal by definition. Nevertheless what happens on the asset side can illuminate why there were changes on the liability side. The importance of the liability side of the banks' balance sheet is due to its effect on the money supply. A change in bank liabilities that change the money stock can have wider repercussions on total income except when there are big enough offsetting changes in velocity.

Suppose bank lending rises by \$100 and that assets and liabilities rise by the same amount. If this constitutes an addition to the stock of money then the effect on money income equals velocity X \$100.

A good illustration of the importance of keeping in mind both sides of the balance sheet is the lessons to be learned by looking at banks' holdings of U.S. government securities. Starting in the 1920's, banks changed the composition of their assets by holding less U.S. government securities, by holding more mortgages and by lending more on stock market collateral. These changes exposed the banks to more risk. When the stock market crashed and the real estate market collapsed, the surviving banks responded by holding more U.S. government securities and lending less to business. Lending to the government does not stimulate the economy as much as an equal amount of loans to the private sectors even with a constant stock of money. This is because government spending and relief programs do not evoke the same response from those who are its beneficiaries as an equal increment of spending by private firms. The banks' reaction to the Federal Reserve increases of required reserve ratios starting in August of 1936 was to sell some of their U.S. government securities. This had a less contractionary effect than an equal decrease in business loans .

Another important lesson was the deleterious effect of the Federal attempts to stimulate recovery centering on the Reconstruction Finance Corporation. This Federal agency, created at the behest of a Republican president and enlarged by his Democratic successor, was a source of destructive political controversy. A Federal corporation that can lend huge amounts of money to private banks cannot be trusted to refrain from abuse of its power. The unintended but not surprising result of its first year of operation was the banking panic of February and March 1933 that transformed a depression into the Great Depression. Equally unintended were the effects of its preferred stock program starting in 1934. To meet the criticism that RFC loans would not help enough those most in need because of its stringent collateral requirements, the RFC supplied funds to banks by buying preferred stock in them. This program gave the RFC effective control over the banks. The first and most dramatic instance was the replacement early in 1934 of the chairman of Continental Illinois. The lesson was not lost on any bank beholden to the RFC. Bank lending policy became even more cautious to the detriment of recovery from the Great Depression.

The public was highly confident during the 1920's. This is shown in many ways, notably high and rising real estate construction fueled by the willingness of banks and other lenders to accommodate increasing demands of their residential and business customers. Other capital goods also grew rapidly being financed in booming financial markets. However, borrowing large amounts stemming from the rising confidence of the public made the economy more vulnerable even to mild downward shocks. When a recession began in late Spring 1929, some borrowers could not make their interest payments. Defaults began to rise, especially on mortgages. The market value of collateral backing the loans began to fall. Lenders, notably the banks, were in increasing distress and could not meet obligations to their creditors. Things kept getting worse. Bad politics hastened the decline. The climax was a panic that led to runs on the banks, that caused many banks to fail and that required the national bank holiday proclaimed on Sunday, March 5, 1933. These blows to the public's morale engendered by the sequence of crises undermined confidence in a free enterprise system. New Deal remedies could not overcome this loss of faith. The effects lingered in the minds and attitudes of a generation of Americans and persist even to this day.

11. Appendix. The Effects of the Higher Reserve Ratios Imposed on Member Banks by the Federal Reserve in August 1936, March 1937 and May 1937¹⁹

Perhaps alarmed by the rapidly rising Index of Production during the last half of 1936 and fearing the inflationary potential that could result from increases of the money supply by virtue of the large amount of excess reserves held by member banks, the Federal Reserve Board used its new power over member bank reserve ratios for the first time on August 16, 1936 (HS p. 1043) when it raised these ratios. Perhaps because it did not obtain the response it desired in the next 5 months, it raised reserve ratios again on March 1, 1937 and again on May 1, 1937. After the third increase, required reserve ratios were twice as high as they had been from June 21, 1917 to August 1936. However, it is also useful to observe the Fed's holdings of U.S. government securities while the required reserve ratios were being changed. From January 1936 to March 1937, the Fed did not change its holdings of

¹⁹ Friedman and Schwartz (1963, pp. 534-539) give a detailed analysis of the causes and effects of the change in reserve ratios.

these securities. However, in March 1937, just *before* the third increase in the required reserve ratios, the Fed's holdings of U.S. government securities began to increase. By April 1938 its holdings had risen modestly from \$2.432 billion to \$2.569 billion, about \$137 million.

The Federal Reserve Board Seasonally Adjusted Index of Production reached its highest level since 1930 in December 1936 (121). From that apogee, the Index fell more than 37 percent to a nadir in May 1938 (76). Table 6 shows the percentage changes in the FRB Index of Production, M1, Reserves at the Fed and Vault Cash between the dates when the Fed changed the reserve ratios. Note that from August 1936 to May 1937, production grew more than 9 percent, M1 went up over 3 percent, Reserves at the Fed rose more than 12 percent but vault cash fell nearly 11 percent. However, not until 3 months after the third increase of the required reserve ratio did the economy revert to depression. From May 1937 to April 1938, the contraction was severe as judged by the figures in Table 6. After the Fed lowered reserve ratios on April 16, 1938 by nearly 10 percent returning to the level it had decreed on March 1, 1937, signs of recovery started to appear. From April to October 1938, industrial output surged nearly 25 percent. M1 went up a little more than 5 percent and reserves at the Fed rose more than 14 percent.

Table 6 Percent Change of the Federal Reserve Board Index of Production, M1, Reserves at the Fed and Vault Cash on Selected Dates from April 1933 to October 1938

	Percent Changes				
	FRB Index Prod	Price Index	M1	Reserves at Fed	Vault Cash
Apr '33-Dec '36	83.33	39.74	62.05	219.51	76.02
Aug '36-Dec '36	12.04	3.43	3.91	7.83	14.25
Aug '36-May '37	9.26	7.11	4.65	8.46	-8.71
May '37-Apr '38	-34.75	-9.95	-3.86	7.75	10.06
Apr '38-Oct '38	24.68	-1.40	5.18	14.42	17.74

Looking at these events through the spectacles of the money supply focuses on the liability side of member banks' balance sheets. However, the asset side is equally important because it shows how

bank loans and investments responded to the higher reserve ratios. Since the Fed had direct power only over its member banks, it is their response we shall scrutinize. Table 7 has some pertinent figures.

Table 7 All Member Banks in Million \$

Call Date ^a	Demand Deposits Adj ^b	Loans to Business	U.S. Govt Securities
4 Mar 36	19.161	12.099	12.444
30 Jun 36	20.284	12.542	13.672
31 Dec 36	21.647	13.360	13.545
31 Mar 37	21.352	13.699	12.718
30 Jun 37	21.401	14.285	12.689
31 Dec 37	20.387	13.958	12.372
7 Mar 38	20.513	13.546	12.452
30 Jun 38	20.893	12.938	12.343
28 Sept 38	21.596	12.937	13.011
31 Dec 38	22.293	13.208	13.223

a. Figures are available only for those call dates on which both state and national member banks submitted data.

b. Demand deposits adjusted are gross deposits minus the float.

An argument relying merely on the propinquity in time between changes in the money supply and changes in production encounters weighty objections. A closer look at the portfolios of member banks in Table 7 shows that their loans to business rose steadily and peaked at the end of the second quarter of 1937 to \$14.3 billion. Even 6 months later at the end of 1937, bank loans were still only \$327 million below this peak. In sharp contrast, banks decreased their holdings of U.S. government securities from \$13.54 billion at the end of 1936 to \$12.37 billion a year later, a drop of \$1.173 billion. This is more than 3.5 times bigger than the drop in their loans to private business²⁰ During the same period in which member banks reduced their holdings of U.S. government securities, their loans to business *rose* by nearly \$600 million and adjusted demand deposits fell by \$1.26 billion. It appears that the drop in liabilities in the form of adjusted demand deposits matches very closely the drop in member

²⁰ Friedman and Schwartz (1963, p. 539, n. 40) do describe the drop in bank holdings of Federal securities, especially short-term holdings, but do not comment on the movement of bank loans to business.

assets in the form of U.S. government securities. Nothing could be plainer than these figures showing that business loans did not bear the brunt of member banks' responses to the higher reserve ratios.

From June 30, 1936 to June 30, 1937, a period that spans all three increases of reserve ratios, net demand deposits at member banks rose from \$20.3 billion to 21.4 billion. Member bank sales of U.S. securities accompanies a rise in U.S. Treasury Bill rates that began at the end of 1936 and lasted for 15 months (see Fig. 24). This Figure also shows the remarkable stability of the 90 day Bankers' Acceptance Rate for most of 1938. For the first 12 months of this 15 month period, bank loans to private business actually rose from \$13.4 billion to \$13.96 billion. At the same time, Reserves at the Fed rose by \$430 million. It is hard to avoid the conclusion that banks responded to the higher reserve requirements by selling some of their holdings of U.S. bonds. No decrease in loans to private business took place until the end of the first quarter of 1938, almost a year after the third increase in the reserve ratios and just before the reduction of reserve ratios that occurred in April 1938. This is compelling evidence against the hypothesis that the rise in reserve ratios explains the relapse to depression. Like 1929-1933, the drop in business loans was most likely the result of both decreased demand for loans and decreased supply of loans.²¹

It is also useful to look at the elasticities in Table 2. The total drop in demand deposits was about \$2 billion, less than 10 percent of the total, and the net increase in required reserves was about 10 percent of total reserves. Even so, the Fed's decision to raise the reserve ratios must have had a

²¹ In the following regression the dependent variable is adjusted demand deposits at member banks (AdjDem) so it is on the liability side of the balance sheet. This variable is related to two components on the asset side of the balance sheet, loans to private business (Loans) and bank holdings of U.S. government securities (USGov). The figures are quarterly, the call dates of the Federal Reserve, from the first quarter 1919 to the last quarter 1941, 84 quarters. Some quarters are missing from the source, Banking and Monetary Statistics (see note a, Table 7).

$$\text{AdjDem} = -4.10977 + 0.63701 \text{ Loans} + 1.35081 \text{ USGov} \\ - 3.554 \quad 13.0 \quad 29.0$$

Adj R² = 0.92 and F-ratio = 466. It must be emphasized that this regression does not purport to measure causation, only association. It shows a closer relation between demand deposits and bank holdings of U.S. Government securities than between demand deposits and loans.

contractionary effect (but see note 6). The peak of the FRB Index of Production in December 1936 was still below the levels it had attained a decade before when the population of the U.S. was smaller.

Other evidence casts doubt on the power of money to affect economic activity. The money supply cannot explain the remarkable expansion in the 4 months from April 1933 to July 1933. With a constant money supply, production rose 51 percent, only 25 points below the level of June 1929 and stock prices rose 69 percent.²²

References

- Bernstein, Michael A. 1987. *The Great Depression*. Cambridge: Cambridge University Press.
- Bittlingmayer, George. 1992. Stock Returns, Real Activity and the Trust Question. *Journal of Finance* 47:1701 -1730 (December).
- Burns, Arthur Robert. 1936. *The Decline of Competition*. New York: McGraw-Hill.
- Cagan, Phillip. 1965. *Determinants and Effects of Changes in the Stock of Money, 1875-1960*. New York: National Bureau of Economic Research.
- Calomaris, Charles W. 1993. Financial Factors in the Great Depression. *Journal of Economic Perspectives*. 7:61-85 (Spring).
- Einzig, Paul. 1933. *The sterling-dollar-franc tangle*. New York: Macmillan.

²² Arthur R. Burns (1936, pp. 515-6), writing while these events were fresh in his mind, attributes the rise in economic activity to the anticipated effects of the National Industrial Recovery Act. The NRA began operating in June 16, 1933. From late March 1933 to early July 1933, Burns shows that industrial production rose from about 60 to 100 (1923-1925 = 100). Nonagricultural prices rose from about 60 to about 75 and peaked at that level in September, 1933. Anticipating higher wages that would take effect after passage of the NIRA, business accumulated inventories hoping to sell at higher prices. Friedman and Schwartz (1963, pp. 493-4) and Himmelberg (1993, p.211) also agree with this interpretation.

This explanation is unacceptable on the basis of Burns' evidence. The essence of his argument is not confined to the particular events surrounding the passage of the NIRA Act or the first 100 days of the New Deal. It asserts that the expectation of higher prices inspired an accumulation of inventories requiring a rise in current production and employment. This argument ignores the possible effect of the NIRA on raising wages that might lower the profit from rising prices. Putting aside this objection, there is a more general point. One would be obliged to show that similar circumstances led to the same consequences. Burns explanation takes on the burden of showing that the rise and fall of inventories in the aggregate explain changes in total output and total employment. Ad hoc explanations for particular events have less credibility than the extraction of a general explanation demonstrating that it applies in circumstances other than those that inspired them.

