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THE GREAT DEPRESSION : A PARADOXICAL EVENT ?*

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RÉSUMÉ

LA CRISE DE 1929 : UN ÉVÉNEMENT PARADOXAL ?

Du point de vue des tendances historiques de la technique et de la répartition, la crise de 1929 apparaît comme un événement paradoxal. Elle interrompit, en fait, le cours de tendances très favorables, telles que la croissance rapide de la productivité du travail, un taux de profit croissant, etc. Cette étude soutient que l'obsolescence prématurée de larges fractions du stock de capital, qui résulta de ce progrès technique rapide, est un élément déterminant dans l'analyse de la dépression. Il explique comment une récession se transforma en dépression au début des années trente. Les nouvelles perspectives techniques suscitèrent la hausse du prix des actions dans les années vingt, mais les effets du krach d'octobre 1929 furent corrigés par l'intervention rapide des autorités monétaires. La durée de la chute de la production provoqua une crise financière, au départ une *crise de l'offre de crédit*, c'est-à-dire une perturbation de la volonté de prêter du système bancaire, faisant suite aux défaillances croissantes. La Réserve Fédérale mit des réserves à la disposition des banques, mais laissa la crise du crédit dégénérer en une crise bancaire (la faillite des banques). En dépit de l'acuité exceptionnelle des problèmes à régler, il faut souligner les faiblesses du cadre institutionnel existant, y compris des politiques. Une thèse plus ambitieuse est, ensuite, formulée qui, à un niveau plus élevé d'abstraction, fait de la dépression une crise exprimant la difficile venue au monde d'une nouvelle phase du capitalisme, *le capitalisme managérial*.

ABSTRACT

THE GREAT DEPRESSION : A PARADOXICAL EVENT ?

When considered from the viewpoint of the historical trends of technology and distribution, the Great Depression appears as a paradoxical event. It actually interrupted several very favorable trends : rapid growth of labor productivity, a rising profit rate, etc. We contend that the premature obsolescence of a large segment of the capital stock, in relation to this rapid technical progress, is a crucial factor in the analysis of the Great Depression. It explains how a recession was transformed into a depression in the early 1930s. New technical opportunities account for the rise of stock prices during the 1920s, but the effects of the collapse of October 1929 were corrected by the swift action of monetary authorities. The duration of the decline in output set in motion a financial crisis, at first a *credit-supply crisis*, *i.e.*, a disruption of the willingness to lend of the banking system, due to increasing defaults. The Fed provided banks with reserves, but let the credit crisis develop into a banking crisis (the failure of banks). Although the size of the problem to be tackled was quite unusual, the weaknesses of the existing institutional environment, including monetary institutions, must be acknowledged. A more daring thesis is then formulated which interprets the depression, at a higher level of abstraction, as a crisis expressing the difficult emergence of a new stage of Capitalism, *Managerial Capitalism*.

MOTS CLEFS : Grande Dépression, Crise de 1929, Hétérogénéité, Crise Financière.
KEYWORDS : Great Depression, Heterogeneity, Financial Crisis.
J.E.L. Nomenclature : N11, N12.

INTRODUCTION

Business-cycle fluctuations have been a constant feature of the macroeconomy, at least in the last two centuries. David Ricardo had already identified recurrent *states of distress*, and the cyclical pattern itself was carefully described by Marx in the middle of the 19th century. Even after World War II, similar fluctuations were still observed, and the issue of the relative amplitude of business fluctuations prior to World War I and after World War II, in the US economy, is still controversial.[1] It is, however, easy to show that, in all accounts, the Great Depression stands out as *exceptional*.

A voluminous literature has been devoted to the analysis of the Great Depression, and many aspects of the depression are now better known and understood. It is still very difficult, however, to derive a truly unified interpretation from an examination of this literature. Indeed, real and monetary phenomena combine their effects ; technology, distribution, and institutions are at issue ; domestic and international determinants are all relevant, etc. The specificity of the present study lies not only in its emphasis on *technical change*, but in the connection it establishes between this first layer of real determinants and a broad variety of other financial, institutional, and historical aspects of the depression.

The first sections of the paper discuss two rather conflicting initial observations concerning the depression :

1. Section 1.1 recalls the quite exceptional size of the contraction of output, significantly larger and lengthier than any other downturn.
2. Section 1.2 describes the profile of the major macro variables, such as output, prices, or money, during the 1920s and the first stages of the depression, as rather typical of severe business fluctuations. It seems therefore difficult to detect, until the end of 1931, any trait that might account for the dramatic character of the forthcoming slide to the abyss.

Beginning with these observations, several distinct directions can be followed. Four hypotheses are explored :

1. *The rapidity of technical change* (section 2). The exceptional rapidity and features of technical change in the first decades of the 20th century was responsible for a quite unusual heterogeneity of technology among firms. The existence of a large obsolete, and potentially devalued, segment of the productive system represented a considerable threat to the stability of the macroeconomy.
2. *Speculation on the stock market* (section 3). The sharp rise of the price of stocks and the sudden downturn of the market in 1929 destabilized the macroeconomy and financial institutions.
3. *Financial crisis* (section 4). The financial system collapsed, credit mechanisms were disrupted, and banking panics had a devastating effect.
4. *A deficient institutional framework* (section 5). Basic institutions, such as the stock market, the banking system, the Federal Reserve, etc., were not adequately

1. See ROMER C.D. 1986 and 1989, and BALKE N.S., GORDON R.G. 1989.

adapted to the task, and either provoked the depression, or were at issue because they were unable to check the contraction of output.

The analysis of the depression in this paper combines these various potential explanations, emphasizing the rapidity of technical progress, and downplaying the importance of the stock market. The basic line of argument can be summarized as follows: *The premature obsolescence of a large segment of the capital stock is central in the understanding of the Great Depression and the exceptional character of the contraction of output in the early 1930s. It explains how a recession was transformed into a depression. New technical opportunities account for the rise of the price of stocks during the 1920s, but the effects of the crash of October 1929 were corrected by the swift action of monetary authorities. The duration of the decline of output set in motion a financial crisis, at first a credit-supply crisis, i.e., a disruption of the willingness to lend by the banking system, due to increasing defaults. The Fed provided banks with reserves, but let the credit crisis develop into a banking crisis (the failure of banks). Although the size of the problem to be tackled was quite unusual, the weaknesses of the existing institutional environment, including monetary institutions, must also be acknowledged.*

This analysis of the depression is, in our opinion, confirmed by the painful character of the recovery and the way in which it was achieved : reconstruction of financial institutions, relaxation of competition, etc. This is shown in section 6.

A more daring thesis is then formulated in section 7, which interprets the depression, at a higher level of abstraction, as a crisis expressing the *difficult emergence of a managerial stage of capitalism*. First, the acceleration and new forms of technical progress in the early 20th century are imputed to a revolution in management that affected all aspects of the organization of the business firm. Second, the tighter management of individual firms was responsible for an increased instability of the macroeconomy. Simultaneously, the management of the macroeconomy, and the corresponding necessary adjustment of institutions — a managerial revolution at the center of sorts — were lagging behind, and developed mostly in the wake of the depression.

1 - AN EXCEPTIONAL EVENT ?

This section considers the depression comparatively to other business fluctuations. Section 1.1 stresses the exceptional size of the contraction of output. This observation is then contrasted, in section 1.2, with the rather standard profile of major variables along the business cycle since the previous trough in 1921 up to 1931.

1.1 THE EXCEPTIONAL AMPLITUDE AND DURATION OF THE DEPRESSION

Figure 1 displays the historical profile of the Gross National Product (GNP), in constant dollars, in the private US economy since the Civil War.[2] The upward trend in this figure dwarfs the fluctuations of the general level of activity, because of the scale. However, the depression is still quite evident. (Output declined by 31.8% between 1929 and 1933.) One also can easily locate the bulge during World War II. (Output rose by 42.8% between 1941 and 1944, and declined by 19% between 1944 and 1946.)

The NBER's classification of business-cycle fluctuations distinguishes between mild recessions, severe recessions, and major depressions.[3] The six *major* cycles described by the NBER since 1878 obviously include the Great Depression : 1878-1885, 1891-1894, 1904-1908, 1919-1921, *1927-1933*, 1933-1938. Excluding the Great Depression, the fall of GNP never exceeded 8% !

A better view of business-cycle fluctuations can be gleaned from an examination of figure 2, which displays the ratio of GNP to its trend ($(\cdot)$ in figure 1), denoted u.[4] The ratio in figure 2 can be interpreted as a *proxy capacity utilization rate* for the total economy.[5] When the economy is active, this ratio rises above 1 and it declines symmetrically below 1 when activity is sluggish. A sudden rise corresponds to overheating and a sudden collapse to recession.

Because of the criterion used, the NBER locates a series of troughs during the interwar period : 1921, 1924, 1927, 1933, and 1938. An examination of figure 2 suggests a "broader" approach based on the deviation of output from its trend (u above or below 1). With this approach, one is led to distinguish between a period of expansion from 1923 to 1929 ($u > 1$) and a *depression* from 1929 to World War II ($u < 1$).[6] This is the point of view adopted in this paper.

The depression is also exceptional in its duration, since low levels of activity (when u remains below 1) prevailed during 12 years, from 1930 to 1941 ; the recovery to the 1937 "peak" was only partial (in 1937, u is still smaller than 0.8.) ; after the new severe recession in 1938, actual recovery followed the outbreak of World War II ; the GNP only reached its 1929 level in 1940.

As is well known, the fluctuations in the general level of activity are closely related to the changes in employment and, consequently, unemployment : The depression is no exception in this respect, and its amplitude is reflected in the movement of

2. In this paper, we use a data base that we built for the US private economy since the Civil War. This data base covers major aggregate series concerning output, technology, and distribution. Sources and the construction of the variables are presented in DUMÉNIL G., LÉVY D. 1994(c).

3. The NBER dates business cycles from trough to trough. From 1891 to 1985, there were 7 mild recessions, 9 severe recessions, and 5 major depressions (ZARNOWITZ V., MOORE G.H. 1986, p. 559).

4. In the determination of the trend, we use the Whittaker filter, introduced in economics in HODRICK R.J., PRESCOTT E.C. 1980 (with $\lambda = 650$).

5. The correlation coefficient between this series and the capacity utilization rate, for manufacturing industries, when available, *i.e.*, between 1948 and 1992, is strong : 87%.

6. Along such lines, the contraction of output in 1937-38 appears as a *recession within the depression*.

Figure 1 GNP and its Trend, Billion, $1987 (1869-1992)

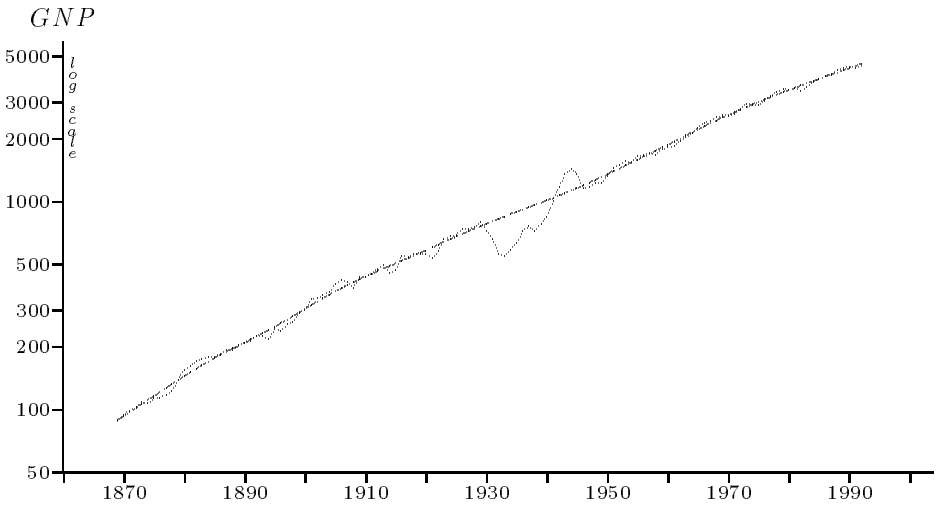


Figure 2 Proxy Capacity Utilization Rate (1869-1992)

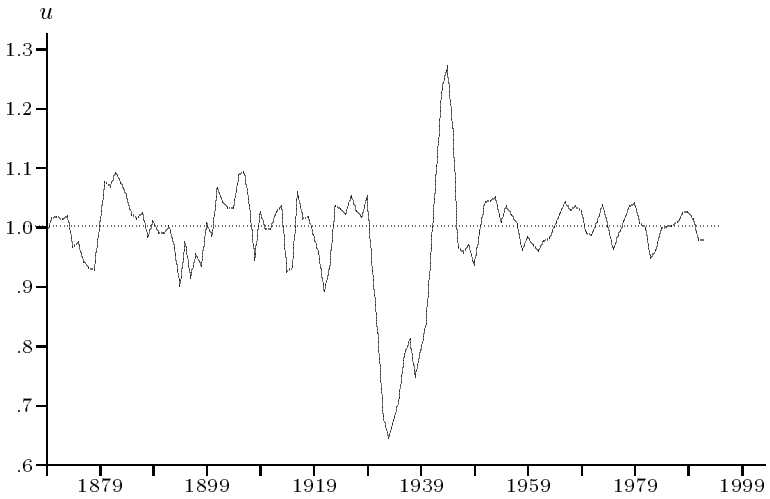


Figure 3 Rate of Unemployment, % (1890-1992)

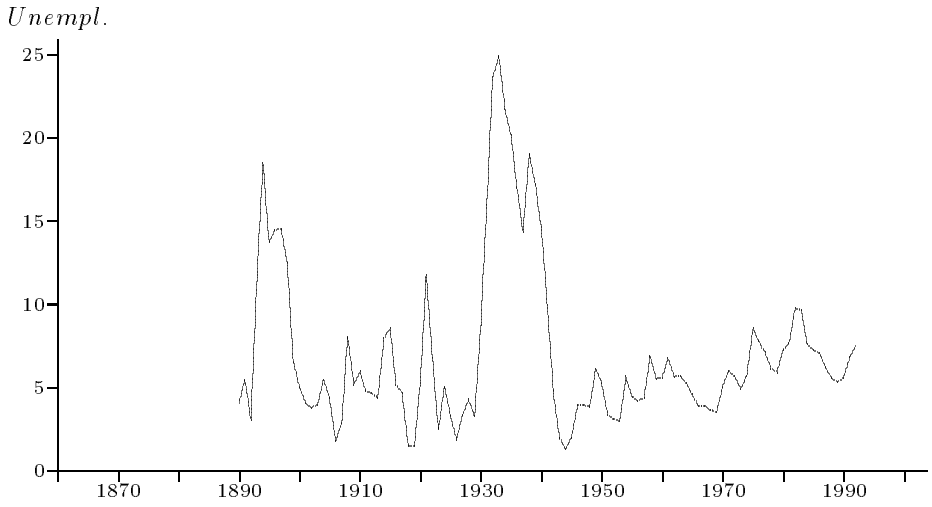
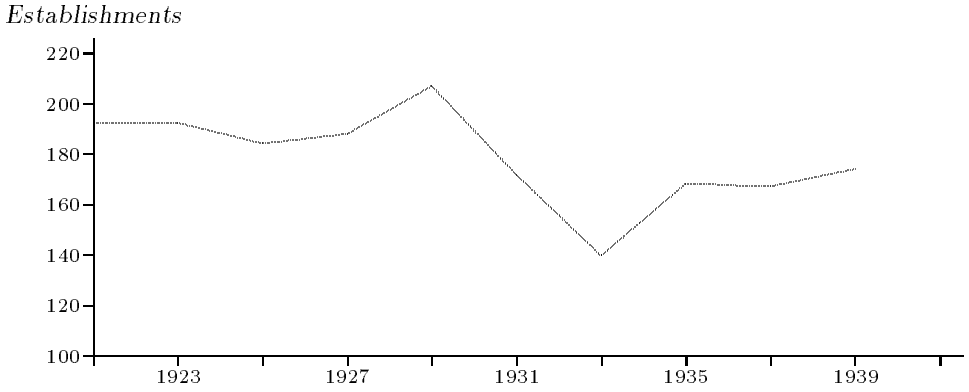


Figure 4 Number of Establishments within Manufacturing, Thousands (1921-1939)

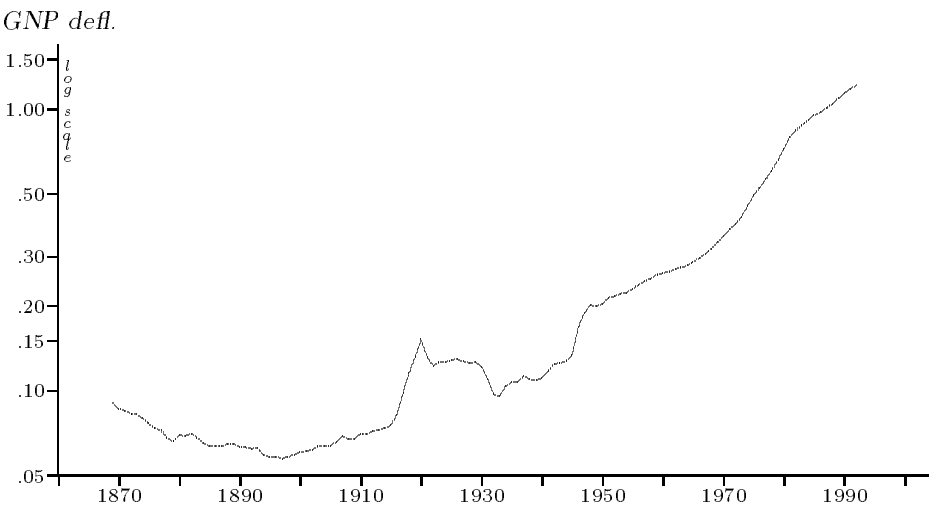


unemployment. Figure 3 displays a measure of the rate of unemployment (from LEBERGOTT S. 1964), which peaks at 24.9% in 1933. (Simultaneously immigration is reduced to nearly zero.) One can notice parenthetically the rise of unemployment during the *major depression* in the 1890s (18.4% in 1894).