- Firestone, John M. 1960. *Federal receipts and expenditures during business cycles 1879 - 1958*. Princeton: National Bureau of Economic Research.
- Fisher, Irving. 1933. The Debt-Deflation Theory of Great Depressions. *Econometrica*. 1:337-57 (Oct).
- Flood, Mark D. 1992. The Great Deposit Insurance Debate. *St. Louis Federal Reserve Bank Review*. 74: 51-77 (July-Aug).
- Friedman, Milton. 1967. The Monetary Theory and Policy of Henry Simons. *Journal of Law and Economics*. 10:1-13 (October).
- Friedman, Milton and Anna Jacobson Schwartz. 1963. *A monetary history of the United States 1867-1960*. Princeton: National Bureau of Economic Research.
- Friedman, Milton and Anna J. Schwartz. 1982. *Monetary trends in the United States and the United Kingdom, 1867 - 1975*. Chicago: National Bureau of Economic Research.
- Galbraith, J.K. 1961. *The great crash 1929*. Harmondsworth, Middlesex: Penguin.
- Himmelberg, Robert F. 1993. *The Origins of the National Recovery Administration*. paperback ed. New York: Fordham Univ Press.
- Hodson, H.V. 1938. *Slump and recovery*. New York: Oxford University Press.
- Hoyt, Homer. 1933. *One hundred years of land values in Chicago: the relationship of the growth of Chicago to the rise of its land values, 1830-1933*. Chicago: University of Chicago Press.
- Jones, Jesse. 1951. *Fifty billion dollars: my 13 years with the RFC*. New York: Macmillan.
- Keynes, J.M. 1930. *A treatise on money. vol II The applied theory of money*. London: Macmillan.
- _____. 1931. *Essays in persuasion*. London: Rupert Hart-Davis.
- _____. 1936. *The general theory of employment, interest and money*. New York: Harcourt, Brace.
- Menger, Carl. 1994. *Principles of economics*. trans. James Dingwall and Bert F Hoselitz with an introduction by F.A. Hayek. from the first German edition published in Vienna in 1871. Grove City, PA.: Libertarian Press.
- Mills, Frederick C. 1932. *Economic tendencies in the United States: aspects of pre-war and post-war changes*. New York: National Bureau of Economic Research.
- Mitchell, Wesley C. and Arthur F. Burns. 1935. The National Bureau's measures of cyclical behavior. *National Bureau of Economic Research Bulletin* No 57 July 1, 1935.
- Olson, James Stuart. 1977. *Herbert Hoover and the Reconstruction Finance Corporation, 1931 -1933*. Ames, Iowa: Iowa State University Press.
- Persons, Charles E. 1930. Credit expansion, 1920-1929, and its lessons. *Quarterly Journal of Economics*. 45:94-130 (Nov).
- Phillips, Ronnie J. 1995. *The Chicago Plan and New Deal banking reform*. Armonk, New York: M.E. Sharpe.
- Reconstruction Finance Corporation. 1933. *Quarterly Report of the Reconstruction Finance Corporation to the Congress covering the corporations operations for the periods October 1,*

- 1932 to December 31, 1932 and February 2 to December 1932 inclusive.* Washington, D.C.: U.S. Government Printing Office.
- Reifler, Winfield et al. 1937. A Program of Financial Research. *National Bureau of Economic Research Bulletin*. 64 (May).
- Robertson, D.H. 1946. *Money*. Cambridge Economic Handbooks. Nisbet: Cambridge University Press.
- Shirer, William L. 1960. *The Rise and Fall of the Third Reich*. New York: Simon and Schuster.
- Simons, Henry. 1948. *Economic Policy for a Free Society*. Ed. Aaron Director. Chicago: University of Chicago Press.
- Smith, Rixey and Norman Beasley. 1939. *Carter Glass*. New York: Longmans, Green.
- Treasury, U.S. 1940. *Annual Report of the Secretary of the Treasury on the State of the Finances for Fiscal Year ending June 30, 1939*. Washington, D.C.: U.S. Government Printing Office.
- Temin, Peter. 1976. *Did Monetary Factors Cause the Great Depression?* New York: Norton.
- Wheelock, David C. 1991. *The Strategy and Consistency of Federal Reserve Monetary Policy, 1924-1933*. New York: Cambridge University Press.
- Wheelock, David. C. 1992. Monetary Policy in the Great Depression: What the Fed Did and Why. *St Louis Federal Reserve Bank Review*. 74:3-38 (Mar - Apr).

Stock Prices Jan 1919 - May 1933

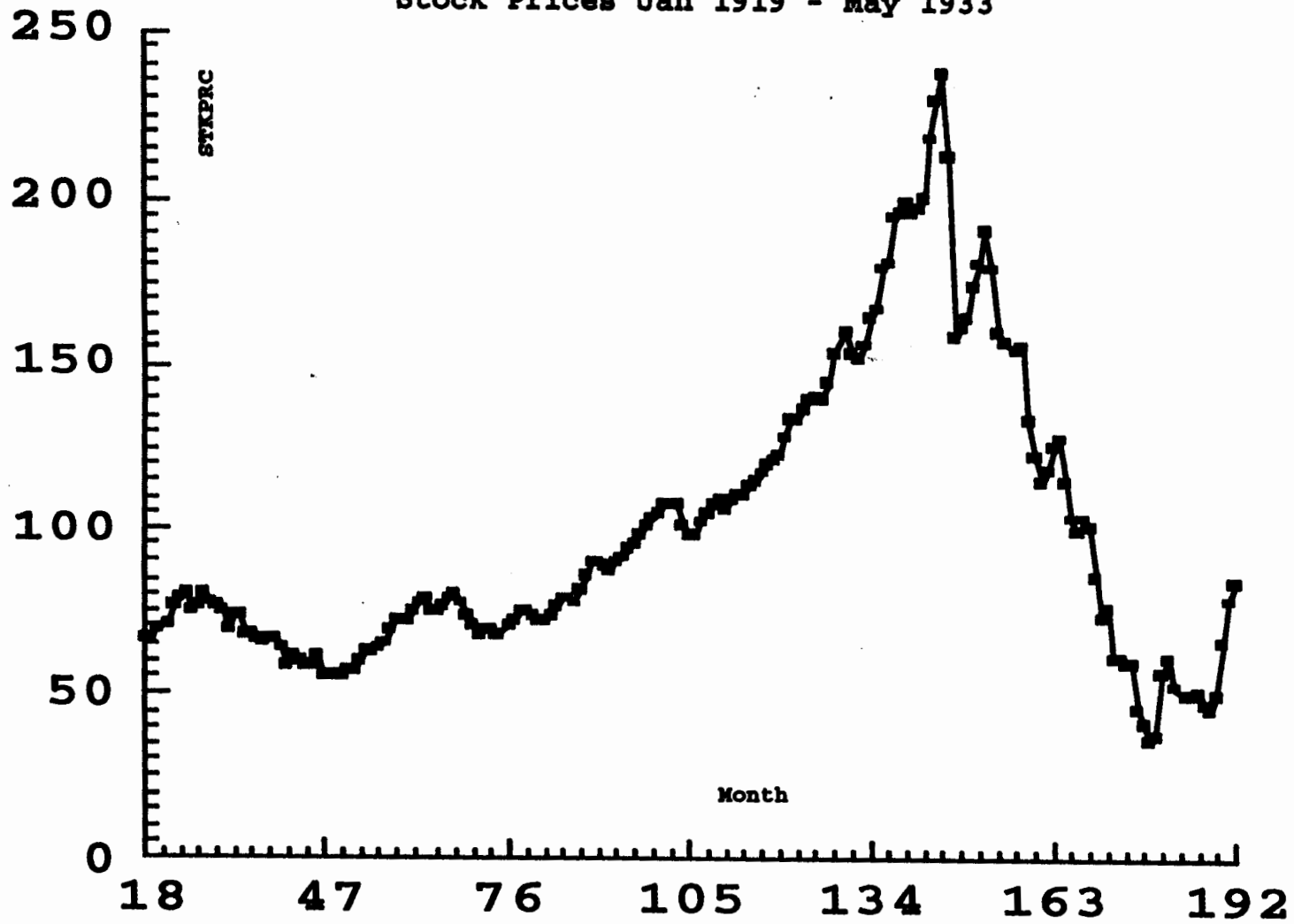
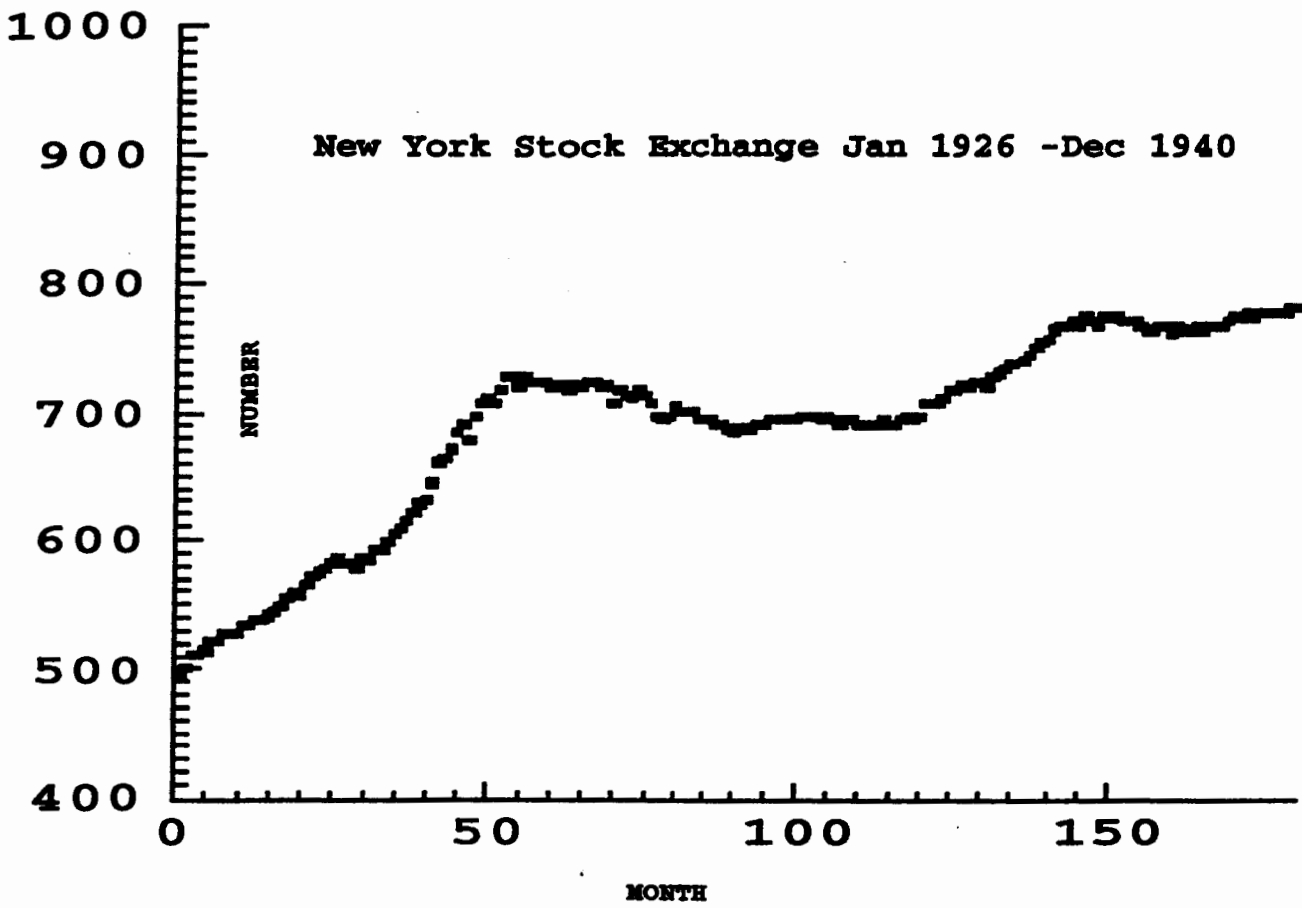


Fig 1



Number of Issues
Traded

Fig 2

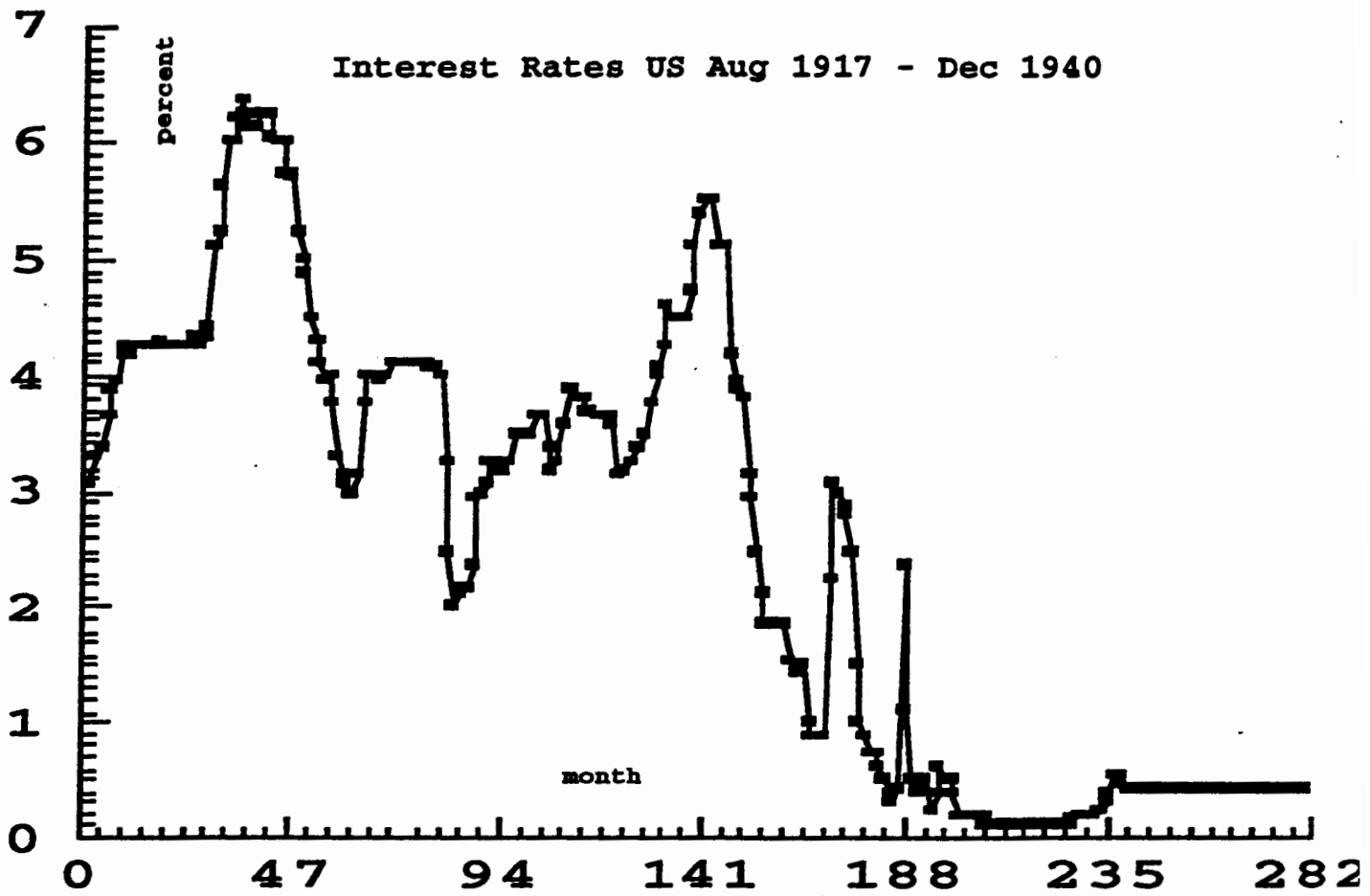


Fig 3

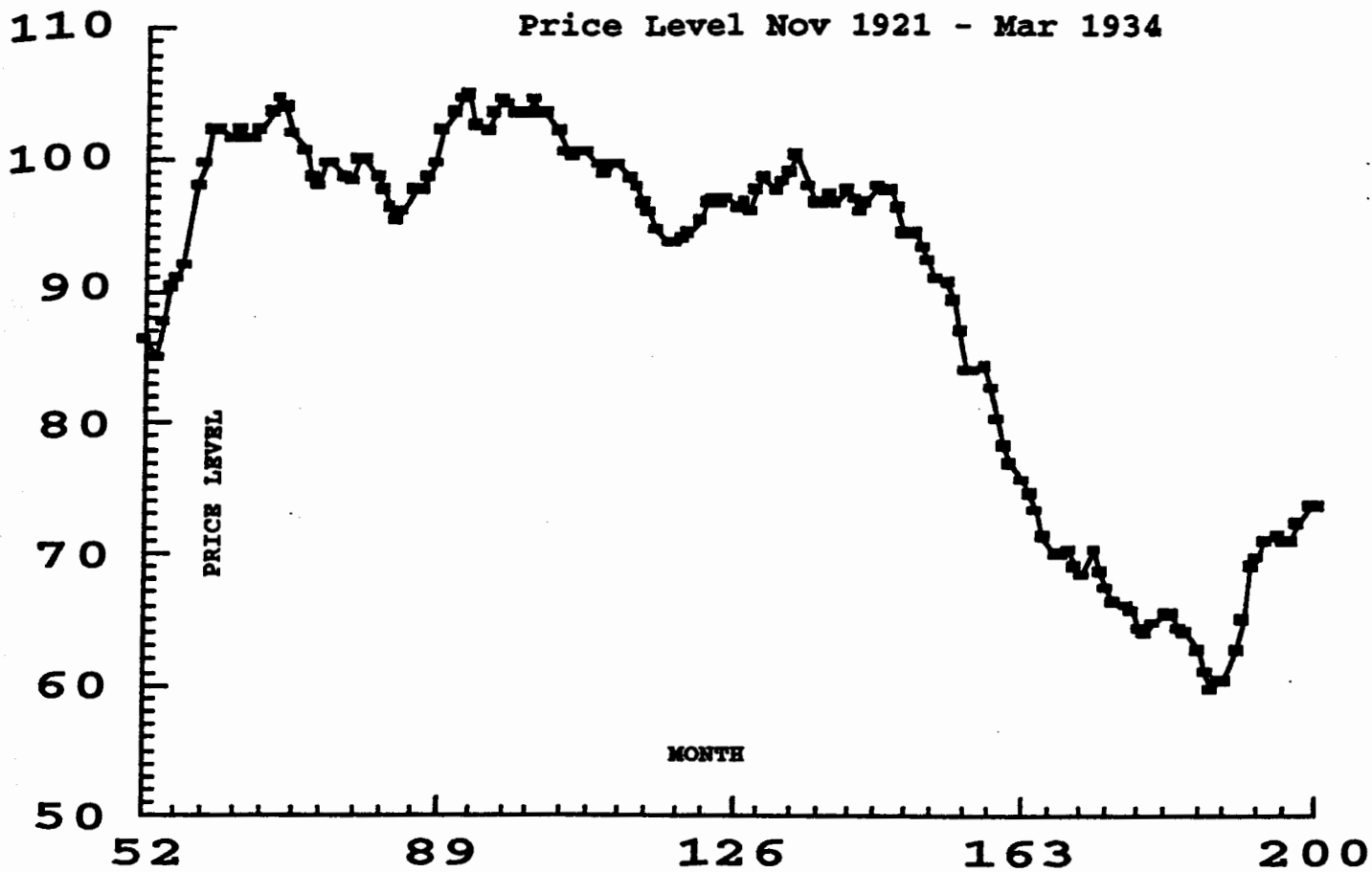


Fig 4

FRB Index of Production Jan 1919 - Dec 1940

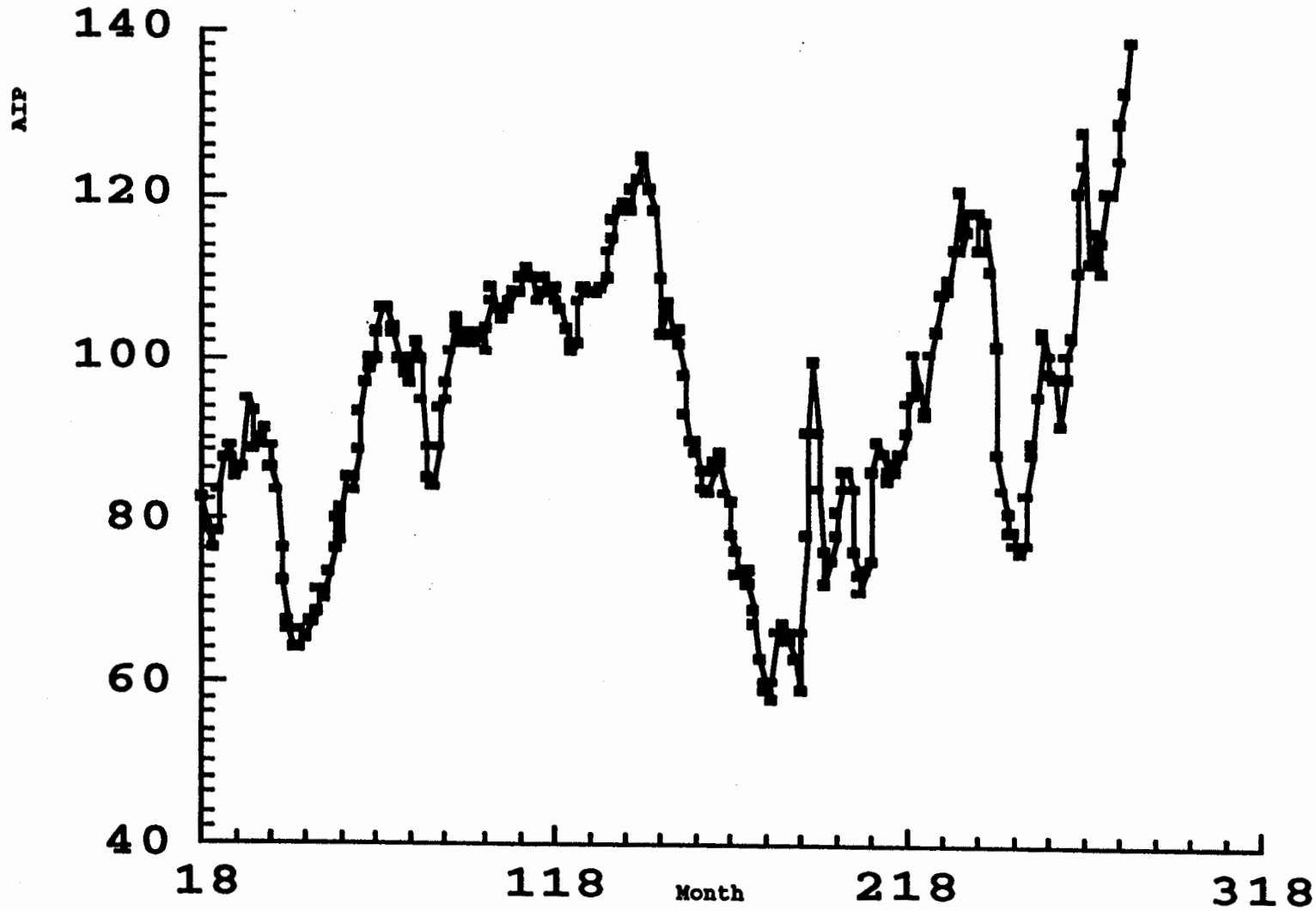


Fig 5