The exceptional violence of the depression is reflected in its devastating effects on certain segments of industry. This is not so much evident from the number of failures of firms, than on the dramatic reduction of the number of establishments. As shown in figure 4, the number of establishments within Manufacturing, culminated at 206,663 in 1929, and declined to 139,325 in 1933.[7] *Thus, the contraction of output must not be interpreted only in terms of diminished capacity utilization rates, but*

7. See U.S. BUREAU OF THE CENSUS 1975, series P1, p. 666.

Figure 5 GNP Deflator, Index 1987 = 1 (1869-1992)



also in terms of outright "destruction" of productive capacity.[8]

The dramatic character of the depression was also manifest in the profile of other variables. An examination of figure 5 reveals how the depression was paralleled by a sharp deflation. In 1933, the general price level diminished 24.5% below its 1929 value. It is also well known that the 1920s coincided with a sharp rise of stock prices, and that the stock index collapsed in October 1929, up to 1932 (see section 3.1 and figure 10).

The Great Depression can also be compared to other "large crises" (to be distinguished from the above *contractions of output*). Over the period of more than a century covered in figures 1 and 2, two other large crises occurred : in the late 19th century and in the late 20th century, *i.e.*, the recent decades (beginning around 1970). A number of typical features are concentrated during these two periods : slowdowns in the rate of accumulation, in the rapidity of technical change, in the growth rate of real wages, and larger business fluctuations. These characteristic features are well known for the recent decades, but were also observable in the late 19th century, after the 1880 boom. Only the Great Depression coincided with a large and durable decline of output, and is therefore of a different nature.

1.2 1921-1931 : A STANDARD BUSINESS CYCLE ?

The focus of this section concerns whether the 1920s and early 1930s (during the first stage of the slump) differed fundamentally from typical phases of expansion and contraction. In other words, the question is whether it is possible to detect in the

8. It is easy to imagine the devastating effect of the particularly severe contraction of output and employment in the building industry. Employment in this industry (see THE BROOKINGS INSTITUTION 1936, p. 137) peaked at 3 millions in late 1929, and the trough was reached in the middle of 1933 with 400,000 employed !

profiles of the variables during the 1920s and early 1930s significant symptoms of the forthcoming collapse.

The *growth of output* during the 1920s, following the recovery from the 1921 recession, was "normal" for a period of steady growth, as in all business cycles. As can be gleaned from an examination of figure 1 and table 1 below, the average yearly growth rate of GNP (ρ(GNP)) from 1922 to 1929 (3.89%) is similar to the rate that prevailed between 1869 and 1910 (3.88%), and slightly larger than over the entire period 1869-1992 (3.13%). (One should be careful, however, in the comparison between the period 1922-1929 and other longer periods, since 1922-1929 corresponds to a period of rather steady growth, the expansion phase of the business cycle, interrupted only by minor and ephemeral declines.)

Before World War II, the GNP is known available on an annual basis, and a more detailed picture of the course of output can be obtained from the index of industrial production for which monthly data are available. (Instead of the old Fed index used in most studies, we will refer to the series presented recently in MIRON J.A., ROMER C.D. 1990.) As shown in figure 6, the trend of industrial production, prior to the depression, was interrupted by two minor recessions in 1923 and 1927. At the beginning of 1929, industrial production rose sharply as the economy tended to overheat. The peak was reached in February 1929 (instead of August as in the NBER's dating).

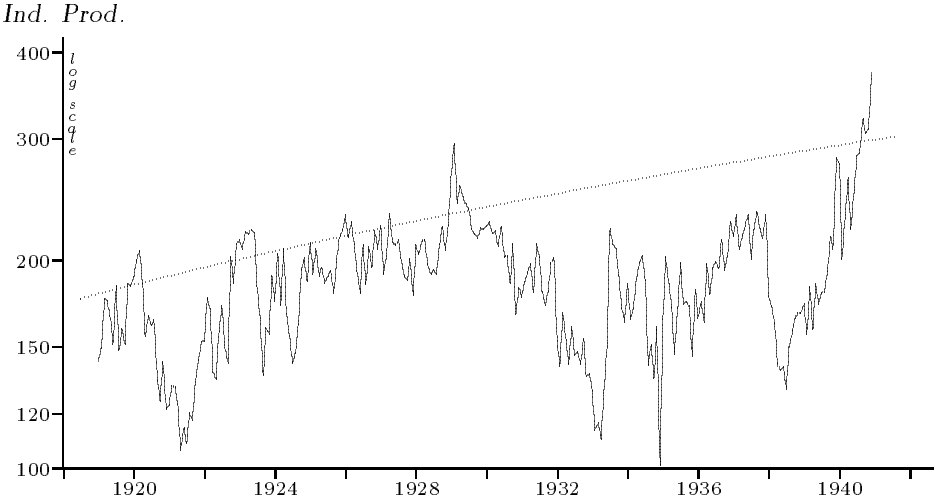
When the recession occurs, the rapidity of the collapse of GNP between 1929 and 1931 (figure 2) is comparatively large, but the fall of industrial production (figure 6) is less pronounced than those observed in 1921 and 1937. The index of industrial production declines from 295 to 225 between February 1929 and February 1930, *i.e.*, a fall of 23.2%. The yearly average for 1930 is 14.1% below that for 1929. After a short period of "stabilization," a new decline is evident in January 1932. To this point the overall magnitude of the fall is inferior to those observed in 1921 and 1937.

There is nothing exceptional in the profiles of the major components of output, investment and consumption, before and after the 1929 break (see section 2.5). There is no clear evidence of underconsumption or overinvestment (C/GNP, I/GNP, and I/K in table 1), although, as in other cycles, investment is more cyclical than consumption. (When output rises, investment rises faster than consumption; when output declines, investment also declines faster.) The growth rate of the capital stock (structures and equipment) is comparatively low ($\rho(K)$ in table 1). Robert Gordon and John Veitch computed the elasticity of investment *vis-à-vis* output for a large number of cycles; the cycle corresponding to the Great Depression does not stand out as exceptional (GORDON R.J., VEITCH J.M. 1986, table 5.1).

The fall in prices is also in line with the above observations: When assessed relatively to the decline of output, it does not appear that the deflation was exceptionally strong. Before World War II, such deflations were typical of business contractions. If one subtracts the trend value of prices from their actual value, or, what is approximately equivalent, if one considers the *difference* between the average growth rate of prices prior to and after the peak, 1929 does not stand out as exceptional (ZARNOWITZ V., MOORE G.H. 1986).[9]

9. This difference amounts to -13% for 1929, -12.8% for the 14 cycles between 1891 and 1945 (in the average), and -21.0% for the five major depressions from 1891 to 1945 (ZARNOWITZ V., MOORE G.H. 1986).

Figure 6 Industrial Production, Index 1909 = 100 (January 1919-December 1940)



The | corresponds to January

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There is no clear bias in distribution favoring profits during the 1920s. The profit rate (see figure 8 (·)) is comparatively low, and the growth rate of wages is not specifically small ($\rho(w)$ in table 1). One striking feature of the period is that, in connection with the violence of the deflation and the stickiness of nominal wages, real wages declined only slightly during the first phase of the depression, in spite of the size of unemployment.

As in all business cycles, the quantity of money diminished with output. Between August 1929 and October 1930, M2 diminished by 2.6% (FRIEDMAN M., SCHWARTZ A. 1963(a), p. 307-308). In the first stage of the recession, the money stock, deflated by the GNP deflator, actually rose (see section 4.1). During recessions, the decrease in the nominal stock of money is typically smaller than the decrease in output. Consequently, the so-called velocity of money also falls during recessions. Again there was nothing exceptional in this respect during the depression.[10]

2 - THE FAVORABLE FEATURES OF TECHNICAL CHANGE

This section is devoted to the relationship between technical and distributional changes, and the depression :

10. As clearly stated in FRIEDMAN M., SCHWARTZ A. 1963(a): "*In 1929-1933, the decline in velocity, though decidedly larger than in most mild cycles, was not as much larger as might have been expected from the severity of the decline of income.*" (p. 303). Friedman and Schwartz provide comparative figures : −13.0% from 1929 to 1930, −10% from 1907 to 1908, −13% from 1917 to 1918, and −15% from 1920 to 1921 (p. 307).

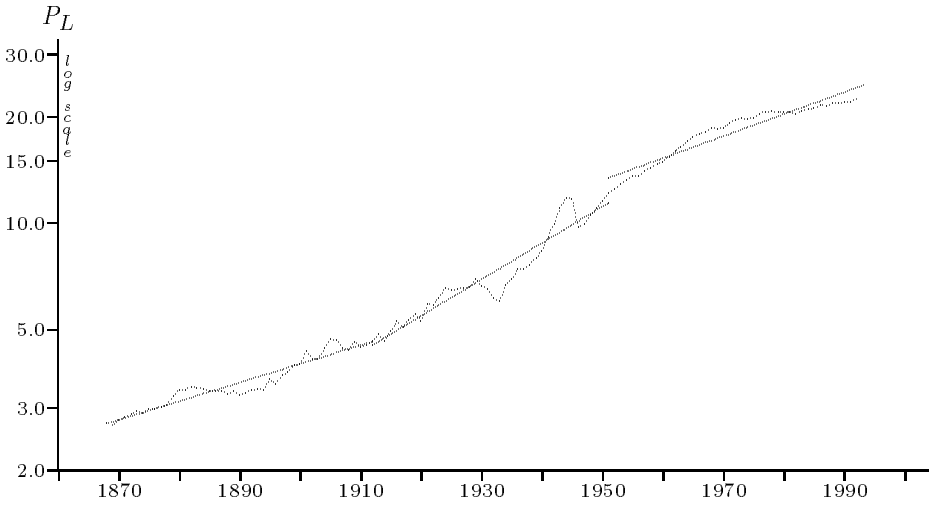
Table 1 - Average Annual Growth Rates (% per Year) and Average Values of Some Ratios (%)					
	1869-1910	1910-1950	(1922-1929)	1950-1992	*1869-1992*
ρ(GNP)	3.88	2.66	(3.89)	2.91	*3.13*
$\rho(K)$	4.71	1.22	(2.84)	3.41	*2.66*
$\rho(L)$	2.62	0.39	(1.77)	1.35	*1.21*
$\rho(Y/L)$	1.22	2.33	(1.80)	1.48	*1.95*
$\rho(Y/K)$	-1.22	1.39	(0.51)	-0.88	*0.04*
$\rho(K/L)$	2.07	0.40	(1.00)	2.24	*1.48*
$\rho(w)$	1.46	2.33	(1.87)	1.48	*1.95*
$\rho(r)$	-1.66	1.40	(0.39)	-0.88	*0.05*
ω	65.7	68.5	(66.6)	65.2	*66.4*
I/K	6.53	4.21	(4.59)	6.45	*5.74*
I/GNP	12.5	8.6	(9.4)	11.5	*10.9*
C/GNP	73.9	78.2	(77.8)	71.5	*74.4*

The description of technical and distributional trends in the table is based on the conventional representation of production, in which two inputs, labor and capital, are combined. Labor income corresponds to total labor compensation (including a correction for self-employed). "Profits" measure the entire excess of the Net National Product (NNP) over labor income. More precisely, the variables are defined as follows:

5. *Labor productivity, Y/L, is the ratio of the NNP in constant dollars to the total number of hours worked;*
6. *The productivity of capital, Y/K, is the ratio of the NNP to the gross stock of fixed capital, both in constant dollars;*
7. *The capital-labor ratio, K/L, is defined as the gross stock of fixed capital in constant dollars divided by the number of hours worked;*
8. *Labor cost, w, is the hourly nominal wage (total compensation) divided by the NNP deflator;*
9. *The profit rate, r, is obtained by dividing profits, i.e., the NNP minus total labor income, by the net stock of fixed capital, both in current dollars; and*
10. *The wage share, ω, is the ratio of labor income to the NNP. In the ratio of investment, I, to capital (I/K), of investment to GNP, (I/GNP), and of consumption, C, to GNP (C/GNP), all variables are in current dollars.*

1. The interwar period stands out as quite exceptional by the *very favorable features of technical and distributional changes* (section 2.1). This first investigation stresses the *paradoxical* character of the depression in this respect.
2. Further analysis reveals, however, the strong heterogeneity of technology and the associated obsolescence of fixed capital, and the threat that they represented

Figure 7 Labor Productivity, with Three Linear Trends, $1987 per hour (1869-1992)



for the macroeconomy. In our opinion, this obsolescence and the corresponding massive destruction of fixed capital are crucial factors in the explanation of the depression (section 2.2).

3. A vintage model of technology is presented in section 2.3, leading to an estimate of economic discards in section 2.4.

These analyses converge to a first explanation of the severity of the depression in *real* terms, which is compared to other similar *real* analyses in section 2.5.

2.1 FAVORABLE HISTORICAL TRENDS

It is important to consider the Great Depression from the view point of the historical transformations of technology and distribution. When approached in this manner, the depression appears as a paradoxical event: *The first half of the 20th century was a very favorable period*. This is evident from an examination of table 1, where the period 1869-1992 has been divided into three shorter periods of approximately equal duration: 1869-1910, 1910-1950, and 1950-1992. The Great Depression occurs precisely in the middle of the second period.[11]

The quite favorable features of the intermediate period, 1910-1950, can be easily identified from these figures. During these years, the growth rates of labor productivity and labor cost were larger than average, the capital-labor ratio grew only slowly, and the trends of the profit rate and of the productivity of capital were upward. The coincidence of the more rapid growth of labor cost (close to that of the real wage) and the *upward* trend of the profit rate provides a summary expression of this favorable pattern. During the first and third periods, the profit rate *declined*, while the growth rate of the labor cost (as well as labor productivity) remained below the average!