FRB Production Index Nov 1921 - Mar 1934

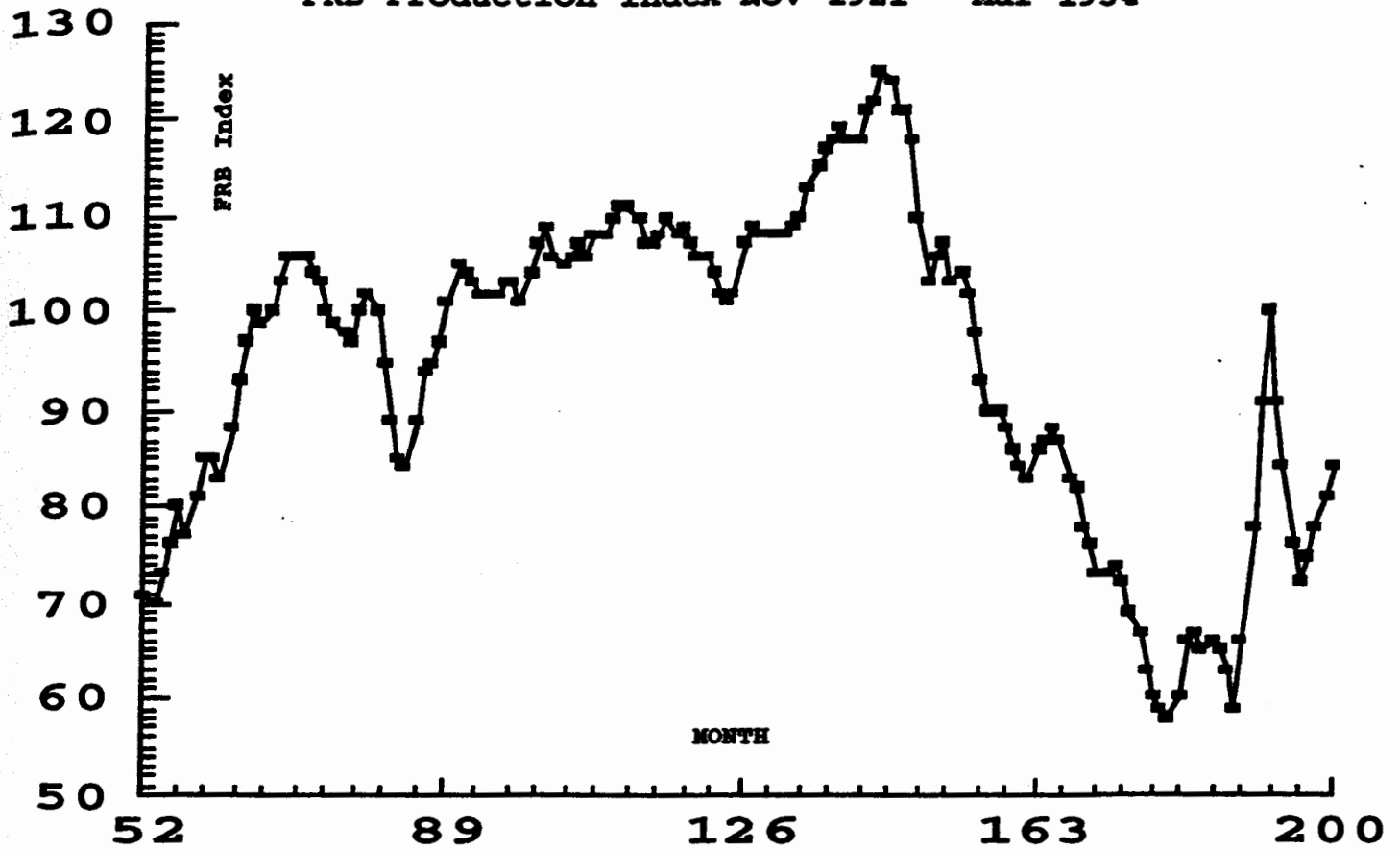


Fig 5.1

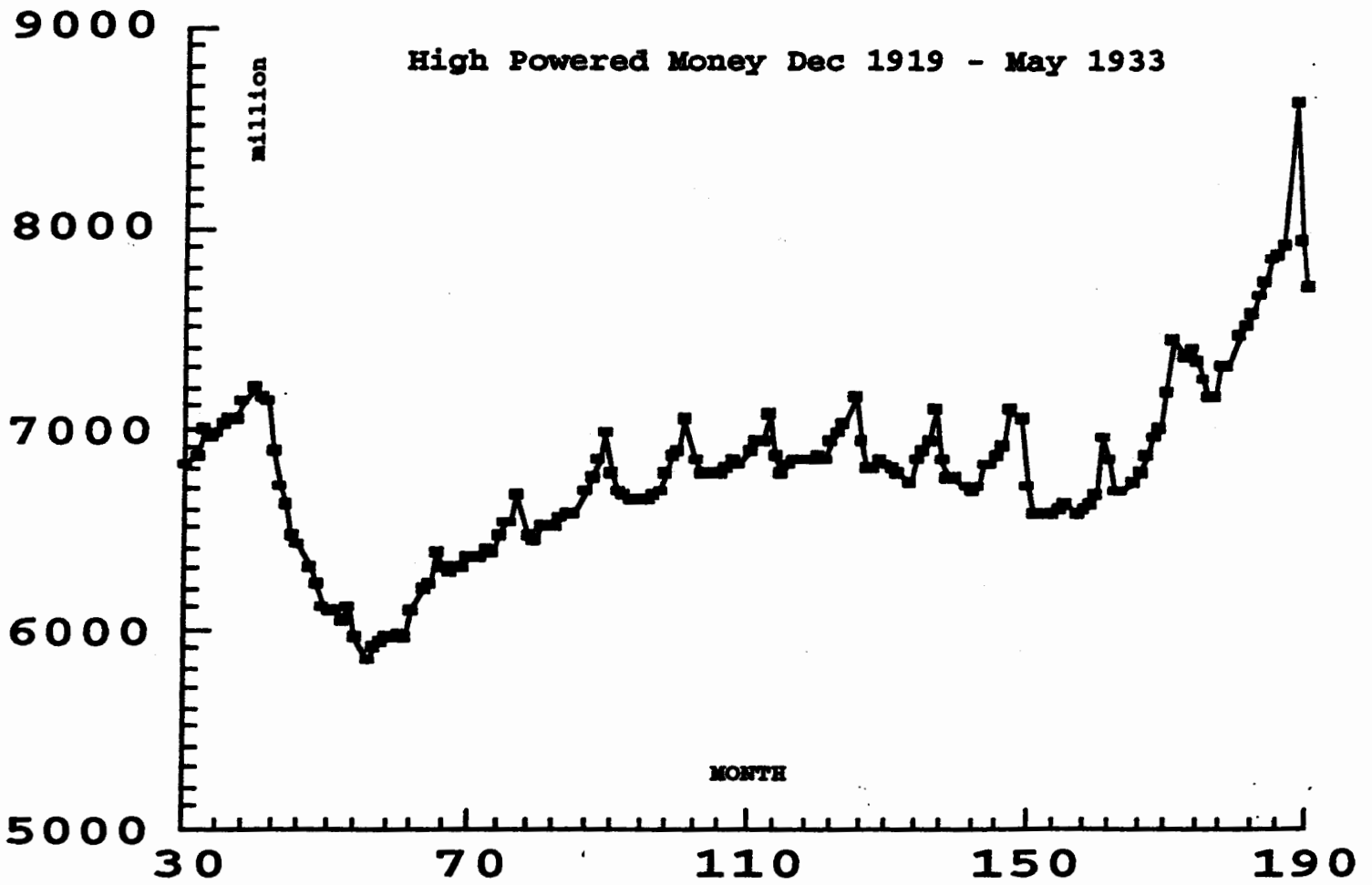


Fig 6

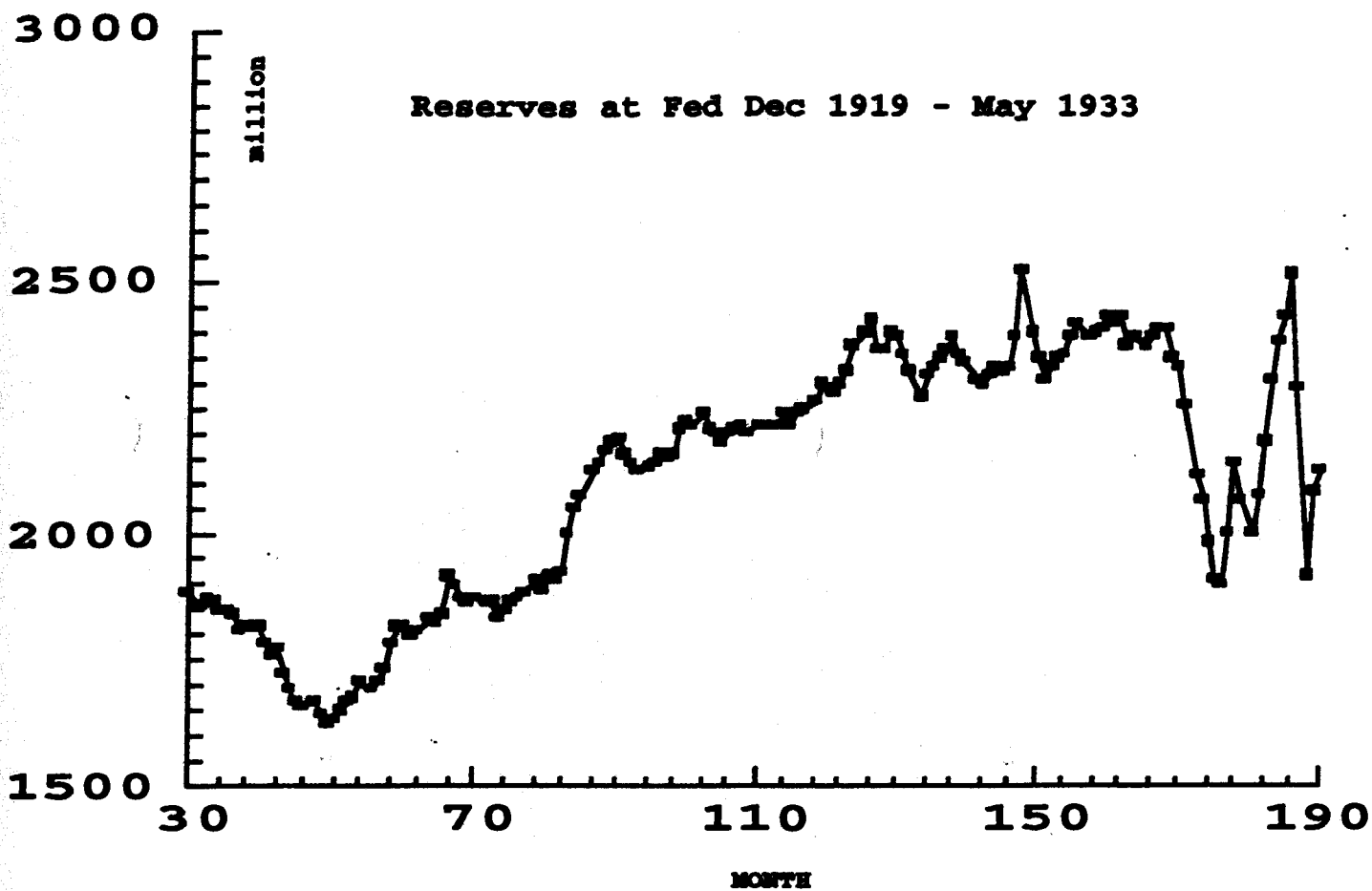


FIG 7

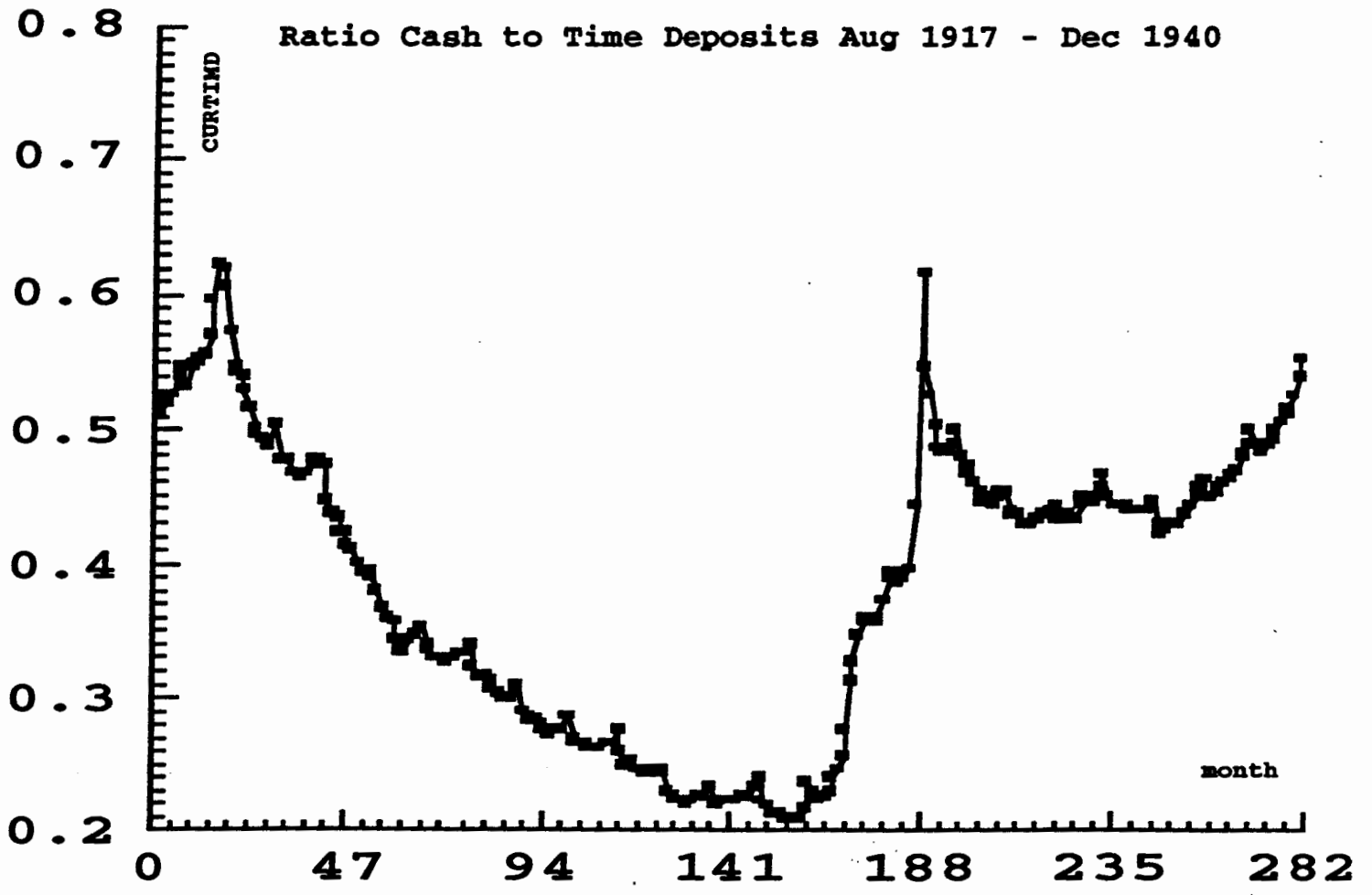


Fig 8