11. We use the same data base as for figure 1.

Figure 7 displays the growth of labor productivity. (The profile of the labor cost is nearly identical.) The three periods are clearly evident in this figure, with the three growth rates corresponding to the pattern *Slow / Fast / Slow*, as shown in the three linear trends. The impact of the depression is visible in the middle of the intermediate period. (The effect of the general level of activity on labor productivity is known as the productivity cycle.) Note that the depression did not even shift the trend of labor productivity, which was particularly steep during these years.

The paradoxical context of the Great Depression is even more obvious when the depression is compared to the two other "large" crises, in the late 19th and 20th centuries, mentioned above in section 1.1. A common aspect of these two crises is that they followed a significant decline of the profit rate (see figure 8), and this is not, we believe, a mere coincidence. These two crises can actually be denoted as *profitability crises* (see DUMÉNIL G., LÉVY D. 1993, section 20.3). Even if the still low levels of profitability played a role in the explanation of the Great Depression (DUMÉNIL G., GLICK M., RANGEL J. 1988), it is associated with thoroughly different trends.

2.2 THE HETEROGENEITY OF CAPITAL AND THE DECLINE OF OUTPUT

There are three aspects to the relationship between the strength of technical change and the contraction of output :

1. A rapid technical change results in a greater heterogeneity of capital among the various vintages of capital, as well as among *firms*, depending on their ability to adapt to the ongoing transformations.
2. The strong obsolescence of some fractions of the capital stock leads, in particular during recessions, to large discards and plant closures.
3. Large discards and closures add to the impact of the cumulative contraction in demand and output.

If the obsolescence of a given component of fixed capital reaches such a degree that it becomes unable to yield a positive cashflow, the time is ripe for its discard. Even before such extreme circumstances are reached, any decline in the capacity utilization rate is a strong inducement to discard the fractions of the capital stock which approach this situation. This is particularly true if significant fixed costs are incurred. If, in a given firm, such discards reach considerable proportions, they may well coincide with plant closures or firm failures. Thus, a slackening of activity can easily initiate a cumulative movement downward in which large segments of the capital stock are likely to be discarded.

These observations provide, in our opinion, a key insight into the size of the contraction of output in the early 1930s. Our intermediary period, 1910-1950, combines several basic characters that account for the severity of the depression :

1. Since the turn of the century, a new wave of exceptionally rapid technical change was underway.
2. This transformation of technology was associated with a similar transformation of management, characteristic of the new large corporations and "mass-production"

methods. This transformation affected firms very unevenly, depending on their size, creating much heterogeneity within the productive system.

3. This movement was paralleled by the rise of the growth rate of labor cost, adding to the obsolescence of the older segments of fixed capital.

Under such circumstances, *there was, actually, a strong potential for the transformation of a recession into a depression*. This is what happened when the recession began in 1929. In the subsequent years, large segments of the capital stock were discarded, a large number of plants were shut down, and many enterprises failed. The "ordinary" contraction of demand and activity, that is characteristic of any recession, grew to unprecedented proportions.

We have already stressed in section 1.2 above that there was a sharp rise in the number of closures of establishments during the depression. Here we will only consider an example concerning the motor vehicule industry (BRESNAHAN T.F., RAFF M. 1991). The motor vehicule industry was the largest of manufacturing industries in 1929. *Half of the existing establishments were closed during the depression*. Bresnaham and Raff point to the large *heterogeneity* within the industry, and the quite distinct evolutions of the various categories of firms. Larger plants, owned by large corporations, were already engaged into modern management, and survived the depression. In contrast, the depression was fatal to smaller firms with larger costs and, often, only one establishment.[12]

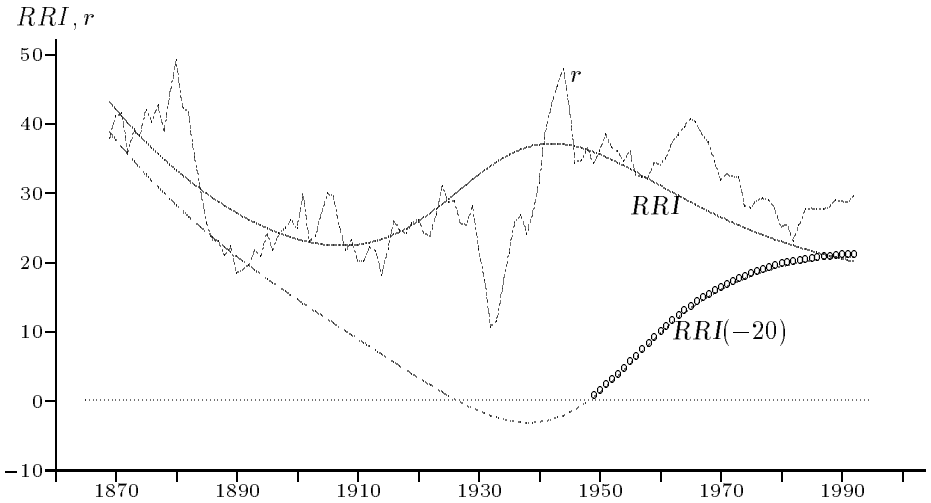
2.3 A VINTAGE MODEL

No aggregate measure of capital heterogeneity is available, and it is not easy to construct such an index. One possible approach is to build a *vintage model* of technology, accounting for the transformation of the technology in the various layers of successive investments that compose the capital stock at a given point in time. Even on the basis of such a model, further difficulties arise :

1. The performance of each technique must be assessed globally, although several inputs exist (capital and labor in the model). The consideration of labor productivity alone, for example, is not sufficient, since the rise of labor productiviy can be paid for by a large addition to the amount of fixed capital, *i.e.*, a decline of capital productivity. The ability of a technique to yield profit is, in our opinion, the best criterion.
2. There is an intertemporal aspect to the profitability of an investment over its entire service life. We will, therefore, refer to the *Rate of Return on Investment* (RRI) of each vintage, often denoted the "internal" rate of return. The RRI is the discount rate which equalizes the value of the investment with the present value of the flow of returns (profits gross of depreciation, or cash flows) which will result from the investment. It is considered by many economists as the most relevant approach to profitability (see, for example, FISHER F.M., McGOWAN J.J. 1983). Keynes' *marginal efficiency of capital* is a well-known example of such an expected rate of return on investment. (The RRI must be distinguished from

12. Louis Galambos provides a similar information concerning heterogeneity within the textile industry (GALAMBOS L. 1966).

Figure 8 RRI (•), RRI of an Investment Using a 20-Year Old Technology (◦), and Average Profit Rate (·), % (1869-1992)



the average profit rate in section 2.1, that is determined over the entire stock of fixed capital, independently of the year in which it has been invested.)

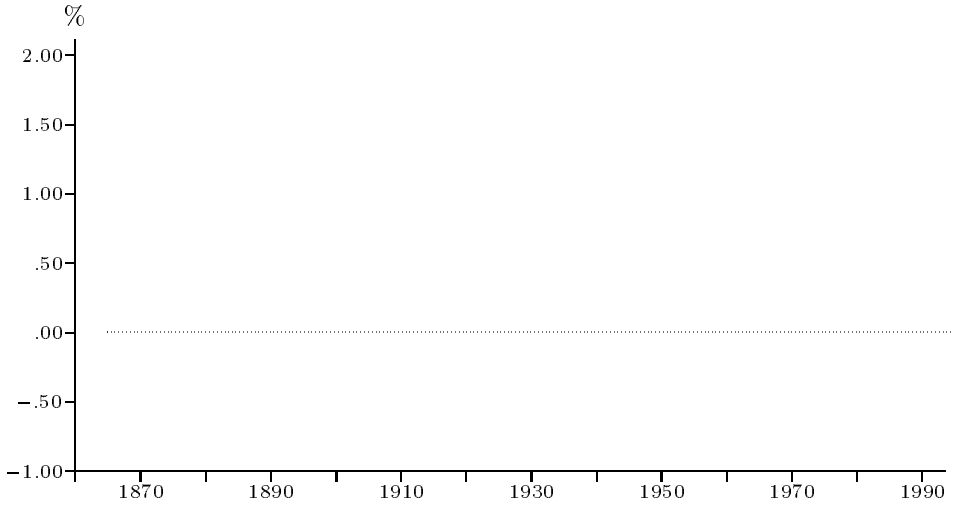
Figure 8 (•) displays the measure of the RRI determined with the model presented in DUMÉNIL G., LÉVY D. 1994(a) (as well as the average profit rate (·) for comparison). It is clear from this figure, that the 1920s coincided with a totally unusual and sudden recovery of the RRI, that soars from 22.3% in 1907, to 37.1% in 1942 (with a maximum growth rate in the late 1920s). This model also allows for an estimate of the consequences of lagging behind from the point of view of technology (taking account of the rise of wages). This is illustrated by the second curve (◦) that displays the rate of return of an investment which would use the best technology available 20 years before. Beginning in the late 1920s, it appears strikingly that the prospective yield of such an investment would have, actually, been negative.

2.4 OBSOLESCENCE AND ECONOMIC DISCARDS

In the determination of the stock of fixed capital by the *Bureau of Economic Analysis* (BEA), discards are estimated using given *discard schedules* (modified Windfrey schedules), that do not take account of the fluctuations in the general level of activity. In other words, firms are not supposed to discard more during recessions or depressions than during any other periods. It is, therefore, not possible to estimate the effect on discards of the fluctuations of the general level of activity from BEA's series, since they abstract from this phenomenon.

To our knowledge, no such series concerning "economic" discards are available. In DUMÉNIL G., LÉVY D. 1994(a), we suggest a "ball-park" estimate using the above vintage model. Figure 9 displays the difference between economic discards and accounting discards (according to Winfrey schedules, as in BEA's computations). This

Figure 9 Obsolescence : (Economic Discards – Accounting Discards) / Capital Stock, %



difference is expressed as a percentage of the capital stock. A vintage is definitively discarded (economic discard) as soon as it yields a *negative cashflow*. For example, 1% on the vertical axis means that 1% of the capital stock would have been discarded above the BEA's estimate of discard. Three variants of this calculation are presented, depending on the level of activity assumed : $u = 1$ ($\bullet$), $u = 0.9$ ($\circ$), and the actual value of u during this year ($\star$). When the ratio displayed in figure 9 is larger than 0, discards are above "normal" (obsolescence exists). A ratio smaller than 0, means that what has been prematurely discarded in the past does not need to be discarded later.

Two important findings emerge from these estimates :

1. *No threat of accelerated discards existed before the 1910s.* There is some evidence of an acceleration during the 1910s, which then rapidly rose to significant proportions. This phenomenon is typical of the 1920s and the following decade, and vanished again with World War II. It reflects the specific decline of the capability of older vintages of fixed capital to yield profit during those years.
2. *The effect of these accelerated discards is large.* With the actual value of u, more than 20% of the capital stock is discarded up to the end of World War II as a result of premature obsolescence, in addition to standard discards.

These results can be compared to empirical data concerning failures during the 1920s and 1930s.[13] As expected the percentage of failing firms was high during the depression : 1.35% each year, in the average, between 1930 and 1932 (to be compared to 0.42% during the 1950s). However, it is striking that this rate was already very large during the period 1922-1929 : 1.05%. This observation matches the above finding that premature obsolescence was already manifest during the 1920s.

13. See U.S. BUREAU OF THE CENSUS 1975, series V23, p. 912.

In spite of their crudeness, we believe that these computations resolve the *paradox* introduced in section 2.1. During the 1920s, the rapidity of technical change resulted in a very large heterogeneity of capital, which, in relation to the strong rise in labor cost, rendered a comparatively large segment of the economy obsolete, and "candidate" for discard, while prospective yields on the more advanced segments of the economy were florishing. This condition created a potential for a large contraction in output. *The contradiction between the size of the depression and the favorable features of technical change and of the profile of distribution is apparent.*

2.5 OTHER REAL EXPLANATIONS OF THE DEPRESSION

The analysis of the depression in the previous sections gave a prominent role to *real* determinants, *viz.* the strong heterogeneity of technology and the premature obsolescence of large segments of the capital stock, in connection with the rapidity of technical progress. The present section briefly discusses two other analyses of the depression, in which real determinants play the prominent role. Section 2.5.1 is devoted to Joseph Schumpeter's interpretation of the depression, and Section 2.5.2 to Keynesian analyses.

2.5.1 A Schumpeterian Interpretation of the Depression ?

There is a common aspect between our analysis of the real determinants of the depression in the previous sections and Joseph Schumpeter's theory of business fluctuations, since both analyses emphasize the role of technical change and innovations. However, two basic differences must be stressed :

1. Schumpeter's view that the Great Depression occurs during the downswing of a Kondratieff conflicts with our thesis that the depression interrupted a historical period in which very favorable technical and distributional trends were observed.
2. The explanation of the severity of the depression by Schumpeter relates to the superposition of *three* downswings — an interpretation that we, *a fortiori*, believe lacks merit :

   > [. . .] It is clear that the coincidence at any time of corresponding phases of all three phases will always produce phenomena of unusual intensity, especially if the phases that coincide are those of prosperity or depression. The three deepest and longest "depressions" within the epoch covered by our material — 1825-1830, 1873-1878, and 1929-1934 — all display that characteristic.[14].

2.5.2 Keynesian Analyses of the Depression

A similar emphasis is also placed on real determinants by studies of Keynesian inspiration (see, in particular, TEMIN P. 1976 and 1981). However, the central notion within Keynesian analyses is that of *exogenous demand*. The variations of the general level of activity are related to the exogenous shift of some component of demand.

We do not follow the Keynesians in their characterization of the depression. We agree with Keynesian economists that inappropriate levels of exogenous demand may

14. SCHUMPETER J. 1939, p. 172.

lead to a shift in the general level of activity (*downward*, as was the case during the late 1950s, or *upward*, as during the 1960s). *However, recessions or, a fortiori, depressions, cannot be interpreted as such shifts.* The sudden contractions of output during recessions or depressions are the expressions of the *destabilization of a short-term equilibrium*, or, what is equivalent, an *endogenous, instead of exogenous, shrinkage* of demand.[15]

The stability of the macroeconomy is a *dynamic* problem (see DUMÉNIL G., LÉVY D. 1993, Ch. 11). Centripetal and centrifugal forces are active within the economy. In the short term they ensure the stability of short-term equilibrium (an equilibrium by quantities which can be called a *Keynesian equilibrium*), more precisely the gravitation around this equilibrium, *under certain conditions*. If these conditions are not met, as is recurrently the case, equilibrium becomes unstable, and the macroeconomy overheats or suddenly collapses into a recession. Under such circumstances, individual reactions to disequilibria do not lead to the correction of disequilibrium, but to increasing disequilibrium. In a contraction of output, deficient levels of activity lead to diminished demand, that, in turn, induces new declines, in a cumulative movement downward.

During the Great Depression, such contractionary chains of events reached unusual proportions. Disesquilibrium, in the sense of already deficient output and demand, was followed by a further scaling down of activity *and closures of obsolete production units in an attempt to restore capacity utilization rates on the more efficient fractions of the capital stock*, entailing sharp reductions of investment, of demand for inputs, diminished payment of wages and, consequently, diminished demand from households, etc.[16]

Peter Temin denotes the Keynesian emphasis on exogenous demand, *the spending hypothesis* :

> According to the spending hypothesis, the Depression was generated by a fall in autonomous spending. At a given level of income, desired investment and consumption fell. Various reasons for this fall can be given, but the most frequently cited focus on construction and stock market. Construction — which was a substantial component of investment — fell because the housing stock exceeded the demand after 1925. And consumption fell sharply after 1929 in response to the stock market crash. The fall in these components of autonomous spending then produced a fall in real income and prices by the multiplier process. The Depression was severe because the fall in autonomous spending was large and sustained.[17].

Temin stresses the two explanations that coexist within modern Keynesian literature :

1. GORDON R.J., VEITCH J.M. 1986 test the Keynesian thesis of an *exogenous* decline of investment during the 1920s. The authors conclude that such a shift can be detected for one component of investment, *structures* :

15. This criticism of the Keynesian perspective does not apply to *Keynesian dynamic models* (see DUMÉNIL G., LÉVY D. 1994(d)).
16. Isaac Johsua also interprets the contraction of output during the depression in terms of instability (of an equilibrium). In his analysis, this destabilization relates to the shift from agriculture to industry, under the assumption that incomes from industry are more cyclical than incomes from agriculture (JOHSUA I. 1992).
17. TEMIN P. 1976, p. 9.