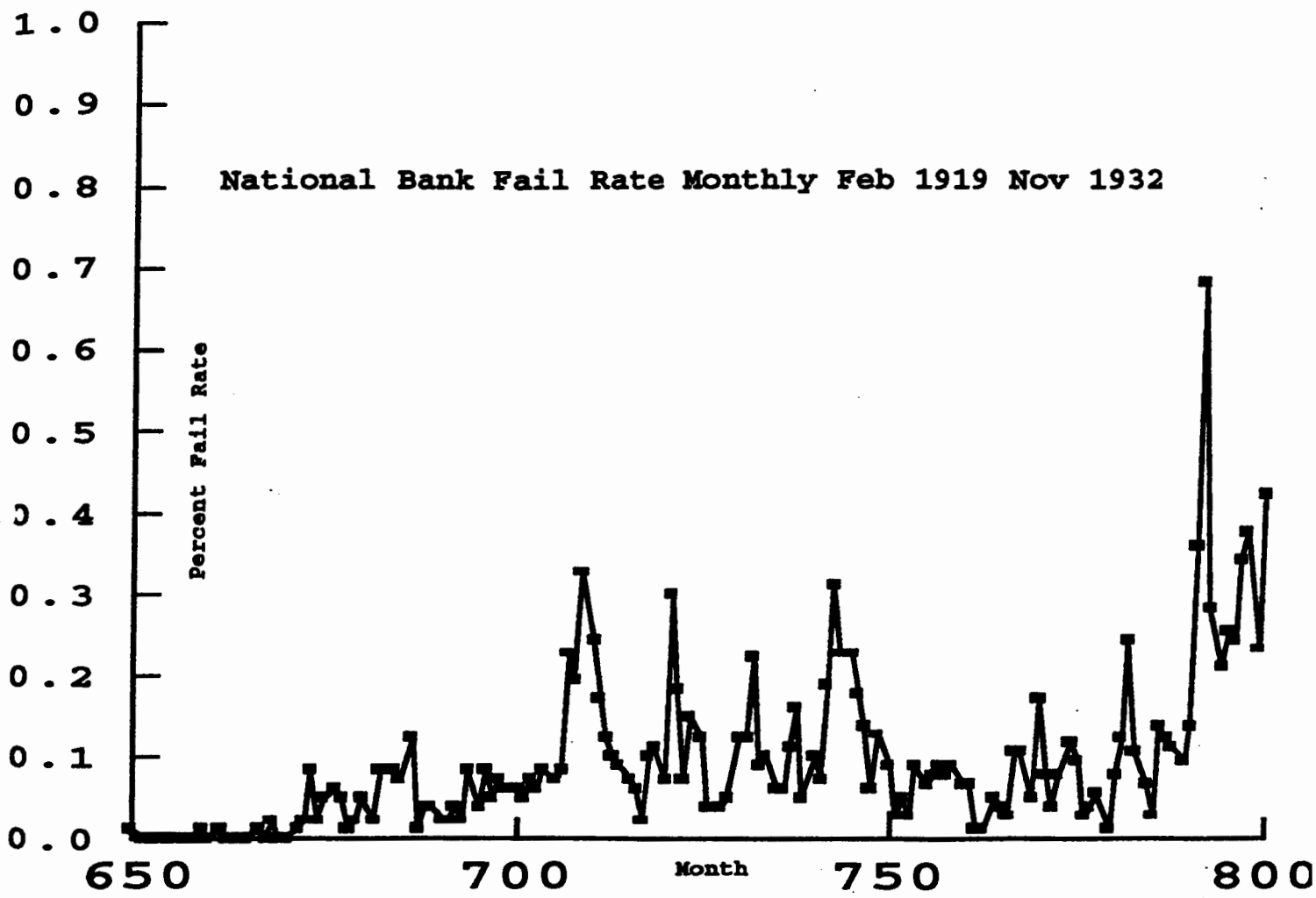


Fig 9

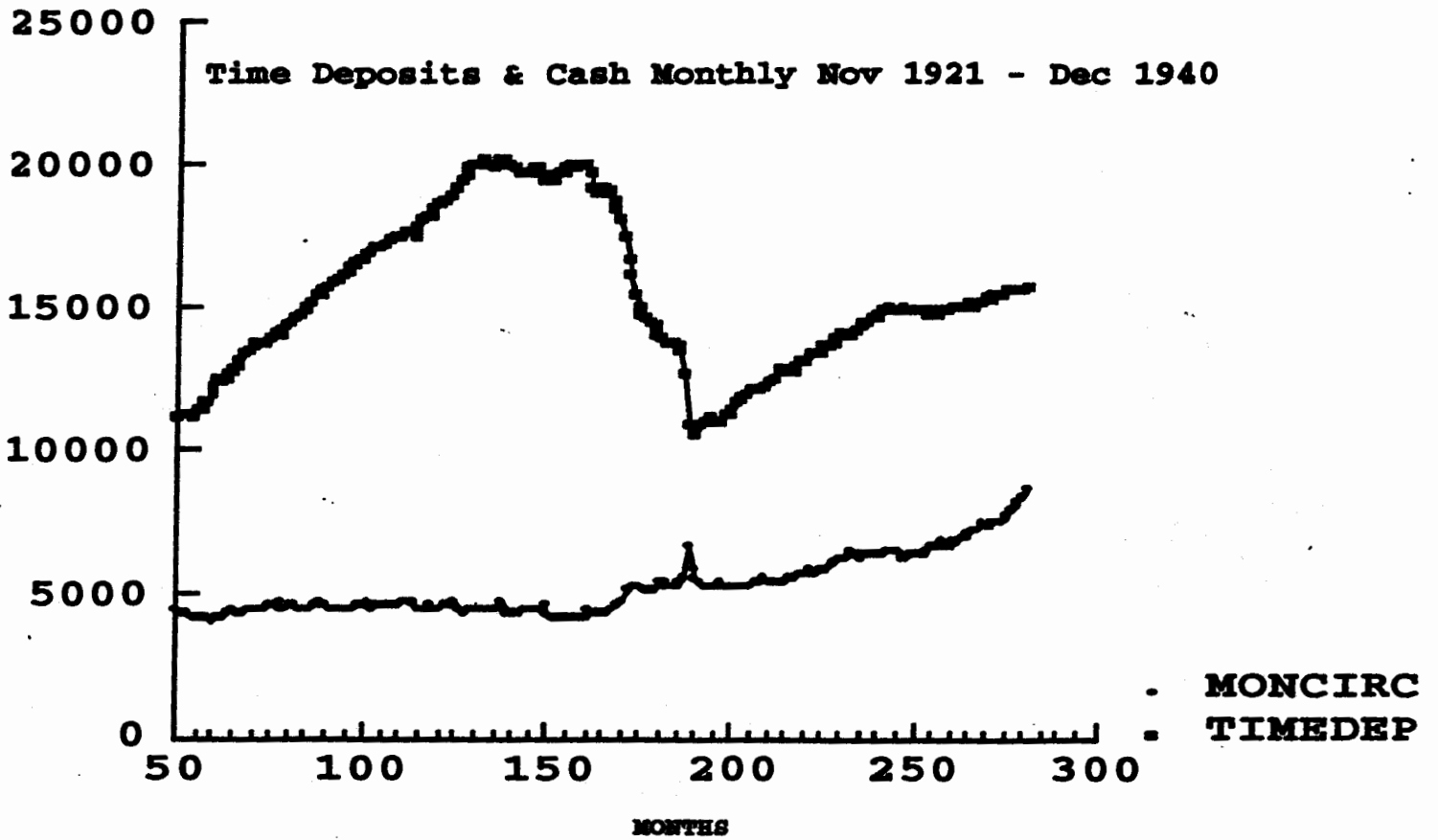


Fig 10

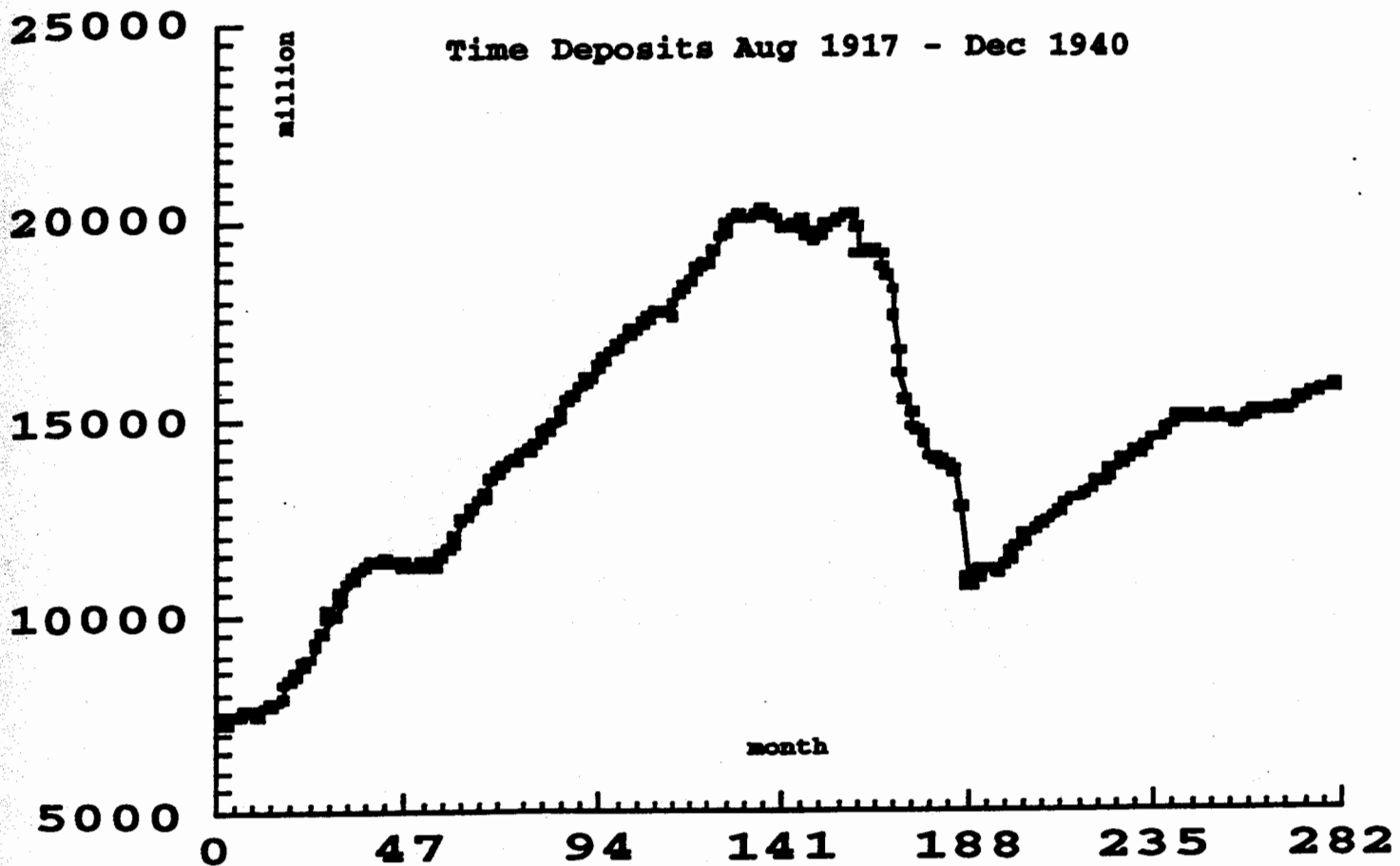


Fig 21

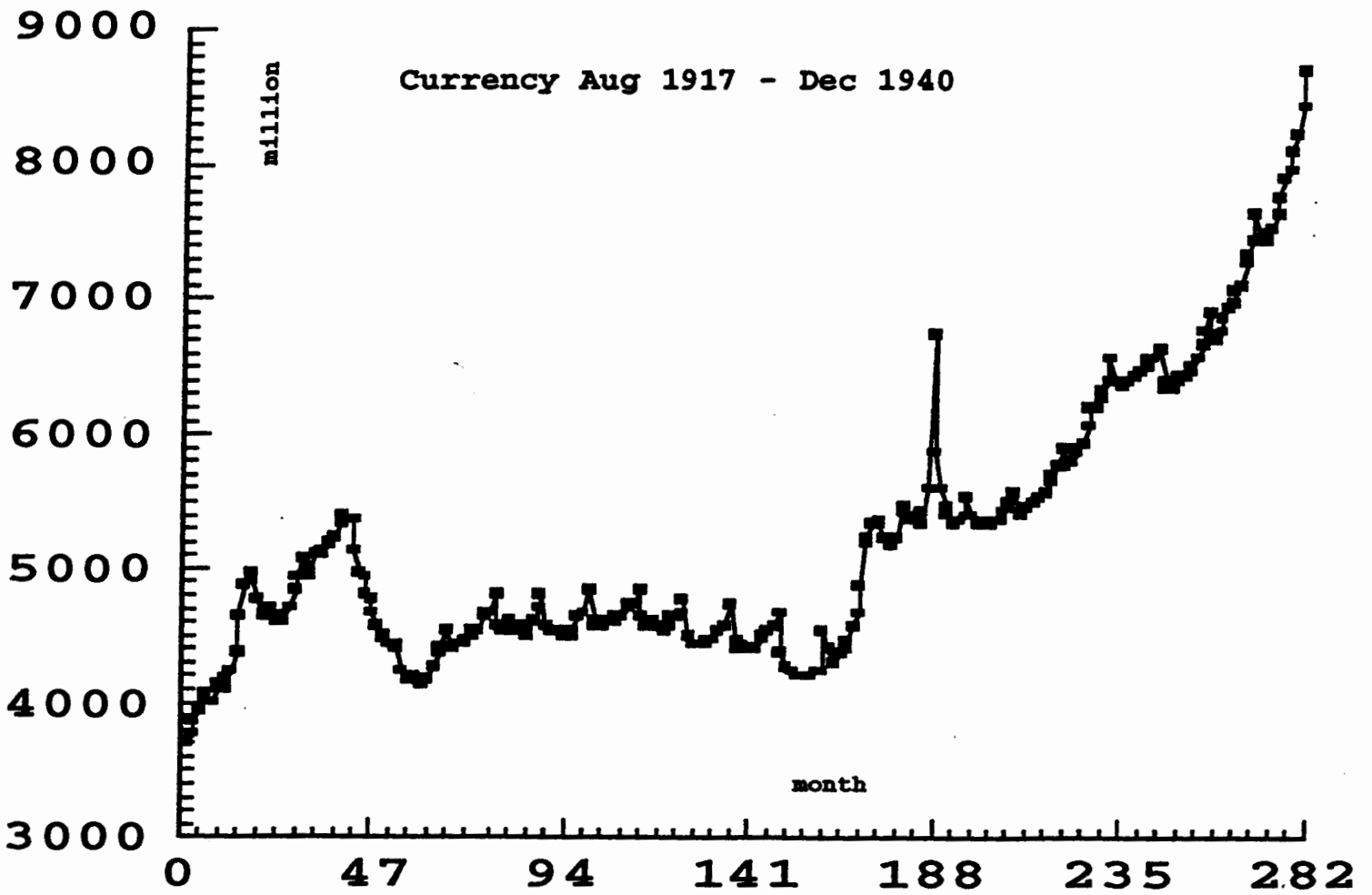


Fig 12

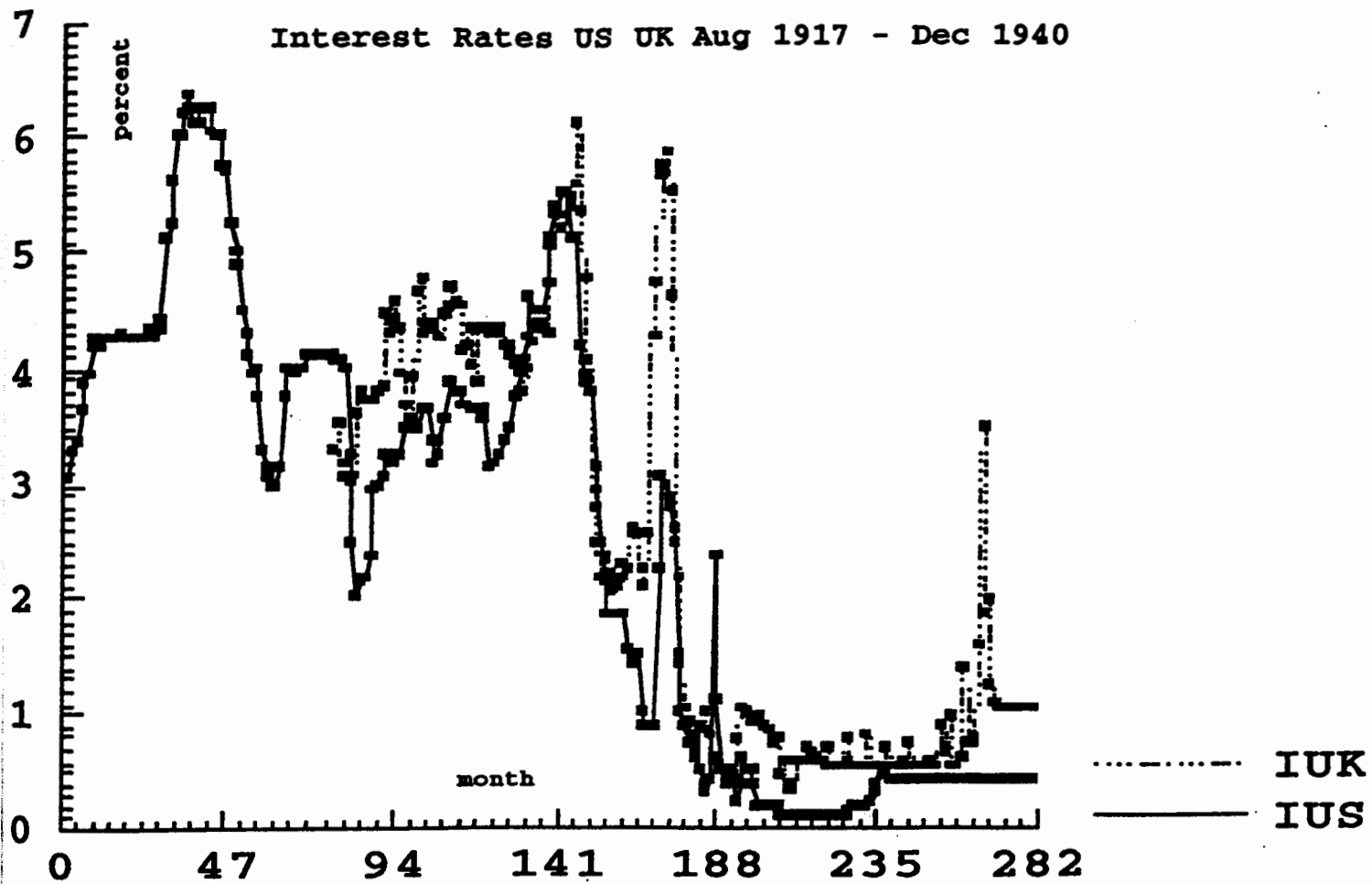


FIG 13