> [...] autonomous innovations [*in the econometrical sense of these terms*] *in structures investment are an important driving force in the business cycle.* [...] *The boom in structures investment between 1923 and 1929, the subsequent slump in the 1930s* [...] *can be viewed mainly as autonomous events...*[18].

2. The effect of the collapse of stock prices on output has also been studied. The idea is that this collapse diminished the wealth and liquidity of consumers, who then cut on their expenditures on durable goods and residential investment (MISHKIN F.S. 1978). Christina Romer suggests that the crash increased the uncertainty among the public, leading consumers to postpone their purchases of durable consumption goods, such as cars (ROMER C.D. 1990).

There is no denying the fact that the various components of demand may vary "exogenously" with time. We contend, however, that recessions and depressions do not mirror such variations.

The traditional explanation of the depression as a crisis of *underconsumption* is another typical example of spending hypothesis. This analysis was known, in the 1930s, as the man-on-the-street explanation of the depression. It was given a theoretical content at the *Brookings Institution* :

> Our study of the productive process led us to a negative conclusion : no limiting factor or serious impediment to a full utilization of our productive capacity could there be discovered. Our investigation of the distribution of income, on the other hand, revealed a maladjustment of basic significance. Our capacity to produce consumer goods has been chronically in excess of the amount which consumers are able, or willing, to take off the market, and this situation is attributable to the increasing proportion of the total income which is diverted to savings channels. The result is a chronic inability [...] to find market outlets adequate to absorb our full productive capacity.[19].

This explanation of the depression is also central in the French School of *Régulation*, which, in relation to this analysis, emphasized the importance of the *wage relation* (see AGLIETTA M. 1979, BOYER R., MISTRAL J. 1978, LIPIETZ A. 1979).[20]

We already stressed in section 1.2 that it is difficult to locate such a bias in income distribution or within the components of demand during the 1920s, and already questioned this view within several earlier studies (see DUMÉNIL G., GLICK M., RANGEL J. 1986 or DUMÉNIL G., LÉVY D. 1989).[21] Temin also rejects this analysis of the depression :

> The concept of underconsumption has been abandonned in modern discussions of macroeconomics, although the idea that consumption was depressed before the onset of the Depression by an unfavorable distribution of income occasionally reappears. A glance at Table 1, above, however, shows that the ratio of consumption to national income was not falling in the 1920s. An underconsumptionist view of the 1920s is therefore untenable.[22].

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18. GORDON R.J., VEITCH J.M. 1986, p. pp. 323-324.
19. MOULTON H.G. 1935, p. 45-46.
20. See also DEVINE J. 1983 and HOWARD M.C., KING J.E. 1990.
21. See also BRENNER R., GLICK M. 1991.
22. TEMIN P. 1976, p. 32.

3 - THE STOCK MARKET AND THE DEPRESSION

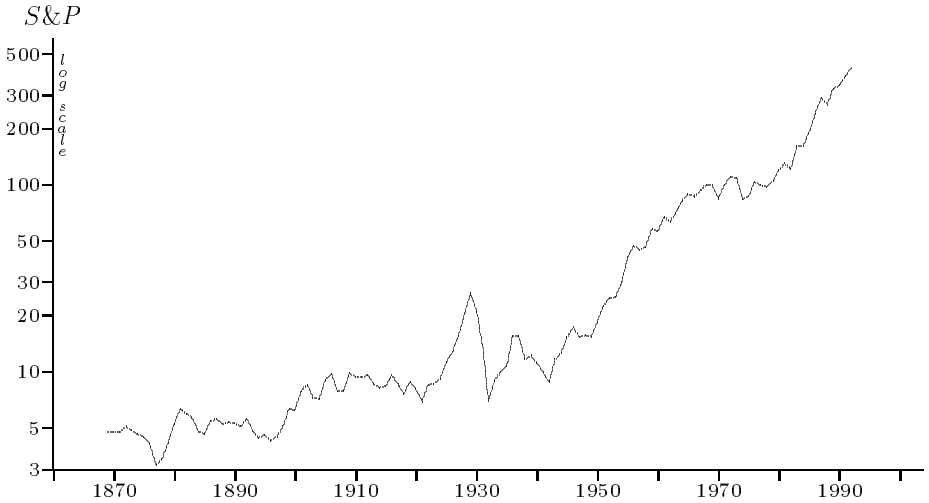
This section focuses on the relationship between the above analyses and the dramatic profile of stock prices in the 1920s and 1930s. There are two aspects to this investigation. First, there is a relationship between the *rapidity and favorable features of technical change* and the rise of stocks during the 1920s, that fueled a wave of speculation during the last two years. Second, the effects of the crash were rapidly corrected and, in spite of the dramatic character of these movements, it does not appear that they played a prominent role in the explanation of the depression.

Section 3.1 first documents the movement of stock prices. Section 3.2 is devoted to the real determinants of the rise of stock prices during the 1920s. Speculation is considered in section 3.3. Last, section 3.4 discusses the impact of the crash.

3.1 THE RISE AND FALL OF THE STOCK MARKET

A very well-known feature of the 1920s and the depression is the rise and collapse of the stock exchange. The sharp increase in stock prices into the 1920s and the subsequent decline are clearly illustrated in figure 10 which displays the Standard and Poor index of the stock market over the period 1869-1992. Between 1922 and 1929, the index grew by 209.4%; between 1929 and 1932, it declined by 73.4%. In other words, it more than tripled, and was later nearly divided by 4! Despite a number of other rather sudden variations, these rise and fall appear quite exceptional.

Figure 10 Standard and Poor Index of Stock Prices, 1941-43=10 (1869-1992)



Another approach to the price of stocks uses the ratio of the market value of shareholders' equity to its value in firms' own accounts, known as *Tobin's Q*.[23] This ratio rises from 0.76 in 1922 to 1.22 in 1929! (Such high values are not absolutely exceptional: The Q-ratio was close to 1 before World War I and in the middle of the 1960s.)

3.2 REAL DETERMINANTS AND THE RATE OF RETURN ON INVESTMENT

There has always been a tradition in the economic literature stressing the importance of *real determinants* of the rise of the price of stocks during the 1920s. This tradition goes back to the 1930s and, in particular, to the work of Irving Fisher, who wrote the following in the aftermath of the crash[24]:

> My own impression has been and still is that the market went up principally because of sound, justified expectations of earnings, and only partly because of unreasoning and unintelligent mania for buying.[25].

This interpretation echoes the favorable features of our intermediate period described in section 2. In its exact qualification of these new favorable developments, Eugene White, in reference to Fisher and another contemporary writer, Charles Amos Dice, lists the following factors[26]:

> [...] the systematic application of science to industry, the development of modern management techniques, and mergers that gained economies of scale and scope[27].

Although White stresses the speculative character of the last two years, he links the final increases to corporations, not necessarily distributing dividends, but engaged in new advanced technologies and management. The boom was particularly pronounced within Public Utilities, such as Electricity.

The RRI presented in section 2.3, and displayed in figure 8, provides a direct illustration of the existence of favorable prospective yields for new investment. Over the period of more than 120 years considered in this study, never again has a similar signal been sent to the market!

3.3 STOCK PRICES IN 1929 : SPECULATION ?

Within modern studies, speculation is approached in terms of "bubbles," and speculation described as a characteristic feature of 1928 and 1929.[28] Already in the

23. Computation from GOLDSMITH R.W., BRADY D.S., MENDERSHAUSEN H. 1956. Q is defined as the ratio *Stocks (held in the total economy) at market prices / Equity (for all corporations)*.
24. A similar view can be found, more recently, in SIRKIN G. 1975.
25. FISHER I. 1930, quoted by WHITE E.N. 1990, p. 72.
26. These features perfectly match the interpretation of our intermediary period in section 7.1 below, in relation to the transformation of management.
27. WHITE E.N. 1990, p. 69.
28. The notion of a "stock mania" in the 1920s was central in the works of John Kenneth Galbraith (GALBRAITH J.K. 1954).

late 1920s, the Fed was concerned about speculation on the stock market (see section 3.4) ; enterprises themselves were aware of the high price of stocks and issued new shares to repurchase their own bonds ; the spread between the interest rate on loans on securities and rates on other short-term loans was increasing, expressing a growing concern about speculation.

The issue in this discussion is whether the stock market was actually dramatically "high" in 1929. Obviously, the answer depends on the exact criterion adopted, which refers to an implicit analysis of the determinants of stock prices.

Eugene White (WHITE E.N. 1990) links stock market indexes to the flow of dividends payed by corporations (what he calls "fundamentals"). He shows that both prices and dividends, for corporations in the Dow Jones Industrial Index, moved up in concert from 1922 to the end of 1927, whereas stock prices soared compared to dividends in 1928 and 1929. From this observation he infers that speculation was manifest in the last two years. This analysis assumes a causal relationship from dividends to stock prices, and implicitly assumes that corporate dividend policies were actually steady and sound.[29]

J. Bradford De Long and Andrei Shleifer take a different approach to assessing the speculative character of the boom (BRADFORD DE LONG J., SHLEIFER A. 1991). They compare the stock prices of closed-end mutual funds to the price of their portfolio. They "*conclude that the stocks making up the S&P composite were priced at least 30 percent above fundamentals in late summer 1929.*" (p. 675).

It is also useful in this analysis to refer to Tobin's Q. This approach is based on the view that stock market indices also reflect expectations on future yields, not only the replacement cost of capital. As was noted in section 3.1, the Q-ratio in 1929 (1.22) appears quite large, actually the largest figure in the period covered by our investigation, and implies sanguines expectations concerning future prospects.

Overall, these observations suggest a degree of speculation in the last years, but also stress the existence of significant underlying trends reflecting actual favorable prospective yields.

3.4 THE STOCK MARKET AND THE UNDERSTANDING OF THE DEPRESSION

The present section considers the movements of stock prices in relation to the business cycle, and the collapse of output at the end of 1929.

The recession actually began prior to the crash in October : The index of industrial production (figure 6) peaked in February 1929 (or August 1929 in the Fed index) and then declined. Consequently, the recession should not be blamed on the stock market crash ; rather the causation is reversed.

The effect of the stock market on the business cycle was actually *indirect*. As well documented in WICKER E.R. 1966, and several other studies such as WHITE E.N. 1990, the Board of the Federal Reserve was concerned about speculation on the stock

29. The observations made in section 4.3 below, concerning the distribution of dividends, qualify to some extent White's analysis by showing that corporate dividend policy is actually a complex issue, and that speculation may well have started earlier for smaller corporations.

market. Although it was not clear that the control of stock market speculation was part of the responsability of the Fed, a debate arose within the Board concerning the opportunity to tighten monetary policy and, in particular, to contract the brokers' loans that financed stock transactions. Some members of the Board were worried about the possible effect of a credit restriction on the productive system. Eventually, the policy took the form of what Wicker calls (p. 129) the "*Miller-Hamlin Policy of Direct Pressure*" (moral suasion to limit brokers' loans, and a rise of the discount interest rate, from 3.5% to 5% in 1928, and up to 6% just before the crash). All interest rates rose at this point.

After the collapse of the stock market, any negative consequences were considerably alleviated by early action of the New York city banks, with the active support of the Federal Reserve Bank of New York which allowed them to discount as much as needed. Short-term interest rates declined rapidly. As a result of this prompt action, there was no banking panic and very few brokers failed (see WHITE E.N. 1990 and RAPPOPORT P., WHITE E.N. 1993). Consequently, the stock market crash does not explain the severity of the financial crisis to which we now turn.

4 - THE FINANCIAL CRISIS

As the economy sunk deeper into the recession during the last months of 1931, a new pattern of events emerged, emphasizing the importance of financial mechanisms.[30] Two banking panics had already occurred in 1930 and 1931, but new trends were now apparent. As contended in section 1.2, up to 1931, the dynamics of the variables thus far can be considered as typical of business-cycle fluctuations. What is at issue now is a new course of events specific to the depression.

The new situation after 1931 can be called a *financial crisis*. Under this umbrella concept, we include two distincts elements : a *credit-supply crisis* and a *banking crisis*[31] :

30. See CURRIE L. 1934, HART A.G. 1948, FRIEDMAN M., SCHWARTZ A. 1963(a), WICKER E.R. 1966, and CHANDLER L. 1970 and 1971.

31. We borrow the term *credit-supply* from CALOMIRIS C.W., HUBBARD R.G. 1989, where the crisis is described as "*credit-supply disturbances*" (p. 434). The expression *debt crisis*, as used by Bernanke (BERNANKE B.S. 1983, p. 261), should be considered equivalent to that of *credit-supply crisis*. The notion of *financial crisis* is often given a broad content, similar to that outlined above : "*the financial crises (in which we include debtor bankruptcies as well as the failure of banks and other lenders)*" (BERNANKE B.S. 1983, p. 257) (see also MISHKIN F.S. 1992). Various explanations of financial crises, in this broad sense, have been suggested : "*An old view recently formalized in modern terms attributes financial crises to speculative bubbles in selected asset prices.* [...] *Other theories relate financial instability to exogenously induced monetary instability or endogenous economic fluctuations. A monetarist interpretation links banking panics to prior monetary disturbances, whose real effects they aggravate (M. Friedman and Schwartz 1963a, 1963b ; Cagan 1965). Another approach, which combines elements of early and Keynesian ideas, argues that crises result from long expansions in real investment characterized by overconfidence and overaccumulation of (to a large extent, short-term) debt. Such expansions are terminated by cutbacks in credit supply, debt deflation, and debt liquidation (Minsky 1977, 1980; Sinai 1976: Eckstein and Sinai 1986).*" (ZARNOWITZ V. 1992, p. 110).

	1929/30	1930/31	(1929/31)	1931/32	1932/33	(1931/33)
M2	−2.2	−7.7	(−9.8)	−16.5	−11.7	(−26.3)

1. We call credit-supply crisis (or *credit crisis* for short) a situation in which potential lenders, the banking system in particular, add to the recession by an excessive contraction of loans, in spite of the demand emanating from candidate borrowers, and rather "easy" monetary policy. In this latter respect, credit-supply crises undermine the ability of monetary policy to fuel recovery.
2. By *banking crisis*, we mean the collapse of the banking system, manifested in the multiplication of failures.

Obviously, the two phenomena are connected in several important respects, but a credit-supply crisis may occur without a banking crisis, and conversely.

The present section is devoted to the analysis of the financial crisis, and its relationship to the real determinants of the depression discussed earlier :

1. Section 4.1 documents the existence of significant breaks within the profile of the major macro variables at the end of 1931, the symptoms of the outbreak of the financial crisis.
2. Section 4.2 is devoted to the first and essential component of the financial crisis, the credit-supply crisis proper, and its feedback effect on the contraction of output.
3. Section 4.3 relates the credit crisis to the financial heterogeneity prevailing among economic agents in the 1920s and 1930s, thus, establishing a crucial connection with the analysis of technical heterogeneity in section 2.2.
4. Section 4.4 shows how the credit crisis developed into a *banking crisis*.
5. Finally, section 4.5 provides a few elements concerning the international scope of the financial crisis.

4.1 THE OUTBREAK OF THE FINANCIAL CRISIS

An examination of basic macroeconomic variables, such as output, prices, and money stocks, points to the existence of a *break* during the second half of 1931 (or at the transition between 1931 and 1932). This has been clearly identified by a number of students of the period :

1. This break is, first, evident from an examination of the profile of industrial production in figure 6, or in that of GNP. A break is observed at the transition between 1931 and 1932. The decline of industrial production between 1931 and 1932 (−22.0%) is larger than that between 1929 and 1931 (−20.9%) :

	1929/30	1930/31	(1929/31)	1931/32	1932/33	(1931/33)
Ind. Prod.	−14.1	−7.9	(−20.9)	−22.0	7.7	(−16.0)
GNP ($87)	−9.6	−8.9	(−17.6)	−14.7	−2.9	(−17.2)

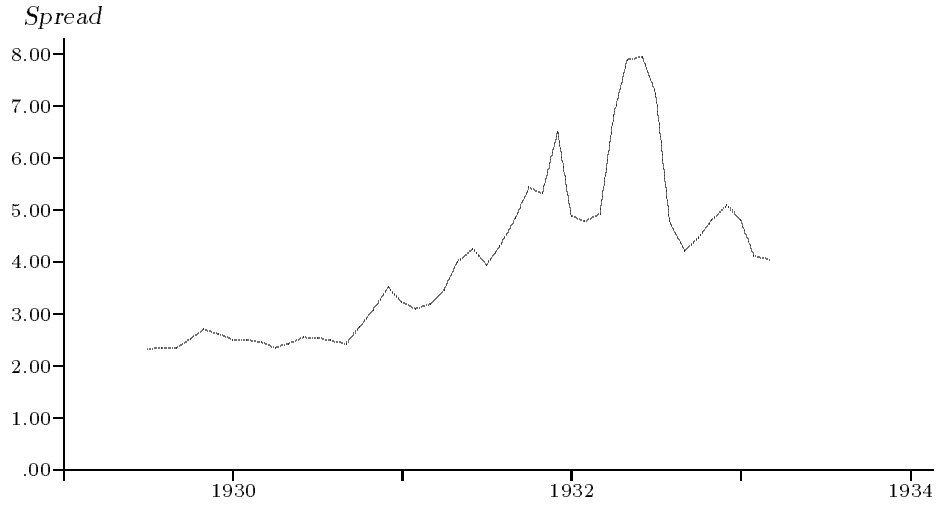
2. The decline of the money stock is suddenly accelerated from 1931 to 1932 :

3. The real stock of money, M2, deflated by the GNP deflator or the Consumer Price Index (CPI), *rises* between 1929 and 1931, and then *declines* :

	1929/30	1930/31	(1929/31)	1931/32	1932/33	(1931/33)
M2/GNP defl.	1.7	1.6	(3.3)	−5.3	−9.9	(−14.6)
M2/CPI	0.3	1.2	(1.5)	−6.9	−6.9	(−13.3)

4. The ratio *Currency / Deposits* remains approximately stable up to 1930, then sags sligthly, and declines rapidly during the second semester of 1931 (FRIEDMAN M., SCHWARTZ A. 1963(a), table B-3) :

Figure 11 The Spread : Baa-Rated Corporate Bonds − Long-Term US Government Bonds, % (July 1929-March 1933)



The | corresponds to January

.

5. The rates charged to "risky" borrowers rise suddenly. For example, the rate on *Baa-Rated Corporate Bonds* averaged 6.25% between 1922 and 1929, and is equal to 5.94% in 1929. In 1930 and 1931 it rises slowly to 5.78% and 7.36%, respectively. In 1932, it leaps to 11.52%.
6. The rates on public securities, a safe investment, falls to nearly zero.
7. Consequently, the spread among interest rates reaches a record height. Figure 11 displays the difference *Rates on Baa-Rated Corporate Bonds − Rates on Long-Term US Government Bonds* which rises above 4% in the second half of 1931, and will remain large for a considerable period of time.

The importance of the break in late 1931 can be detected in the dynamics of the variables. A VAR model is presented in BURBIDGE J., HARRISON A. 1985, with four variables : money (currency plus deposits), industrial production, prices (wholesale

price index), and interest rate (commercial paper at 4-6 months). Using a method of *historical decomposition*, this study distinguishes between endogenous mechanisms (such as the chain : $production \rightarrow money \rightarrow production$) from exogenous influences (such as a change in monetary policy, or a change in the behavior of banks). It is shown that this exogenous component becomes crucial at the beginning of 1932, thus, stressing the existence of a significant break in the relationship among variables.

As we will contend in section 4.2.3, the observation of this break reveals the emergence of new monetary and financial mechanisms, and militates in favor of a significant feedback effect of finance on the contraction of output, in addition to the real determinants introduced earlier.

Table 2 : **Major Events : 1929-1933**

Feb. or Aug.	1929	Peak of Industrial Production
October 23,	1929	Stock Market Crash
June 17,	1930	Hawley-Smoot Tariff Act
Oct.-Dec.	1930	First Banking Panic
March-June	1931	Second Banking Panic
May	1931	Run on the Kredit-Anstalt (Austria)
September	1931	Britain Leaves Gold
		(Fall of the Pound, from \$4.86 to \$3.25 in Dec.)
Sept.-Oct.	1931	Run on the Dollar
October	1931	Increase of the Discount Rate
		(1.5% to 2.5% on Oct. 9 ; to 3.5% on Oct. 16)
February	1932	Glass-Steagall Act
April-Aug.	1932	Open-Market Purchases
Jan.-March	1933	Third Banking Panic
March 6,	1933	Nationwide Banking Holiday

4.2 THE CREDIT-SUPPLY CRISIS

The definition of a *credit-supply crisis* given above stresses the existence of a disruption of credit mechanisms, expressing a reluctance to lend by the banking system. The contraction of credit is not caused by the absence of borrowers but, rather, by the resistance of lenders. *Credit rationing* is, therefore, crucial to a credit-supply crisis.

Even during the expansion phases of the business cycle, credit is rationed, and credit rationing is a general phenomenon. This notion is central within many new-Keynesian studies of credit mechanisms (STIGLITZ J.E., WEISS A. 1981), and is more and more widely used in the analysis of business cycles. However, the concept of *credit rationing* was not invented by new Keynesians. It was already implied in the classical analysis of investment and capital mobility (SMITH A. 1776, Ch. 7, RICARDO D. 1817, Ch. 4, MARX K. 1894, Ch. 10), and has never disappeared from the economic literature (see CALOMIRIS C.W., HUBBARD R.G. 1989 for a list of economists who wrote in the late 19th century or early 20th century). In the analysis of the Great

Depression, a useful reference is, for example, HART A.G. 1948, where a section is entitled "*Selection of Sound Assets ; Credit Rationing*".[32]

Section 4.2.1 documents the reluctance to lend proper. Section 4.2.2 analyzes the origin of the credit crisis. Last, section 4.2.3 discusses the relationship between the financial crisis and the contraction of output.

4.2.1 The Reluctance to Lend

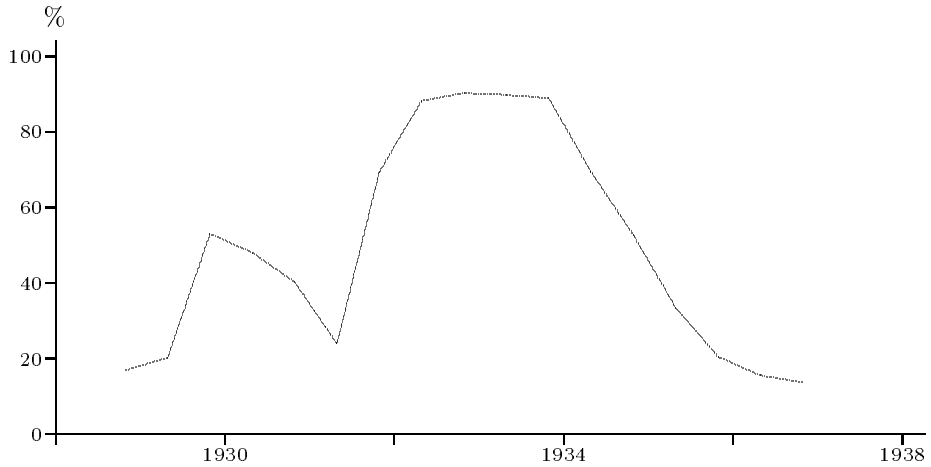
The existence of a credit-supply crisis is well documented in the literature, in particular in BERNANKE B.S. 1983. This study cites several analyses from the 1930s or 1940s :

1. Lewis Kimmel's survey (KIMMEL L.H. 1939) provides a percentage of the refusal to lend, depending on the size of firms, for four classes of firms depending on the value of capitalization : very small firms (capitalization less than $50,000), small firms ($50,001-$500,000), medium firms ($500,001-$1,000,000), and large companies (capital over $1 million). This study shows that "*refusal or restriction of bank credit*" in 1932 for the four groups were respectively : 41.3, 22.2, 12.5, and 9.7% (BERNANKE B.S. 1983, p. 273).
2. A study by Stoddard (STODDARD W.L. 1940) shows that among a sample of 600 companies with high rating, "*75 percent of the firms could not obtain capital or long-term loans requirement through regular market.*" (BERNANKE B.S. 1983, p. 273).
3. HART A.G. 1938, also cited by Bernanke, states that Banks and Life Insurance Companies deliberately "*practically stop*[*ped*] *making mortgages loans, except for renewals*" (HART A.G. 1938, p. 163).

Concerning mortgages, the situation is analyzed in greater detail in BAUM C.F., THIES C.F. 1989. That study displays, in its figure 3 (see figure 12), the results of a survey conducted between 1928 and 1936. The exact series presented is the *percent of real estate boards reporting "loans seeking money"*. From a percentage of approximately 17% in November 1928, the proportions of such loans seeking money rises to about 50% at the end of 1929, and then declines steadily to 24% in May 1931, indicating a progressive relaxation. This first fluctuation relates, we believe, to the tightening of credit conditions during the last stage of the expansion, and the following relaxation (see section 3.4). Then, the percentage soars, quite sharply, to 70% in 1932, and reaches a two-year long plateau at nearly 90%, before beginning to diminish to the end of the survey in 1936. This profile provides important information concerning the timing of the credit crisis, and is consistent with the break described

32. The importance of credit rationing is very well described by Hart as a general feature of our economies : "*The effect of "credit rationing" is more pervasive. From the borrower's standpoint, his ability to borrow depends largely on how the banker's rules of thumb happen to fit his case. Most of the firms in the United States probably feel that they are really entitled to borrow more than banks would lend them ; and many would probably be glad to borrow more than they do, at the interest rates they are charged on the loans they get. We must beware of assuming that the limitation on the amount borrowed is willingness to pay the interest the bank charges. This is the case for some borrowers ; but there is always (as economists put it before the Great Depression) an "unsatisfied fringe" of would-be borrowers who are not allowed to borrow, and of actual borrowers who want more.*" (HART A.G. 1948, pp. 60-61).

Figure 12 Proportions of Mortgage Loans "Seeking Money", % (1929-1936)



From BAUM C.F., THIES C.F. 1989.

in section 4.1: The major tightening — the credit-supply crisis — occurred at the end of 1931, and these observations clearly separate this event from the first tightening in 1929.

The same diagnosis and dating is set forth by Currie: "*The extremely* abnormal *loss of confidence in 1932 led to a greater decline in new borrowings than had probably ever occurred in a previous depression.*" (CURRIE L. 1934, p. 147). For Currie, "*the worst period of contraction* [*was*] *the latter part of 1931 and the first part of 1932.*" (p. 147).

The credit-supply crisis had three important effects:

1. The reluctance of banks to lend was reflected in a shift in their balance sheet toward safer assets, such as Treasury securities.
2. Interest rates on certain categories of loans rose sharply, while others actually declined to extremely low levels (see figure 11).

   These two aspects of the credit crisis are well described in BAUM C.F., THIES C.F. 1989:

   > The changes [*in banks' balance sheets*] from 1931 to 1933, however, were unprecedented. An additional 11 percentage point shifted from loans to investments, and within the category of investments there was a shift to U.S. Treasury securities. Private sector loans, mortgage and bonds were liquidated in favor of cash and secondary reserves. This shift to cash and secondary reserves increased the spreads in the structure of interest rates, lowering rates on liquid securities and raising rates on illiquid securities.[33].

3. As can be easily guessed, these two aspects of the crisis had a quite negative impact on the profits of banks.

33. BAUM C.F., THIES C.F. 1989, p. 492.

4.2.2 The Causes of the Credit-Supply Crisis

The major cause of the reluctance to lend (to enterprises as well as to households) was the very high risk associated with such activities. The crucial factor was "*the extraordinary rate of default*" (BERNANKE B.S. 1983, p. 266). Hart states, for example, that "*about 45 percent of farmers with mortgages (owing 52 percent of the mortgage debt) were in default at the beginning of 1933*" (HART A.G. 1938, p. 84). Under such circumstances, and in relation to the large financial heterogeneity documented in section 4.3 below, the task of discriminating among potential borrowers was highly problematic.[34]

Thus, the credit crisis appears to be a *consequence* of the recession (the decline of output and income), and its distinct impact on various categories of agents.

The increased riskiness of lending must also be connected to the severity of deflation, and this analysis echoes Fisher's theory of *debt deflation* (FISHER I. 1933).[35] Deflation considerably increases the real rate of interest, as it becomes very difficult for borrowers to pay back their debt when their cashflow reflects the declining general price level :

> By March, 1933, liquidation has reduced the debts about 20 per cent, but had increased the dollar about 75 per cent, so that the *real* debt, that is the debt as measured in terms of commodities, was increased about 40 per cent.[36][37].

Hart stresses the same phenomenon :

> The great deflation of 1929-1932 cut the national income in half. Many debts which were "sound" in 1929 were thus made "unsound". The debtors could neither pay them off out of income nor settle them by selling off the property pledged as security. Thus, bank credit became "frozen".[38].

It is interesting to notice that the decline of prices (GNP deflator and CPI) accelerates approximately one year before the break described in section 4.1, and, thus, foreshadows the occurrence of the credit crisis :

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34. This is actually Bernanke's analysis of the credit-supply crisis : "*The basic premise is that, because markets for financial claims are incomplete, intermediation between some classes of borrowers and lenders requires nontrivial market-making and information-gathering services. The disruption of 1930-1933* [...] *reduced the effectiveness of the financial sector as a whole in performing these services. As the real costs of intermediation increased, some borrowers (especially households, farmers and small firms) found credit to be expensive and difficult to obtain.*" (BERNANKE B.S. 1983, p. 257).

35. The debt deflation theory assumes that deflation is not anticipated, neither by lenders, nor by borrowers, as was the case during the depression : "[...] *the overwhelming conclusion is that most of the dramatic deflation that characterized the Great Depression caught people of the day by surprise* [...] *One instead is led to focusing on the potential role of nominal debt contracts in an environment of unanticipated deflation stressed by Fisher and Bernanke.*" (HAMILTON J.D. 1992, p. 167). See also HAMILTON J.D. 1987.

36. Fisher probably overstates the amplitude of the phenomenon. In addition, "*according to Evans Clark (1933), the ratio of debt service to national income went from 9% in 1929 to 19.8% in 1932-1933.*" (BERNANKE B.S. 1983, p. 260).

37. FISHER I. 1933, p. 346.

38. HART A.G. 1948, p. 80.

	1929/30	1930/31	(1929/31)	1931/32	1932/33	(1931/33)
GNP defl.	−3.8	−9.2	(−12.6)	−11.9	−2.0	(−13.6)
CPI	−2.5	−8.8	(−11.1)	−10.3	−5.1	(−14.9)

4.2.3 The Interconnexion between the Credit-Supply Crisis and the Contraction of Output

The link between the credit-supply crisis and the contraction of output is reciprocal :

1. The credit-supply crisis resulted from the continuing decline of output and deflation, and increasing defaults that progressively undercut the confidence of banks. In this respect, the responsability of the *real determinants* of the depression is crucial.
2. The feedback effect of the rationing of credit supply on demand and output is easy to understand.[39]

The connection between lending and demand is striking in the case of mortgage loans discussed earlier. The contraction of credit (as revealed in figure 12) coincided with the sudden collapse of the building industry at the end of 1931 and early 1932. Although the slide of construction had begun even prior to the recession, employment in building collapsed from 1.5 million to 700,000 within a few months (see THE BROOKINGS INSTITUTION 1936, p. 137), precisely during this period.