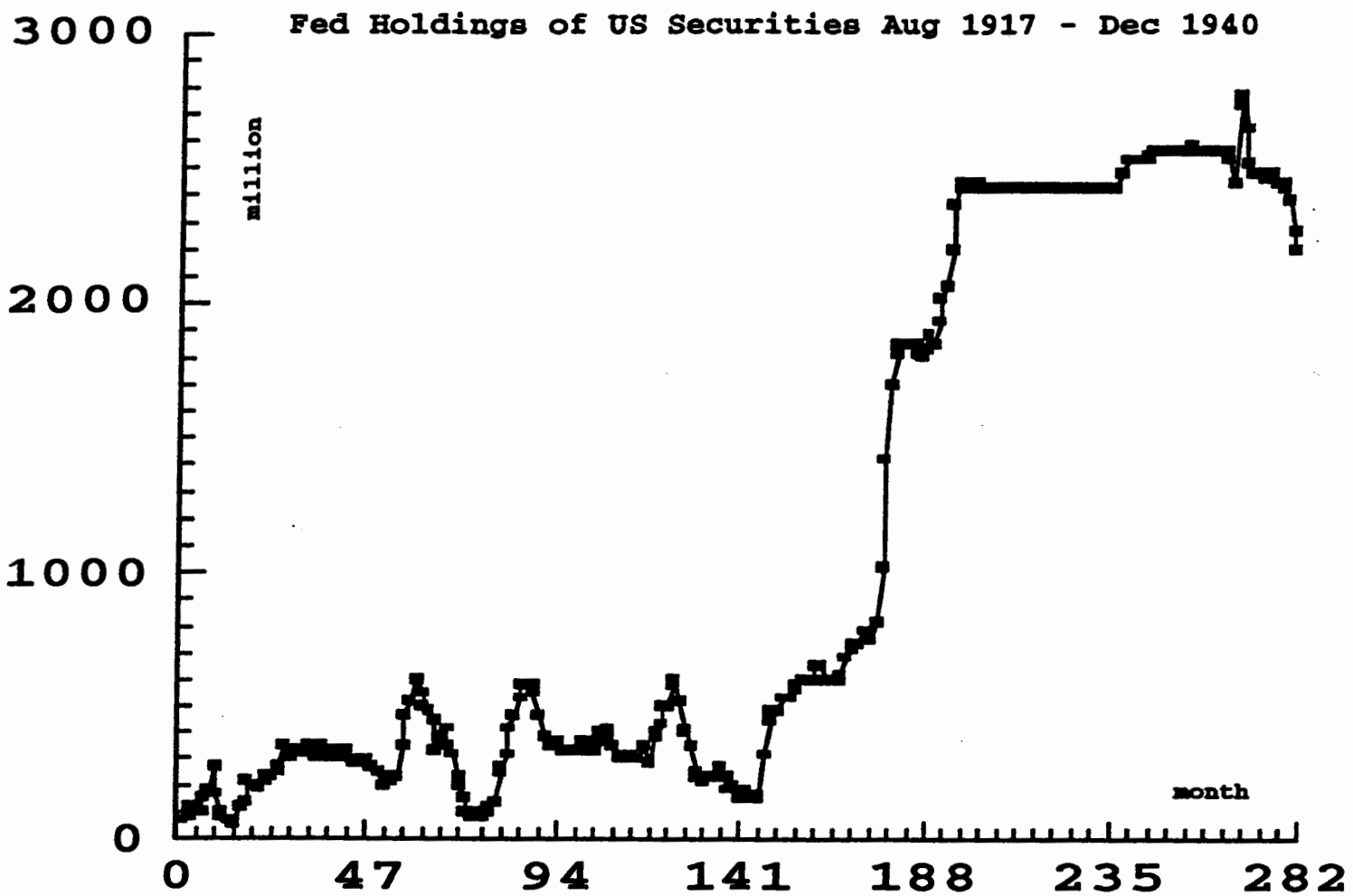


Fig 14

Ratio RFC Preferred to Common Stock Quarterly 1934-1940

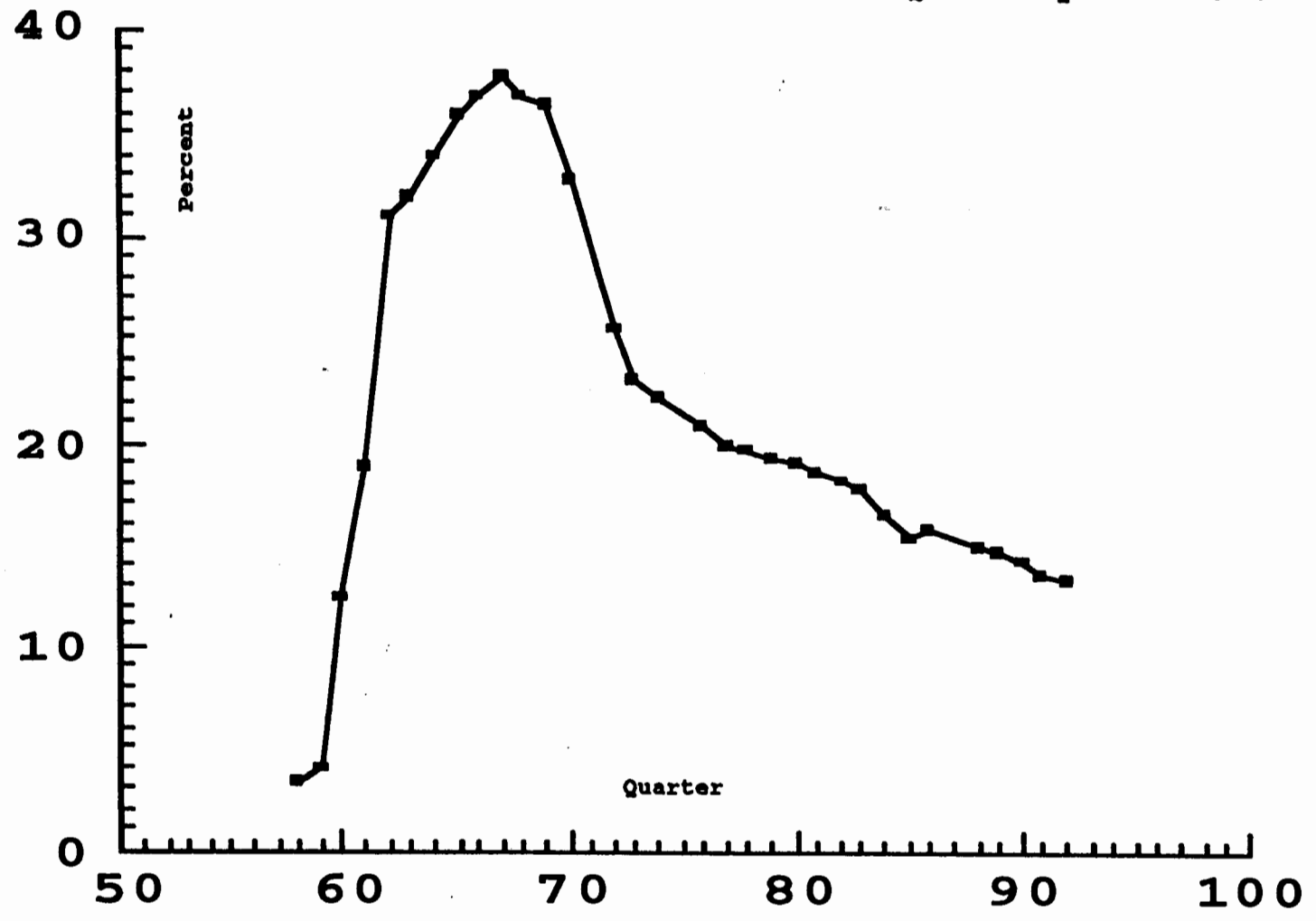


FIGURE 15

Ratio Bank Holdings of Government Securities to Total Bank Loans Quarterly 1919-1941