This feedback effect of the credit-supply crisis on the contraction of output conflicts with the *laissez-faire* view that the depression would correct for the unsound situation of credit, and lead to an autonomous restoration of prosperity, as well understood by Hart :

> We get the same answer again if the starting "imbalance" is an "unsound financial position" of debtors. Pressure on debtors to pay off their debts does not reduce outstanding debts, all right. But such pressure cuts down the volume of business, and thus cuts into the incomes on which the debtors' credit standing depends. Thus, successively in 1930, in 1931, and in 1932 — after one, two, and three years' effort, respectively, to cure the unsound credit situation of 1929 — the credit situation was more unsound than ever. Financial conditions for prosperity were undermined, not built up, by the use of depression as a corrective.[40].

This view is central in Fisher's debt deflation theory, in which deflation sparkles the credit crisis, and the credit crisis leads to more deflation, in a cumulative movement downward (see FISHER I. 1933).

39. As stated by Bernanke : "*The effects of this credit squeeze on aggregate demand helped convert the severe but not unprecedented downturn of 1929-1930 into a protracted depression.*" (BERNANKE B.S. 1983, p. 257).
40. HART A.G. 1948, p. 342-43.

4.3 CREDIT RATIONING AND FINANCIAL HETEROGENEITY

Many among the various examples of credit rationing given in section 4.2.1 point to the importance of financial heterogeneity.[41].

Financial heterogeneity is relevant to the analysis of the Great Depression in two major respects :

1. Financial heterogeneity is crucial to the understanding of the credit crisis. The existence of potential borrowers should not be assessed only on the basis of aggregate variables. Hoarding of *extra precautionary balances* of cash and *liquidity squeeze* may coexist in the economy, leading to the "credit deadlock" expressed in the credit-supply crisis : *Financially sound agents do not want to borrow, and banks do not want to lend to unsafe borrowers.*
2. Financial heterogeneity in the 1920s and 1930s relates directly to technical heterogeneity among enterprises, and echoes our analysis in section 2.2. In the 1920s and 1930s, the technical heterogeneity between small and large corporations, and the associated quite distinct profit rates — a profit-rate heterogeneity — were clearly reflected in a corresponding *financial heteregoneity*.

It is quite intuitive that satisfactory profitability levels are a prominent factor of the *liquidity* and *indebtness* of firms, and large corporations held large balances of cash, whereas smaller firms suffered from deficient liquidity and were eager to borrow.

The disparate *liquidity* positions of large and small firms is well documented by LUTZ F.A. 1945, and more recently by HUNTER H.M. 1982. The latter study is illustrative of the two introductory remarks above concerning the risks associated with aggregation, and the large financial heterogeneity among enterprises during the interwar period. Three main conclusions are reached :

> 1. Cash managers of very large firms in the 1920s and 1930s responded to business downswings by substancially increasing their ratios of cash balances to receipts.
> 2. The corporate population is not homogeneous : in both periods [1931-1932 and 1937-1938] the liquidity ratios and financial behavior of the top 1 percent of firms were very different from those of the bottom 99 percent. Because the top 1 percent's share of receipts and cash was about one-half or more of the total, their behavior dominated the response of the sector as a whole both to falling sales and to interest rates.
> 3. Smaller firms probably suffered a severe liquidity crunch during the episodes of restricted monetary policy that were associated with the downswings of 1931-1932 and 1937-1938. Although big firms were able to raise their cash-to-receipt ratios as sales and receipts fell, other firms were apparently unable to maintain normal cash ratios.[42].

Laughlin Currie adds an interesting element to this analysis concerning *indebtness*. Small firms had considerably increased their debt during the 1920s (1922-1929) :

41. This connection between credit rationing and financial heterogeneity is clearly identified in CALOMIRIS C.W., HUBBARD R.G. 1990. See also FAZZARI S.M., HUBBARD R.G., PETERSEN B.C. 1988.
42. HUNTER H.M. 1982, p. 883-884.

> It was inferred, moreover, from this study that the great bulk of commercial loans were being made to farmers and relatively small business concerns.[43].

In addition, he explicitly links this growing indebtness to the deficient performances of smaller firms :

> [. . .] it is highly significant, in view of the apparent trend toward large scale enterprise, that the companies that were growing most rapidly and should on that account require larger loans, actually reduced them to a nominal figure, while companies whose earnings were low or declining were carrying heavy bank loans and in some cases actually increasing them.[44].

The financial heterogeneity between small and large corporations was also reflected in their distinct dividend policy. This is clearly documented in DOBROVOLSKY S.P. 1951. This study contrasts, for manufacturing corporations, the constancy of retained earnings during the 1920s and the simultaneous rise of the flow of dividends (*i.e.*, the rise of the ratio *dividends / profits*). It is shown that this divergence is particularly striking within *small and medium sized* corporations, where dividends rose in spite of the constant decline of retained earnings. Note that this observation matches very well the findings above concerning the liquidity squeeze of smaller firms.

The interpretation of this distinct dividend policy of small companies is not obvious. One hypothesis is that they may have tried to "follow" a movement initiated within larger firms, in a desperate attempt to attract financial investment by generous distribution. Another possible explanation is that financiers were actually withdrawing as much capital as they could from enterprises in which profit outlooks were very low (a form of disinvestment).

A similar financial heterogeneity prevailed within *households*. As clearly exemplified by the famous rise of wages at Ford, some segments of the labor force had witnessed considerable progress of their purchasing power, whereas other had not. This growing income inequality during the 1920s is a central element in Galbraith's analysis of the depression (GALBRAITH J.K. 1954). During the depression itself, real wages were maintained for employed persons, and the purchasing power of unemployed was, indeed, very low !

4.4 THE BANKING CRISIS

Section 4.4.1 presents the final banking crisis in 1933 as a "complication" of the credit-supply crisis. Then, section 4.4.2 is devoted to Friedman and Schwartz's analysis in which banking crises are given the central role.

4.4.1 A Complication of the Credit-Supply Crisis

By *banking crisis*, we refer to a situation in which the survival of the banking system is jeopardized by the failure of banks, bank runs, and their generalization, known as banking panics. As stated earlier, banking crises differ from credit-supply crises. A banking crisis may develop independently of a credit-supply crisis. A run

43. CURRIE L. 1934, p. 41.
44. CURRIE L. 1934, p. 41.

may occur while credit mechanisms are not disrupted. In the 19th century banking crises were recurrent (see GORTON G. 1988). Panics usually followed the failure of a large industrial or financial corporation. The confidence of depositors was shaken, leading to a potentially general run. Under such circumstances, the survival of banks is endangered by deficient reserves to confront withdrawals : The basic issue is that of liquidity.

The crucial link in the analysis of the Great Depression is that a credit-supply crisis may provoke a banking crisis. Since the normal functioning of the banking system is affected during a credit-supply crisis, the profitability of banks is diminished (see section 4.2.1), and their survival becomes problematic. Customers are informed of the deterioration of the financial situation of banks, and begin to withdraw their deposits. In particular, a protracted credit-supply crisis will naturally degenerate into a banking crisis. However, this is not necessarily the case. For example, a credit-supply crisis developed in Canada during the depression, but no banking crisis.[45]

These mechanisms, in which the Fed, commercial banks, and their customers were involved, were well understood by Harrisson, the Governor of the New York reserve bank. *The origin of the restricted availability of credit must be basically located in the relationship between commercial banks and their customers, not in the relationship between these banks and the Federal Reserve* ; the Federal Reserve made reserves available to the banking system, but this was not sufficient to stimulate credit supply and cure the deteriorating situation of banks. Elmus Wicker provides an interesting summary of Harrison's testimony before a House Subcommitte :

> When conditions are "normal," Harrisson stated, the creation of excess reserves puts pressure on banks to make more loans and investments. But he maintained that when these conditions did not prevail "it is a futile thing for the reserve banks [*to expand open-market purchases*] unless the money we put out is going to operate as a basis for expansion of bank credit." [...] The normal mechanism, he argued, had broken down and excess reserves tended to pile up because the confidence of the banking community had suffered a severe shock — the result of a combination of circumstances : bank failures, panicky depositors, and threat of withdrawals of foreign deposits. Reserves injected through open-market operations simply supplied the banker demand for increased liquidity. Harrison concluded 'you then have, in spite of the excess reserve, a resistance to its use which the reserve system cannot overcome'.[46].

The sequence of banking crises during the depression is well known. A first crisis occurred in October 1930 ; the second in March 1931. The third crisis, in January 1933, led to the final *banking holiday* of March 6, 1933. These crises lasted 2 or 3 months.

It is useful to distinguish between the two first crises and the final crisis in 1933. In 1930 and 1931, the financial crisis was still in its preliminary steps, and the two first panics are, in our opinion, in line with those which accompanied recessions in the 19th and early 20th century (see GORTON G. 1988). Conversely, the third crisis

45. Bernanke relates this phenomenon to the size of banks, large in Canada, and small in the US (BERNANKE B.S. 1983, p. 259).
46. WICKER E.R. 1966, p. 178.

must be viewed as a serious *complication* of the primary desease, the *credit-supply crisis*.

As is well known, curing the complication does not solve the original desease. The recurrent interventions of the Fed, affecting the discount rate and open-market operations, put an end to the two first bouts of bank failures, but, due to the paroxysm of the credit-supply crisis, the third episode was fatal.

In 1933, the Fed only reluctantly yielded to the pressure of events (WICKER E.R. 1966, Ch. 12). On March 4, *i.e.*, only two days before the nationwide banking holiday, when banking holidays had been declared within half of the States, the Board turned down the demand emanating from the Reserve Bank of New York (upon the recommendation of the New York Clearing House Committee). The Governor of New York state declared the banking holiday on March 5. Only then, the Board of the Federal Reserve asked President Hoover to issue a Presidential proclamation. These events exactly coincided with the transfer of power from Hoover to Roosevelt (on March 5, around midnight). Hoover refused to make the final step :

> Roosevelt was unwilling to accept any responsability before he assumed office, and Hoover balked at the idea of doing anything dubious legally which did not implicate the incoming President.[47].

On March 6, President Roosevelt proclamed the national banking holiday.

4.4.2 Friedman and Schwartz's Analysis

The recurrent banking panics are central in the analysis of Milton Friedman and Anna Schwartz, known as the monetarist interpretation of the depression, to which much publicity has been given, and is still at the center of the debate. They actually *explain* the severity of the contraction of output — the transformation of a recession into a depression — by the decline of the money stock due to the repetition of banking panics.

The difficulty with their analysis of the depression is twofold :

3. It fully overlooks the existence of *real* determinants of the depression ; and
4. There is no distinction between the credit crisis and the banking crisis, or, rather, the financial crisis is reduced to the banking crisis. Under such circumstances, it is easy to understand that they have considerable difficulty in offering a satisfactory explanation of banking panics :

   > The facts of the banking panic are straightforward. The immediate reasons for its occurrence are not. Why was temptative recovery followed by relapse ? Why after some months of quiet was there renewed pressure on the banking system ? The answer is by no means clear.[48].

They finally blame the financial and real collapses on the mistaken ("inept") policy of the Federal Reserve (FRIEDMAN M., SCHWARTZ A. 1963(a), p. 407), that they link to the death of Benjamin Strong (in October 1928), the Governor of the Reserve Bank of New York. Following Friedman and Schwartz, the Fed witnessed passively

47. WICKER E.R. 1966, p. 194.
48. FRIEDMAN M., SCHWARTZ A. 1963(a), p. 330.

the recurrent banking panics, and did not performed efficiently its role of bolstering the banking system :

> The explanation for the contrast between Federal Reserve policy before 1929 and after, and hence for the inept policy after 1929, [...] is the shift of power within the System and the lack of understanding and experience of the individuals to whom the power shifted. Until 1928, the New York bank was the prime mover in Federal Reserve policy both at home and abroad, and Benjamin Strong, its governor from its inception, was the dominant figure in the Federal Reserve System.[49].

In September and October 1931, the outflow of gold, due to the run on the dollar after Britain left gold, led the Fed to increase the discount rate, thus, triggering a movement upward of other interest rates. Under congressional pressure, and following the passage of the Glass-Steagall Act, in February 1932, that enlarged the ability of the Fed to issue notes, large open-market purchases were performed, beginning in April 1932. However, these operations were quickly interrupted — the famous decision that Friedman and Schwartz described as "inept".

In our opinion, the emphasis on open-market operations, as a panacea, is misdirected :

1. As stated earlier, the central issue was that of the reluctance of banks to lend, not deficient reserves. In the aggregate, banks were actually accumulating excess reserves (although smaller banks, such as country banks, were borrowing heavily and holding negative free reserves).[50]
2. In addition, as documented in EPSTEIN G., FERGUSON T. 1984, the effect of open-market purchases was to further diminish interest rates on risk-free assets and, in particular, interest rates on Treasury bills. Open-market purchases supplied banks with reserves, but had a negative effect on their profitability. As recalled in section 4.2.1, banks were holding larger and larger portfolios of public securities in comparison to loans to diminish the risks associated with lending. The decline of interest rates on this type of assets further diminished the profits of banks.[51]

There is, however, a further aspect to Friedman and Schwartz's analysis of the depression, concerning the reluctance of the Fed to suspend the convertibility of deposits into currency (FRIEDMAN M., SCHWARTZ A. 1963(a)).

During the second half of the 19th century, and until the creation of the Fed in 1913, clearinghouses played a crucial role in the control of banks and banking panics (see section 5.3 below). These institutional arrangements seem to have been quite efficient (see SPRAGUE O.M.W. 1910, TIMBERLAKE R.H. 1984, GORTON G. 1985 and 1988). Between 1873 and 1914, the NBER identifies 11 business cycles, among which 7 coincided with banking panics. The average fraction of deposits lost is always small (three times 0.1%), and the largest figure is 2.1% in 1873 (see GORTON G. 1988, table

49. FRIEDMAN M., SCHWARTZ A. 1963(a), p. 411.
50. As documented in WICKER E.R. 1966, p. 180, free reserves in December 1932 amounted to $245 million for all member banks. This total breaks down as follows : New York city 283, Chicago 163, Reserve cities −19, and Country banks −182. These figures provide a clear illustration of the large heterogeneity prevailing among banks.
51. Recall that an interest rate was paid on deposits.

1). Friedman and Schwartz, and the defenders of "free banking," base their criticism of the Fed on this observation.

We do not believe, however, that it is possible to extrapolate from earlier crises to the Great Depression. The intervention of clearinghouses had been efficient *vis-à-vis* banking crises, as a result of the mild character or absence of credit-supply crises. Friedman and Schwartz are, in our opinion, wrong when they assume that similar measures (the suspension of convertibility of deposits into currency) would have put an end to the depression. As will be shown in section 6, the final banking holiday ushered in a phase of recovery, but only temporarily, and in connection with a whole set of accompanying measures (targeted to the stimulation of credit supply).

4.4.3 A Feedback Effect of Banking Crises

It is important to stress the existence of a significant feedback from the banking crises of the 1930s to the credit-supply crisis and, therefore, to the contraction of output:

1. The deposits lost by customers, when a bank fails, diminish their purchasing power, or may even provoke their own default or bankruptcy.
2. The closure of a bank leaves its customers in a bad predicament to obtain credit from other banks.
3. There was finally an indirect feedback related to the increased riskiness of lending. As stated by Harrisson in the quotation in section 4.4.1, banks were seeking "*higher liquidity*" because their "*confidence had suffered a severe shock*". Actually, there was a double aspect to the hoarding of high-powered money during the depression. Some households and large enterprises were hoarding currency, and banks were accumulating reserves as long as they could. This cautious attitude of the banking system, alarmed by the first banking crisis, increased with time, and added to the severity of the credit-supply crisis. This was manifested in the significant rise of the two ratios, *Currency / Deposits* (for households and firms) and *Reserves / Deposits* (for banks).

4.5 A WORLDWIDE FINANCIAL CRISIS

The above analysis abstracts from international developments. It is, however, important to stress the international scope of the financial crisis.[52]

A number of studies blame the financial crisis in the US on the crisis abroad. The alleged chain of events is well known. Chronic difficulties within financial institutions in central Europe led to the run on the Kredit-Anstalt in May 1931. After Austria and Germany, speculation hit Britain. Britain left gold on September 21, 1931, and the pound declined rapidly:

> The pound fell from $4.86 with remarkable speed. Within a few days it was off 25 percent, to $3.75 before recovering slightly to $3.90 [...] By December the rate had reached a low of $3.25, 30 percent below par.[53].

52. International relationships are seen as the primary determinant of the Great Depression in KINDLEBERGER C.P. 1973.
53. KINDLEBERGER C.P. 1973, p. 162.

A run on the dollar follows in September and October, as gold flees out of the US. (There is a general belief, that also the dollar will "leave gold".) To stop the outflow, the discount rate is raised from 1.5 to 3.5% in October (and other short-term rates also rose).

It is difficult to balance the relative impacts of domestic and foreign determinants of the financial crisis in the US. Obviously, the rise of interest rates, under the conditions prevailing in late 1931, represented a considerable threat on the domestic situation in the US. These determinants combined their effects :

> Just at this time (and probably in good part as a reflection of the European crisis), American finance took a turn for the worse.[54].

There is, however, a consistent opposite approach to these events : The financial crisis in the US hit foreign debtor countries, and the crisis in other countries was, at least partially, *caused* by the US domestic crisis. This is stressed by Friedman and Schwartz :

> Events abroad still further intensified the financial weakness — a feedback effect since these events were themselves largely a response to the prior severe economic and monetary decline in the United States which reduced markets for both goods and services and for foreign securities.[55].

5 - A DEFICIENT INSTITUTIONAL FRAMEWORK

The analysis in section 2 of the consequences of the rapidity of technical change on the heterogeneity of technology had suggested a first category of explanations of the Great Depression in which the emphasis had been placed on underlying *real determinants*. A different story was told in section 4 stressing the impact of a credit crisis coming to maturity in late 1931. There is obviously a link between the two categories of mechanisms. The fragility of the productive system originating from technical heterogeneity — reflected in a financial heterogeneity — accounts for the exceptional duration of the contraction of output and deflation. Such conditions explain, in turn, the dramatic character of the credit crisis and its culmination in the final banking panic. It is also clear, however, that significant feedbacks from financial mechanisms to the contraction of output were at work, and account for a share of the severity of the depression.

This importance of money and finance, in addition to real determinants, points to another complementary component of the interpretation of the depression, in which institutions and policies are involved : *The severity of the crisis was aggravated by deficient institutions and policies*. Indeed, the importance conferred on real determinants in our analysis suggests that there was no simple remedy to the depression, but

54. HART A.G. 1948, p. 316.
55. FRIEDMAN M., SCHWARTZ A. 1963(a), p. 314.

still the inherent weaknesses of the institutional framework in which the depression occurred must be stressed.

Below we will briefly review a number of sources of fragility concerning : the stock market in section 5.1, the financing of firms in section 5.2, the banking system in section 5.3, the Federal Reserve system in section 5.4, public finance and demand policy in section 5.5, and the Gold Standard in section 5.6.

5.1 THE STOCK MARKET AND THE BANKING SYSTEM

The central role conferred on the stock market and its close link to the banking system represented a significant source of fragility in the 1920s. Large amounts of loans were used to purchase stocks. *Margin loans* were provided by brokers to their customers. Banks, in turn, provided brokers with *brokers' loans* (*call loans* and *time loans*) (see RAPPOPORT P., WHITE E.N. 1993, p. 553). The fraction of loans on collaterals (securities) amounted to 37.6% of total loans in the balance sheet of commercial banks in 1929, to be compared to 9.9% in 1939 or 7.1% in 1949.[56] The problems posed by this intimate relationship between banks and the stock market are obvious. The fluctuations of stock prices, and their possible sudden decline, were a constant threat to the stability of the financial system.[57]

Although commercial banks were not allowed to buy shares on the stock market, they could circumvent this regulation in a variety of manners, in particular, by creating large *security affiliates* :

> Commercial banks did purchase more bonds, but they could not legally trade or acquire equities. To circumvent this restriction, they set up wholly-owned securities affiliates, which permitted them to enter all aspects of investment banking and the brokerage business. Peach (1941) found that the number of affiliates grew rapidly from 10 in 1922 to 114 in 1931. These affiliates attracted many new customers and became big distributors of stocks and bonds, enabling them to become underwriters. By 1930, commercial banks' security affiliates had obtained roughly half the bond originations. By moving into investment banking through their affiliates, commercial banks were thus able to continue servicing the needs of their corporate customers.[58].

In addition, banks used to make specific agreements with brokers acting on their behalf on the market for call loans. This development of security affiliates was paralleled by that of *investment trusts*, a kind of equivalent of modern mutual funds. The number of such trusts grew from 40 in 1921 to 750 in 1929 (see WHITE E.N. 1990, p. 69).

In the absence of a genuine market for federal funds, the call market used to play a prominent role in the management of liquidity in the short term :

---

56. See FEDERAL RESERVE 1959, table A-1a, p. 34. The other components were, for 1929 : Real Estate 17.5% and All Others 44.9%.

57. Actually, brokers lost much more than banks during the depression. In nominal terms, the net worth (assets minus liabilities) declined by approximately 75% between 1929 and 1933 for brokers, to be compared to 30% for banks (GOLDSMITH R.W., BRADY D.S., MENDERSHAUSEN H. 1956).

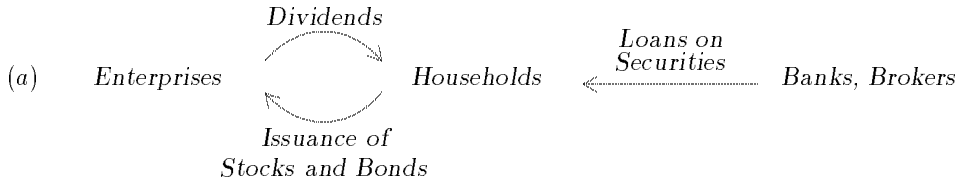
58. WHITE E.N. 1990, p. 69.

> [...] the call market was the residual market of the period, bearing the brunt of unexpected shocks. The federal funds market was in its infancy, and its current role was filled by the call market.[59].

As a result of this tight connection between stock market and credit operations, the call rate — dependent on the fluctuations of the stock market and the expectations formed by financial investors — had a pernicious impact on other rates and international money flows (KINDLEBERGER C.P. 1973, p. 112).

5.2 THE FINANCING OF FIRMS

The central role of the stock market is also reflected in the financing of firms. As illustrated in diagram 1 (a), firms were heavily relying, in the 1920s, on the stock market (the issuance of stocks and bonds). Large dividends were distributed to stockholders, and self-financing was correlatively low. Banks were lending money to firms, but a large flow was going through the stock market.



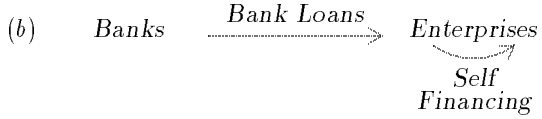


Diagram 1

Between 1925 and 1929, gross fixed investment amounted to approximately $11 billion per year. New issuances in 1928 represented $3 billion of new stocks and $3 billion of bonds. In 1929, $6 billion of stocks and $3 billion of bonds were issued. By previous standards these amounts were unheard-of (BRADFORD DE LONG J., SHLEIFER A. 1991, p. 695).

This quite specific pattern can be contrasted with the situations prevailing before World War I and after World War II (or within other countries), in which self-financing is central, and bank loans flow directly to enterprises (diagram 1(b)). The obvious

59. RAPPOPORT P., WHITE E.N. 1993, p. 554-555.

advantage of this latter configuration, (b), relatively to (a), is that the direct connection between banks and enterprises is favorable to the establishment of a steady relationship, and allows for a better information of banks concerning the reliability of enterprises. Such relationships could have acted as an important check in the development of the credit-supply crisis during the depression.

This historical transformation of the financing of firms, favoring the reliance on the stock market, was already well identified by Currie, in relation to the development of large corporations :

> If economic progress continues to be associated with the increasing importance of the larger corporations having access to the stock and bond markets, there is a strong probability that the commercial loan will continue to decline in the future. The decline in the commercial loan, in other words, appears to be intimately related to the changing structure of business which is bringing about a change in the methods of financing business.[60].

This interpretation seems quite shrewd, provided that the investigation is limited to the evolution that Currie actually witnessed (the late 19th century and early 20th century). The new patterns emerging after World War II increased the reliance on self-financing in the long term and banks loans for short-term operations, diminishing the importance of the issuance of new shares.

5.3 THE BANKING SYSTEM

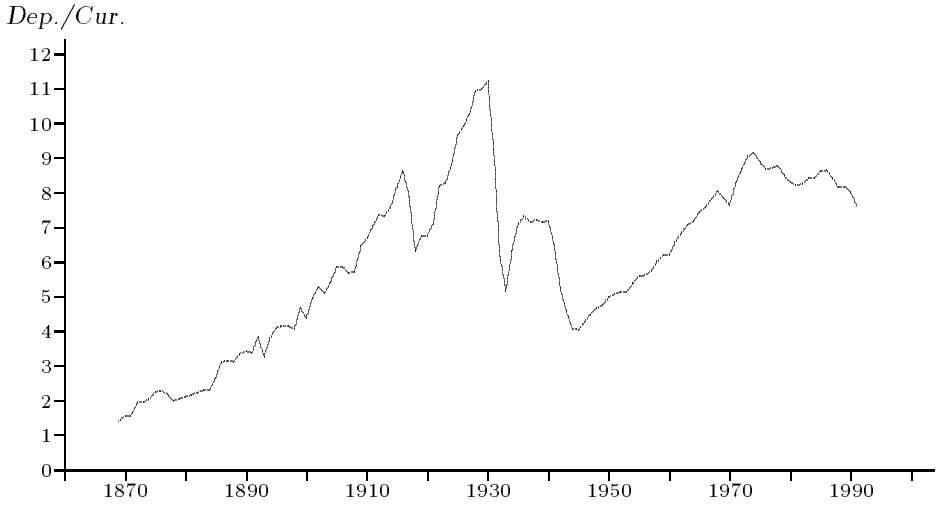
In addition to the volume of loans on securities in the balance sheet of banks, the banking system also suffered from the existence of a large number of very small banks (a total of 25,000 banks in 1929). The number of customers of such small banks is necessarily limited. They are often very dependent on a specific category of customers, such as farmers, whose situation may deteriorate in concert, or on a large customer.

The decrease in the number of banks during the 1930s must be understood as the sudden acceleration of previous trends. The number of banks had already significantly diminished before 1929. There was more than 31,000 banks in 1921, 25,000 in 1929 as stated above, and 15,000 in June 1933. This number declined primarily as a result of mergers or bankruptcies, before 1929, and mainly bankruptcies after 1929 (see WHITE E.N. 1985 and FEDERAL RESERVE 1959).

A striking feature of the evolution of the monetary system in the 1920s was the dramatic rise of *deposits* compared to *currency*. As shown in figure 13, the ratio of deposits within commercial banks to currency held by the public[61] grew consistently since the late 19th century, and peaked in 1930 (precisely in October 1929, on a monthly basis). This ratio was then divided by nearly 3 after World War II. The reliance on the banking system was therefore quite exceptional during the 1920s, and the risks of runs on these deposits were large.

60. CURRIE L. 1934, p. 41.
61. Before 1960, the series is from FRIEDMAN M., SCHWARTZ A. 1963(a), and from *Flow of Funds* for the following years.

Figure 13 The Ratio of Deposits to Currency Held by the Public (1869-1991)



A likely factor in the banking crisis in the 1930s was the very rapid growth of banks. Overall, the total balance sheet of banks grew by approximately 10% per year between 1922 and 1929 (see GOLDSMITH R.W., BRADY D.S., MENDERSHAUSEN H. 1956), to be compared to an average growth rate of GNP of 3.9% (see table 1). This development of banking was reflected in the sharp rise of *loans to households*. Between 1922 and 1929 — with stable prices — the amount of tangible assets held by households were multiplied by 1.51, whereas their total liabilities was multiplied by 2.29 (2.55 for borrowings on securities) (see GOLDSMITH R.W., BRADY D.S., MENDERSHAUSEN H. 1956) !

Given such circumstances, the absence of deposit insurance (with the exception of systems developed within a few States) represented a considerable source of fragility. This absence was crucial to the emergence of bank runs, and their generalization into banking panics.

Without deposit insurance, runs on banks required rapid action. During the 1920s and 1930s, action was taken by the Fed, but failures reached considerable levels. As already stated in section 4.4.2, this form of organization of the banking system had developed rather autonomously within large cities, before World War I, under the control of clearinghouses (see GORTON G. 1985 and TIMBERLAKE R.H. 1984). Even during periods of stability, clearinghouses used to collect and publicize information concerning the situation of banks. When necessary, reciprocal credits among banks were organized and private money was issued. We already recalled that, in case of panics, clearinghouses used to declare suspensions of convertibility of deposits into currency (while banks were still active).

As is well known, a new framework emerged after the depression that practically eradicated banking crises.

5.4 THE FEDERAL RESERVE SYSTEM AND MONETARY POLICY

There were fundamental institutional limitations to an authentic monetary policy due to serious flaws in the organization and regulation of the banking system in the 1920s and 1930s. In particular, reserve requirements varied considerably depending of the various components of the money stock, types of banks[62], and by state :

> While the total reserves against total adjusted demand deposits has remained a fairly steady percentage, the important thing for control is the required percentage reserve against a new increment or decrement of deposits. This ratio, we have seen, has varied enormously, the movement of required reserves and the movement of deposits having been on occasion even inverse. This widely fluctuating reserve ratio is, therefore, a factor seriously impeding the effectiveness of central bank control.[63].

There was also a *basic ambiguity in the definitions of the missions of the Fed* concerning the actual conduct of an active monetary policy. The main purpose of the creation of the Federal Reserve was to provide stability to the banking system (see DYKES S.E. 1989), by providing support to banks when necessary, *i.e.*, during seasonal peaks or periods of crisis. A prominent target was to avoid the earlier recurrent suspensions of convertibility. The Federal Reserve Act of December 1913 defines the goals of the creation of the Fed as follows:

> [. . .] to furnish an elastic currency, to afford means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States, and for other purposes.[64].

The quotation in section 4.4.1, accounting for Harrisson's view of the role of the Fed, clearly illustrates this ambiguous attitude of the Fed, and its inability (unwillingness) to react to a credit-supply crisis. Following Harrisson, the responsability of the Fed was to provide sufficient reserves to the banking system, and this was done to the final run ; whether banks were willing to lend or borrowers willing to borrow was beyond Fed's responsability !

The basic conceptions of the Fed concerning monetary mechanisms were incorrect. When the Board was organized and freed from the requirements of a war economy, just after World War I, the *real bills doctrine* was dominant. The overall idea was that the issuance of money, through discounting or rediscounting, should respond to *real* transactions. As long as this rule was followed, it was thought, there was nothing to be feared from credit mechanisms. This vision of the provision of loans and the issuance of money is, obviously, deficient. It completely ignores credit channels, other than the discount of bills related to transactions among firms, and, most importantly, it is clearly *procyclical*, in the sense that credit "responds" to activity, while the notion of a "control" of activity by credit mechanism is ignored (see CURRIE L. 1934).

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62. Member and non-member banks, national banks and state banks, incorporated and unincoporated banks.
63. CURRIE L. 1934, p. 83.
64. DYKES S.E. 1989, p. 229.

The real bills doctrine began to be seriously questioned in the *Tenth Annual Report* in 1923, when attention was drawn to the quantity of bills discounted, not only the quality of the transaction :

> The Board is fully aware of the fact that the problem of credit extension involves the question of the amount or volume as well as the question of kind or character ; otherwise stated, involves a quantitative as well as a qualitative determination.[65].

This step toward actual monetary policy remained fraught with considerable ambiguity, but should be neither underestimated or overstated, as stressed by Wicker :

> The Board showed that it was well aware that price inflation would follow if credit expansion continued beyond "full employment" even if there no deterioration in the quality of credit. Moreover, the Federal Reserve behavior reveals the use of a dual criteria and shows cognizance of the output and price response to a change in credit policy.[66].