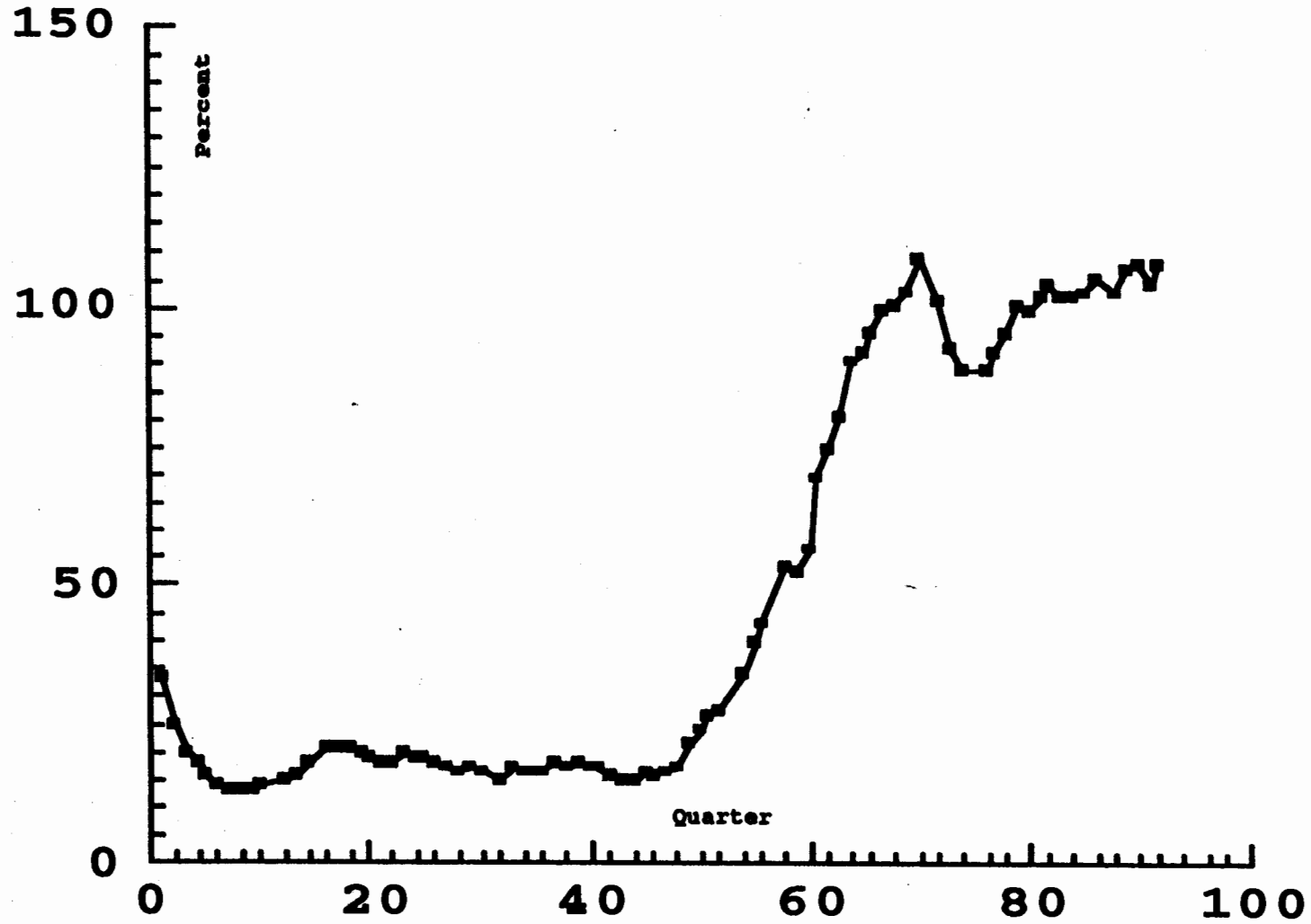


FIGURE 16

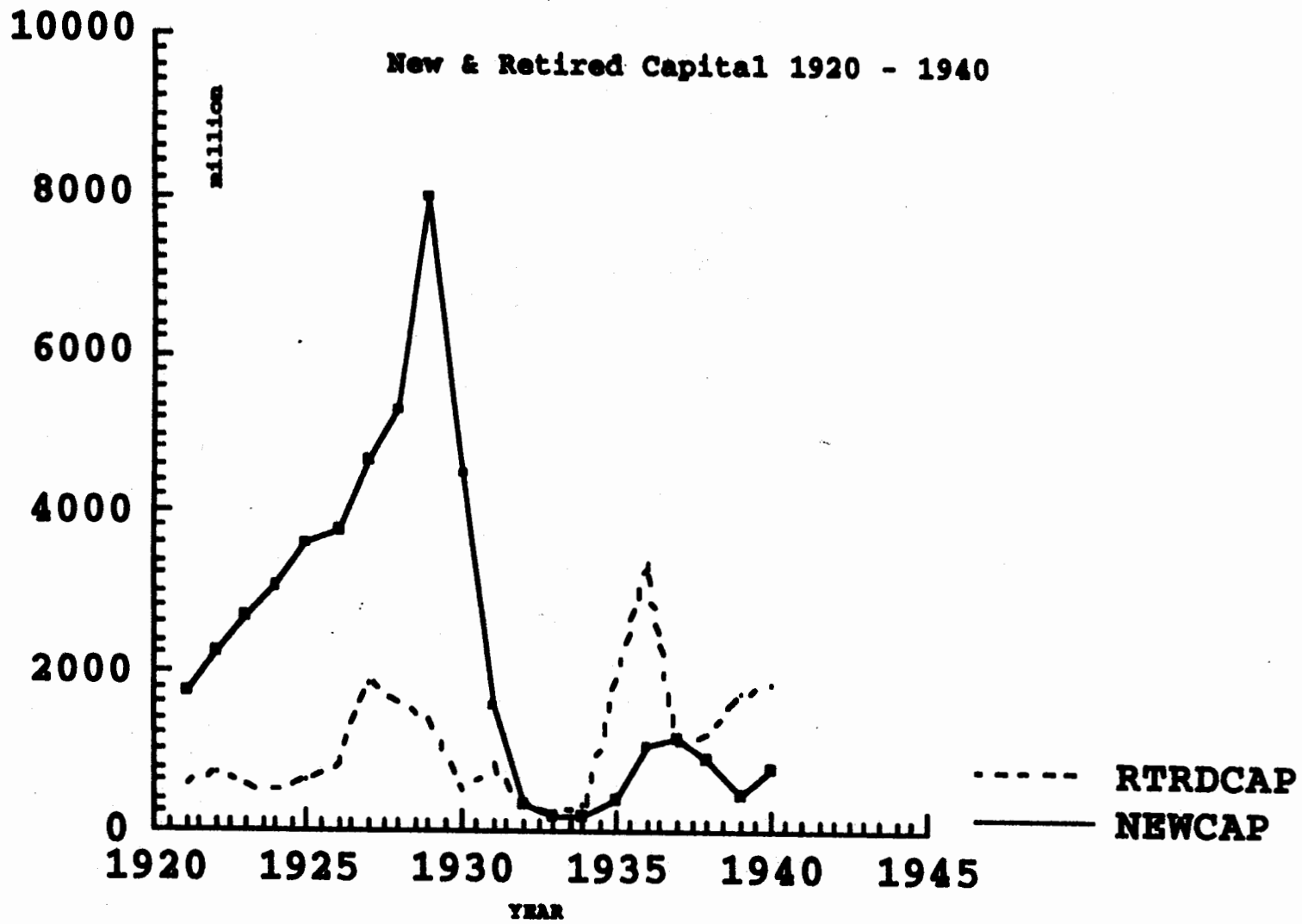


Fig 17

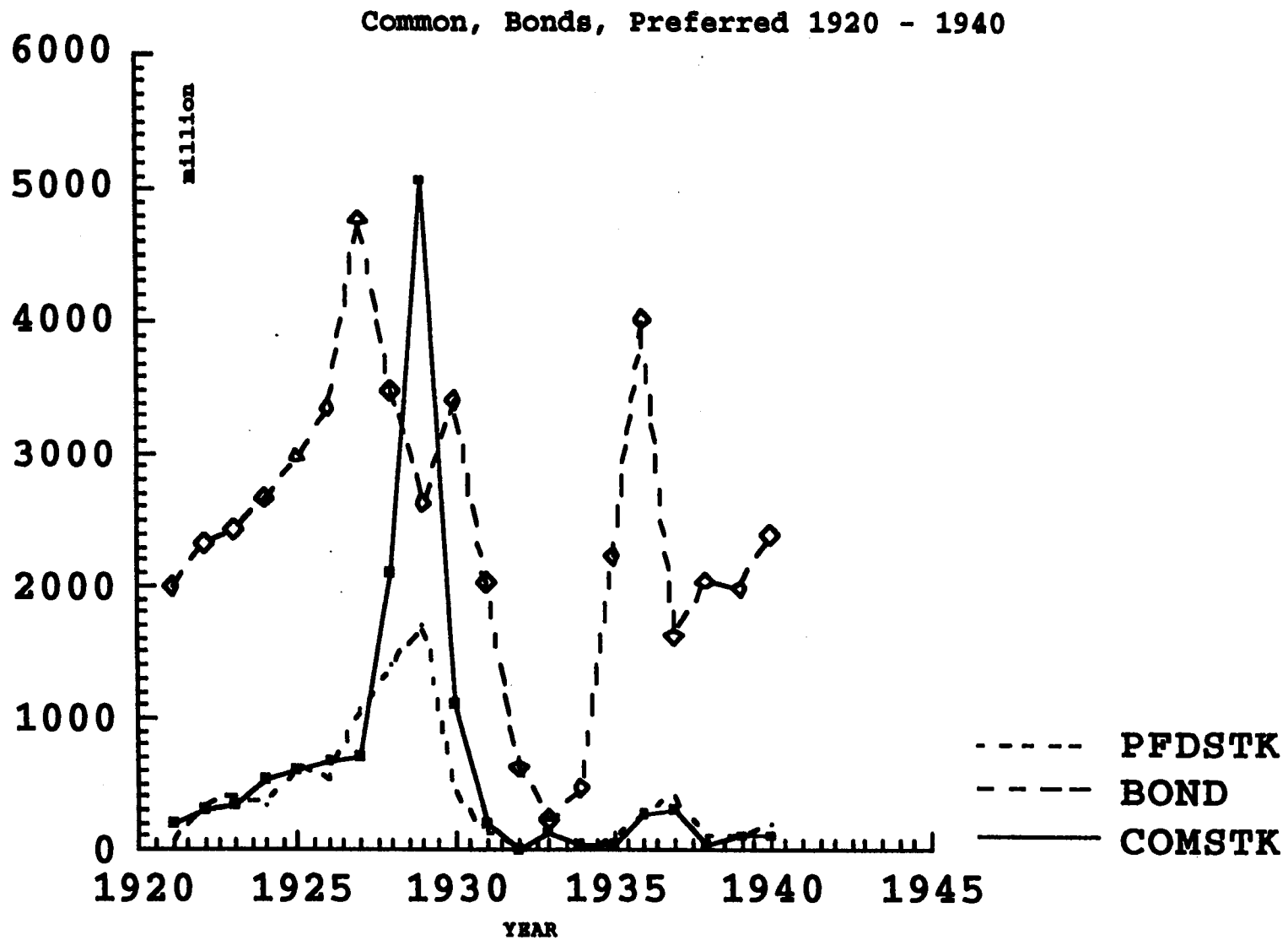


Fig 18

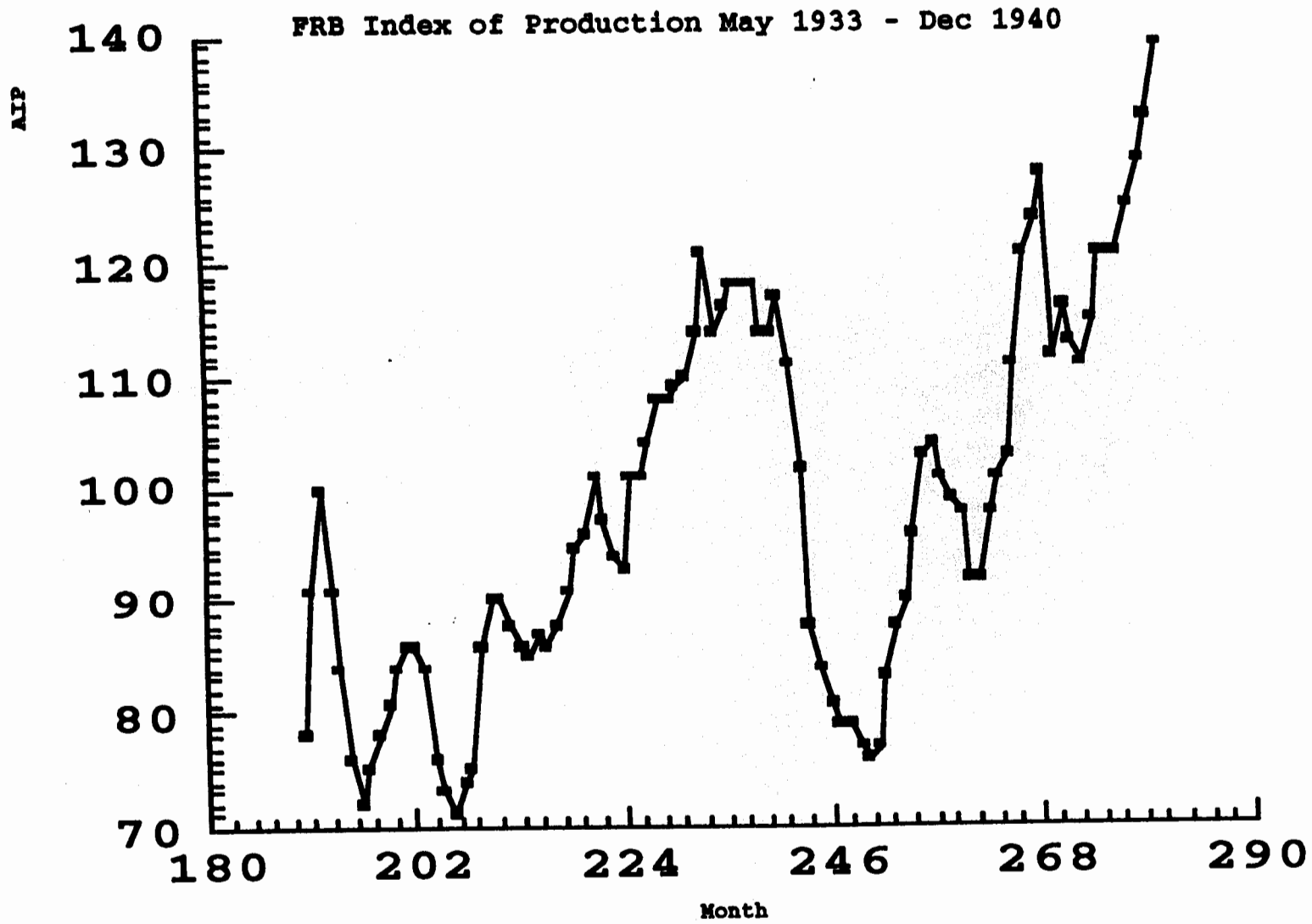


Fig 19

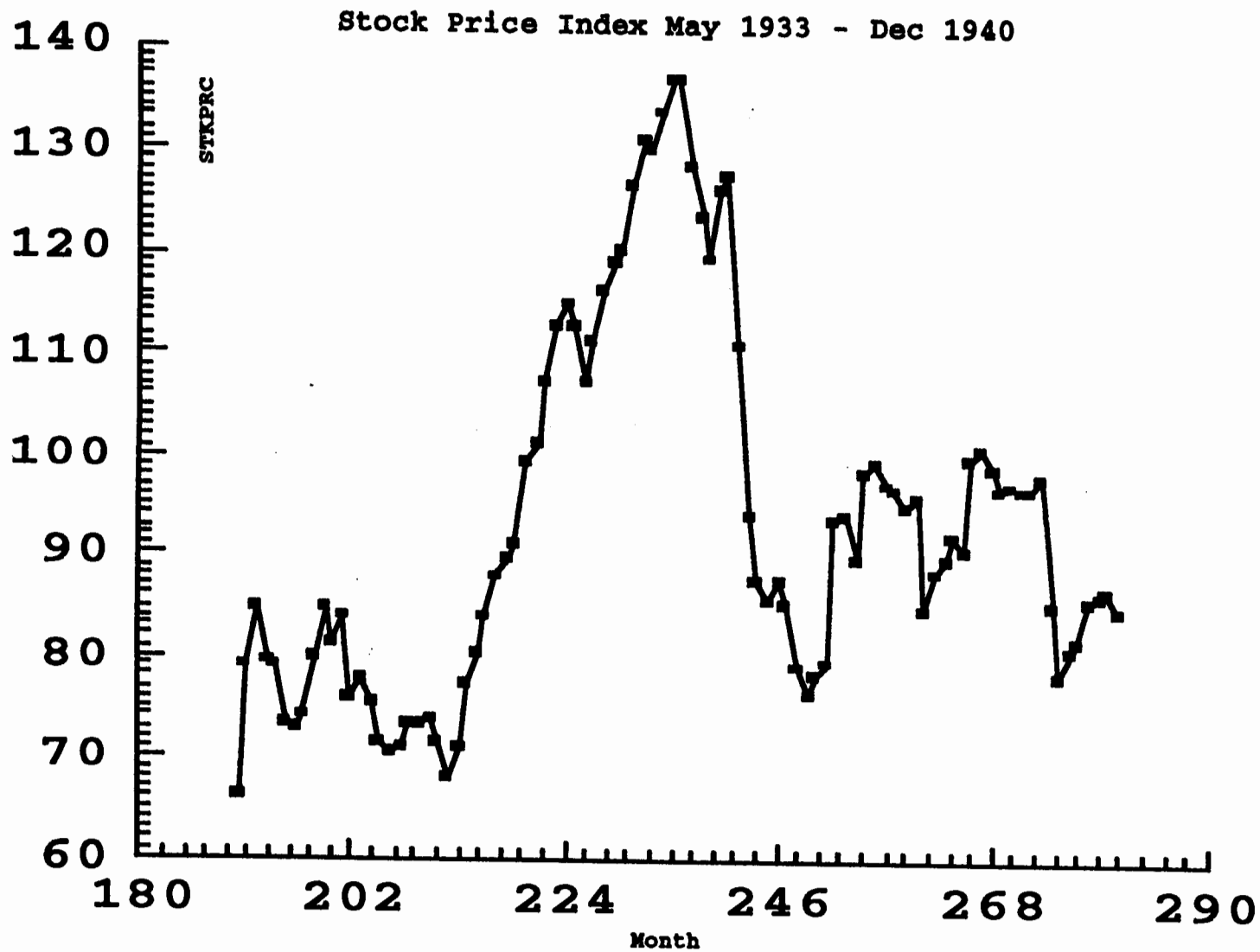


Fig 20

High Powered Money May 1933 - Dec 1940

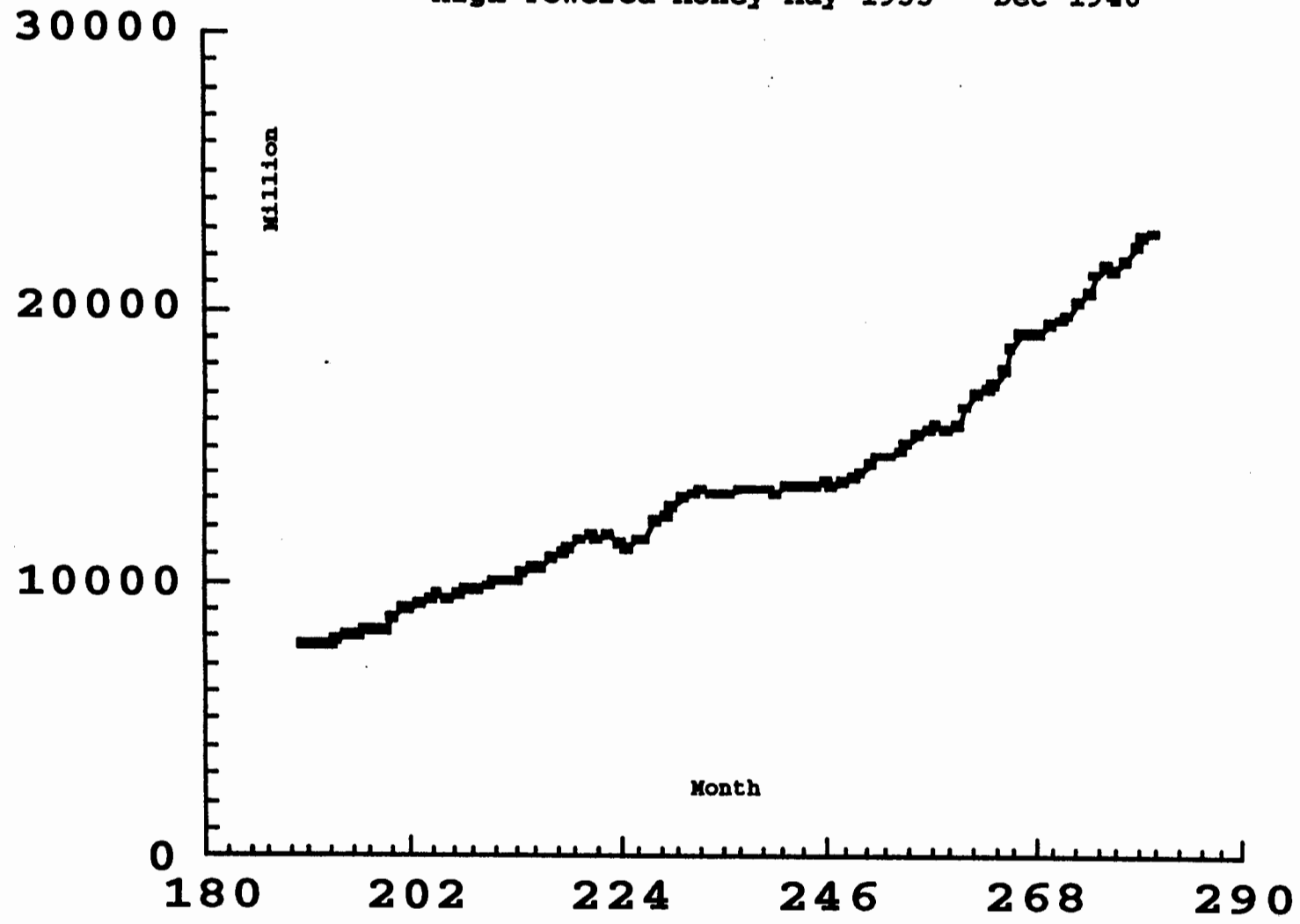


Fig 21

Reserves at Fed May 1933 - Dec 1940

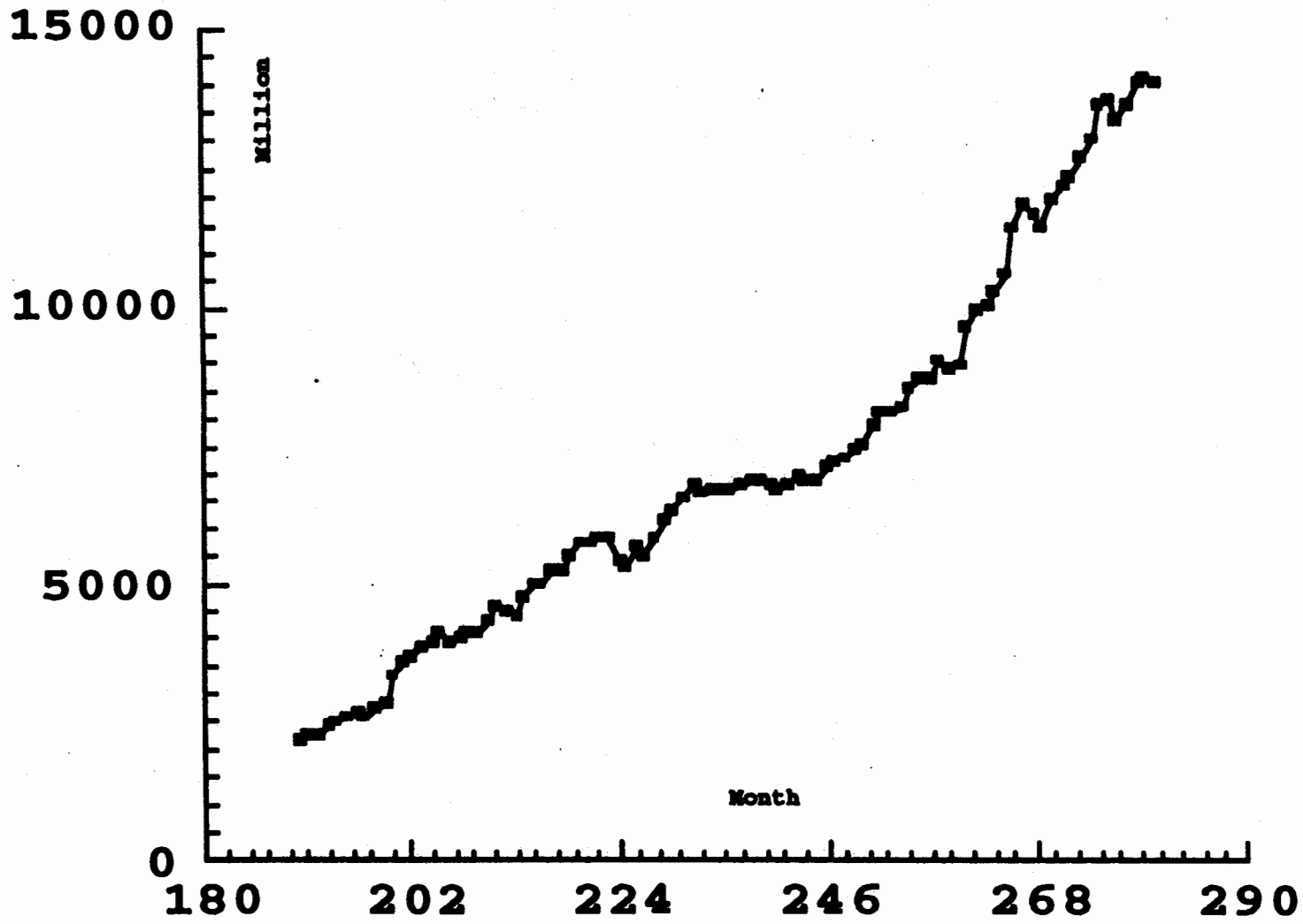


FIG 22

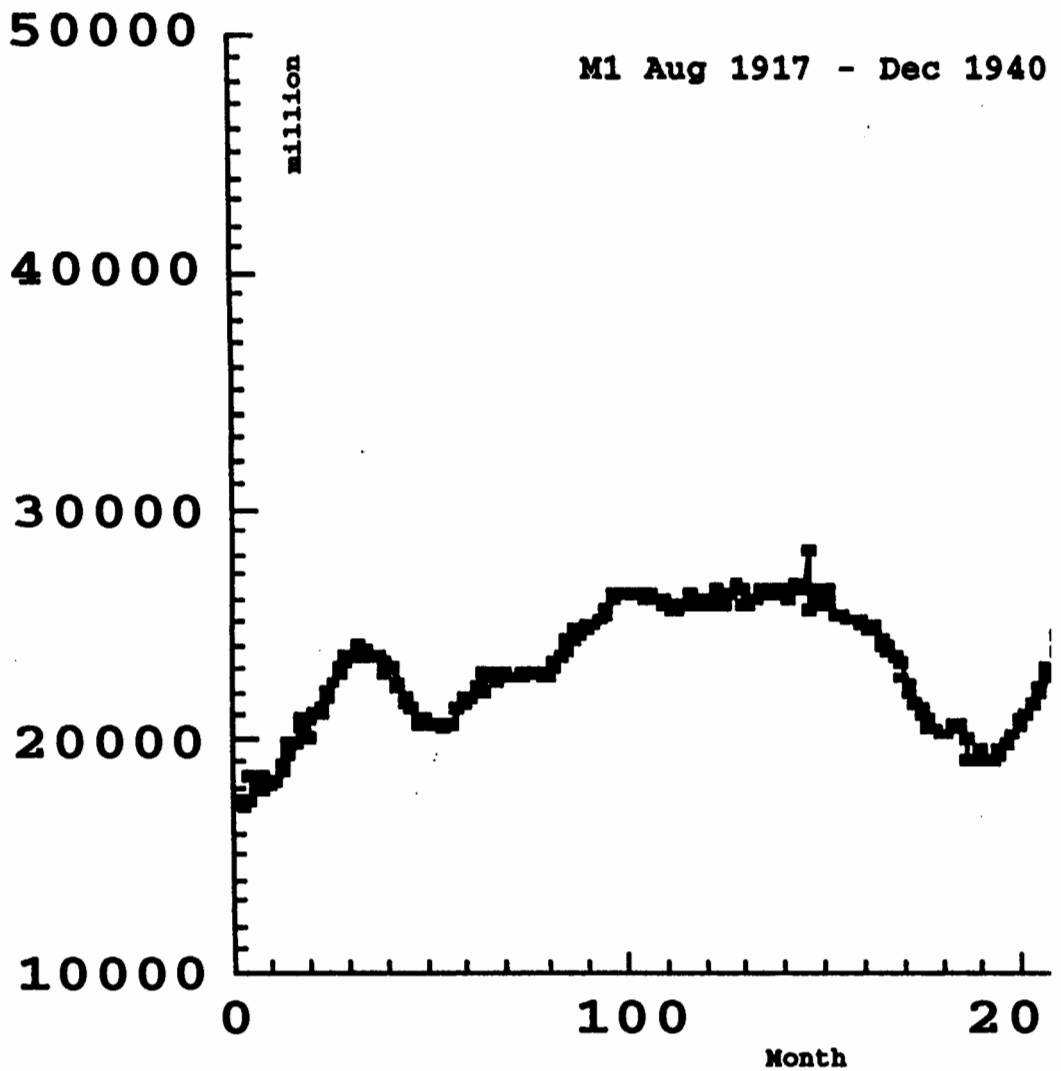


FIG 23

Jan 1936 - Dec 1938, T-Bill Rate & 90 Bankers' Acceptance

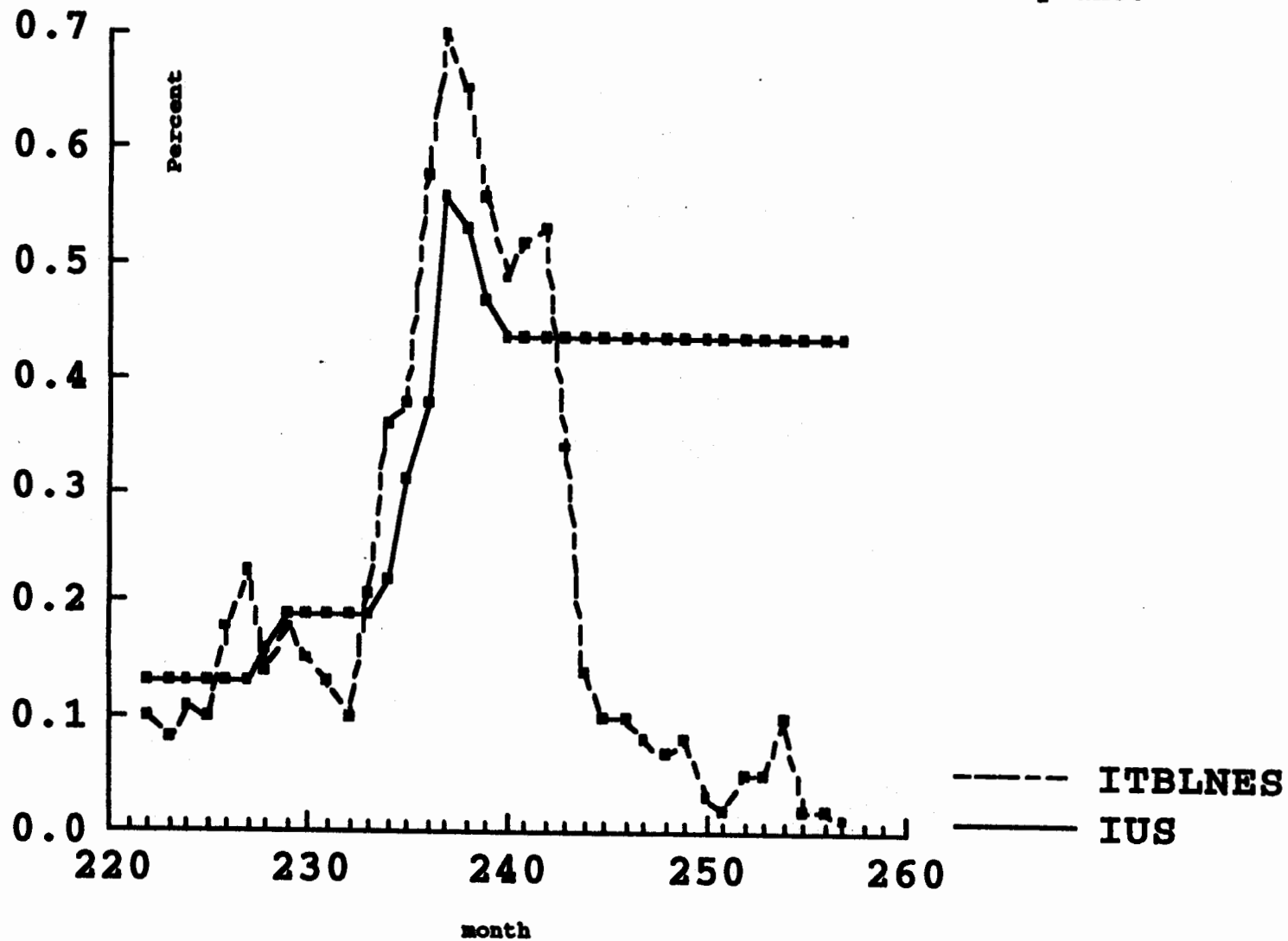


FIG 24