However, Wicker also makes the following statement :

> The success of the policy pursued [in 1924] was the result of an accidental harmony of monetary goals and not — as Keynes, Harrod[67], [Lester] Chandler and others would have us believe — the ushering in of a new and successful era of managed money![68].

Several actions were initiated during the 1920s, following rather limited business fluctuations (1924, 1927). As recalled in section 3.4, action was taken by the Fed in 1928 and 1929 to calm down speculation on the stock market, with a significant concern that these moves might destabilize real activity.

More technically, the attention of the Board focused on *borrowed reserves*[69] considered as an indicator of the need for additional reserves. If borrowed reserves increased, the Fed could develop its open-market purchases in order to diminish bank indebtness. The main focus was therefore on banks' liquidity, and this procedure has often been criticized in this respect (see, for example, WHEELOCK D.C. 1990).

These observations all point to the same conclusion : The interwar appears retrospectively as a period of transition. New institutions and new concerns emerge, but they are still fraught with considerable ambiguity. There was actually not much time for learning and adjustment. Facing "ordinary" business fluctuations over a longer period of time, conditions for gradual reform might, perhaps, have been created, *viz.* the clearer specification of the goals of the Fed, the maturation of the first embryonic forms of monetary policy, the reform of the banking system, etc. Unfortunately, the delay was very short, as the economy was suddenly confronted to quite unprecedented destabilizing forces.

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65. FEDERAL RESERVE 1923, pp. 33-34, quoted in WICKER E.R. 1966, p. 66.
66. WICKER E.R. 1966, p. 66.
67. KEYNES J.M. 1924, p. 199 and HARROD R.F. 1958, p. 34.
68. WICKER E.R. 1966, p. 90-91.
69. *Borrowed reserves* consist of reserves obtained by the discount of eligible paper by member banks from reserve banks. (The interest rate charged is called the *discount rate*.) The capability to borrow depends on the amount of eligible paper. The alternative channel to create reserves is *open-market* operations, where the reserve banks buy securities held by commercial banks (primarily Treasury bills).

5.5 DEMAND POLICY

The situation concerning demand policy was even worse than for monetary policy. There was a general opposition to deficits among Republicans as well as Democrats. Financial orthodoxy, *i.e.*, balancing the budget, was a basic plank in Roosevelt's platform (actually, for both candidates). In 1932, the Revenue Act actually *increased* taxes, apparently as a response to the severity of the banking crisis :

> Neither President Hoover nor the Democratic majority in Congress found it easy to advocate higher tax rates when business was depressed. Both had to be forced into supporting tax increases by the severity of the banking crisis.[70].

There was a deficit because of the crisis, and the public debt was rising, but this deficit was involuntary. According to Herbert Stein, it was not until the 1937 recession that the deficit began to be considered as an active policy device (STEIN H. 1969).

Overall, the debts of the government were considered as "bad" debts. This view echoes the real bills doctrine discussed in the previous section. The reliance on public debt as collaterals to issue Federal Reserve notes was enlarged in 1932 by the Glass-Steagall Act, but only reluctantly.

5.6 THE GOLD STANDARD

An important limitation to active policy during those years relates to the alleged, or actual, domestic and international "requirements" of the *Gold Standard*.

There was still a strong belief that the reference to gold had a stabilizing power of its own, but that during the 1920s, the large inflow of gold toward the US represented a threat of inflation. Under such circumstances, it was unclear whether the Fed should passively wait until such stabilizing forces materialize, as implied in the Gold Standard, or should make positive moves. Several measures were taken in order to "sterilize" this inflow of gold (see BROWN W.A. 1940). Thus, it has been contended that the Gold Standard was *structurally* deflationary, because of the asymmetry between surplus and deficit countries in their response to the movements of gold (see BERNANKE B.S., JAMES H. 1990).

There was still a limitation imposed on the issuance of Federal Reserve notes in relation to the amount of gold. Holding large amounts of gold was considered a prominent goal. During the depression, when Britain went off gold in September 1931, gold began to flow out of the US ; interest rates were increased in spite of the progress of the depression in the US. The Glass-Steagall Act of 1932 was established to overcome this limitation, and to allow goverment securities to be used to back the issuance of Federal Reserve notes.

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70. LINDERT P.H. 1981, p. 130.

6 - TOWARD RECOVERY

The painful character of the recovery from 1933 to World War II, and the manner in which it was achieved, provides additional insight into the causes and nature of the depression. The present section contends that the features of the recovery match quite closely the analysis of the Great Depression in the previous sections.

As a preliminary to this demonstration, section 6.1 recalls the main aspects of the *New Deal*. Then, three basic traits of the recovery are emphasized :

1. The resolution of the financial crisis echoes its twofold character, credit crisis and banking crisis, and their hierarchy (section 6.2).
2. The fight against excessive competition — the cornerstone of the New Deal — is well in line with our analysis of technical heterogeneity (section 6.3).
3. The duration and latter stages of the depression (the new recession in 1937) is the direct expression of the extensive obsolescence of fixed capital, which only came to completion during World War II (section 6.4).

Table 3 : **Major Events : 1933-1938**

March 6,	1933	Nationwide Banking Holiday
March 9,	1933	Emergency Banking Act
March	1933	Temporary Suspension of the Gold Standard
March 31,	1933	Civilian Conservation Corps Act
May 12,	1933	Federal Emergency Relief Act
May 12,	1933	Agricultural Adjustment Act
		(declared unconstitutional in 1936)
May 18,	1933	Tennessee Valley Authority Act
June 16,	1933	Home Owners Loan Act
June 16,	1933	National Industrial Recovery Act
		National Recovery Administration
		(declared unconstitutional in May 1935)
June	1933	Banking Act
		(Temporary Establishment of the Federal
		Deposit Insurance Corporation, FDIC)
	1933	2nd Glass-Steagall Act (part of the Banking Act)
	1933	Securities Act
June 27,	1934	National Housing Act (Fund of the FSLIC)
July 30,	1934	Gold Reserve Act
July 31,	1934	Devaluation of the $ (59.1%)
	1934	Permanent Fund of the FDIC
	1934	Securities Exchange Act
Sept.	1935	Banking Act
	1935	National Labor Relations Act (Wagner Act)
	1935	Fund of the Social Security Board

6.1 THE NEW DEAL

The heroic episode of the government's fight against the depression was the *New Deal*. (Table 3 recalls a number of legislative steps taken from 1933 to 1935 to help recovery.) The set of measures concerning this first phase of the fight against the depression was well summarized in a contemporary study from Brookings Institution :

> The major planks or steps in the early program of the Roosevelt Administration may be listed as follows :
>
> 4. liquidating the banking situation and reconstructing the commercial and investment credit system ;
> 5. extending financial aid to and underwriting the credit of distressed economic institutions and groups ;
> 6. establishing public credit on a sound basis through the balancing of the federal budget ;
> 7. reducing the extraordinary barriers to international trade ;
> 8. raising the general level of commodity prices through devaluation of the dollar ;
> 9. restoring purchasing power by raising the prices of agricultural products through benefit payments and other devices provided by the Agricultural Administration ;
> 10. stimulating employment and purchasing power by means of the National Recovery Administration and extensive appropriation for public works.[71].

The New Deal ushered in a new era of *state intervention*. However, it has been often too rapidly (and erroneously) argued to be coextensive with Keynesian demand policy. Public works were only one component of the New Deal. A public works administration was created, mostly active in the construction of schools, administrative buildings, and hospitals. As recalled in the quotation above, public work was not synonymous with budget deficit ((3) and (7)).

6.2 SOLVING THE FINANCIAL CRISIS

The basic chain of events described in the previous sections can be summarized as follows: *Decline of output* $\rightarrow$ *Credit-supply crisis* $\rightarrow$ *Banking crisis*, leading finally to the banking holiday. The same chain of events will be followed during recovery, but in reverse order.

After the nationwide banking holiday of March 1933, only "sound" banks survived the closure. When the holiday was proclamed, 17,308 commercial banks were still open. On March 15, 1933, 11,878 were authorized to reopen (*i.e.*, 68.6%). Among the 5,430 remaining, approximately 3000 were allowed to open later, and 2,000 disappeared. In addition, a number of actions were initiated to strengthen the confidence of

71. THE BROOKINGS INSTITUTION 1936, p. 446.

the public, in particular the creation of the *Federal Deposit Insurance Corporation.*[72] This first type of action put an end to the *banking crisis*.

The next problem was, thus, to stem the credit-supply crisis. The emphasis was placed on *reflation*, a key concept in this period. The dollar was devalued *in an attempt to raise the price of imported raw materials*, and prices and wage controls were established in order to stop further declines. The same concern about deflation was manifested in the desire to put an end to *cut-throat* competition, to which the depression was attributed (see section 6.3).

The basic issue remained, however, that the circumstances responsible for the credit-supply crisis still prevailed after 1933. Hardy and Viner conclude from an extensive survey of 2.600 firms in 1934-1935 :

> [. . .] a genuine unsatisfied demand for credit by solvent borrowers, many of whom could make economically sound use of working capital [. . .] The total amount of this unsatisfied demand for credit is a significant factor, among many others, in retarding business recovery.[73].

Kimmel's survey cited in section 4.2.1 also provides figures for 1933-1938, showing that small firms were still rationed after 1933 (although slightly less than in 1932) :

> [. . .] survey results show that, of responding manufacturing firms, normally dependent on banks, refusal or restriction of bank credit was reported by 30.2 percent of very small firms (capitalization less than $50,000) ; 14.3 percent of small firms ($50,001-$500,000) ; 10.3 percent of medium firms ($500,001-$1,000,000) ; and 3.2 percent of the largest companies (capital over $1 million).[74].

Under such circumstances, several types of measures were taken in order to restore the confidence of banks and their willingness to lend. Public intervention was required in order to prime the credit pump :

> To the extent that the home mortgage market did function in the years immediately following 1933, it was largely due to the direct involvement of the federal government. Besides establishing some important new institutions (such as the FSLIC[75] and the system of federally chartered savings and loans), the government "readjusted" existing debts, made investment in the shares of thrift institutions, and substituted for recalcitrant private institutions in the provision of direct credit. In 1934, the government sponsored Home Owners' Loans Corporation made 71 percent of all mortgage loans extended.[76].

The same type of mechanisms is described by Hart concerning the action of the Reconstruction Finance Corporation and for Agriculture (HART A.G. 1948, pp. 83-84). In addition : "*In 1933-1934, the Federal Government stepped in — taking over*

72. "*The Banking Act passed in June 1933 set up the Federal Deposit Insurance Corporation with government capital. A 'temporary insurance fund' went into operation at the beginning of 1934, and was superseded in September 1935 by a permanent fund.*" (HART A.G. 1948, p. 86).
73. From STODDARD W.L. 1940, p. x.
74. Bernanke, p. 273.
75. Federal Savings and Loans Insurance Corporation.
76. BERNANKE B.S. 1983, p. 273.

ownership of billion of dollars worth of defaulted mortgages and giving banks and other creditors bonds in exchange." (HART A.G. 1948, p. 86).

The recovery from the financial crisis was long and painful, but the new institutional framework that emerged after the depression proved quite efficient.[77]

6.3 COMPETITION AND HETEROGENEITY WITHIN THE PRODUCTIVE SYSTEM

Since the depression and deflation were attributed to competition, it is easy to understand that a prominent role was conferred on the fight against *cut-throat* competition. *This emphasis on competition clearly echoes our analysis, in section 2, of the strong heterogeneity that prevailed within the productive system*, and rendered competition so destructive for less advanced firms. *Thus, the National Industrial Recovery Act (NIRA) organized business, under the National Recovery Administration (NRA), in 12 industrial groups, which took care of market shares, prices, and wages in each group.*

Only the dramatic character of the recession in 1933 rendered this policy politically acceptable. These impediments to "free competition" fully contradict traditional views concerning the benefits of competition in the US economy. BORN K.E. 1972 describes the industrial groups as follows :

> They were a combination of German cartels — in so far as they laid down binding price controls — and the professional corporations of Fascist Italy — in so far as they included employers and workers. A government authority was set up to act as a supervisory and administration body for these groups. Until 1935, these groups dealt with price, wages and production regulations in almost the whole of American industry. Public price and wage fixing — and, what is more, not even by the legislator, by an executive authority — was something unheard-of in American tradition.[78].

As soon as the economy began to recover, these conditions were transformed. Large corporations could not tolerate in the long term such restraint on competition. This is analyzed in some details in BERNSTEIN M.A. 1984, in a way that fully matches our analysis of technical and financial heterogeneity :

> To be sure, when the NIRA was enacted, the reaction of almost all business leaders was positive.[79].

However, when the situation improved, a clear division appeared between advanced and backward firms :

---

77. "*The first Post-Depression financial crisis widely recognized as such occcurred in 1966 and involved a high degree of disintermediation — withdrawals of funds from savings and loans associations and banks for direct investment in the money market. The flow of credit to nonfinancial corporations fell as much as 40% in the second half of the year.*" (ZARNOWITZ V. 1992, p. 109). See also WOLFSON M.H. 1986. It is only during the last decades — in relation to the development of inflation and international competition — that the alleged *deregulation* led to the constant reform of existing regulations. However, the establishment of a new coherent regulatory framework is still to come.

78. BORN K.E. 1972, p. 50-51.

79. BERNSTEIN M.A. 1984, p. 486.

> The dynamic industries of the interwar period tended to be hostile to the government intervention undertaken by Roosevelt. The declining and moribund firms were far more receptive, and in any cases were instrumental in the early success of the NRA. For example, as Louis Galambos has argued, within the textile industry there was a split between the newer, leaner, more dynamic firms of the South, and the older, overbuilt, and declining companies to the North. The former resisted on cartelizing efforts of the New Deal : the latter regarded them as the only means of survival in bad times.[80].

Following Bernstein, it seems that some of Roosevelt's advisors were quite conscious of what was actually at stake in these movements :

> [...] at least some members of Roosevelt's inner circle appear to have been concerned with the need to get capital flowing out of moribond industries into more dynamic ones. The undistributed profit tax [...] was thought of as a device to achieve such a reallocation of capital [...][81].

6.4 THE LAST STAGE OF THE RECOVERY

After approximately four years of recovery, a new recession occurred in 1937, when unemployment was still large (14.3%).

Only World War II created totally new conditions, with very large demand levels and state involvement in investment. During the war, because of the large degree of uncertainty concerning the ability of the recovery to survive the war (MOULTON H.G., SCHLOTTERBECK K.T. 1942), private investment was very low. Again state intervention was crucial. In 1943, 65% of investment in equipment (and 61% of total investment) was financed by the state, leading to the formation of what is known as *Goverment Owned Privately Operated* capital (see GORDON R.J. 1969). This capital, managed by private corporations, was sold to them at a very low price after the war.

Thus, by the combined effects of the waves of closures during the depression and large investment by the state (later transferred to the private sector), the soundness of the productive system was greatly improved. There was no major depression after World War II as was feared.[82]

7 - A HISTORICAL PERSPECTIVE

The account of the determinants of the Great Depression in the previous sections points to a "multifactor" analysis of the depression. Broadly speaking, this analysis combines two categories of determinants :

80. BERNSTEIN M.A. 1984, p. 486.
81. BERNSTEIN M.A. 1984, p. 486.
82. As shown in table 1 and figure 8 (·), the profit rate was restored. Most of these increased profits were transferred to the state through taxation (see DUMÉNIL G., LÉVY D. 1993, Ch. 17).

1. First, the depression was linked to the profile of technical and distributional changes from the turn of the century — and later stretching to the 1950s — in which exceptionally favorable trends were observed :

- The rapidity of technical progress was responsible for a quite unusual heterogeneity of fixed capital. This potential devaluation of a segment of the capital stock, now obsolete, posed a threat to stability. These circumstances are sufficient to account for the exceptionally severe, and apparently implacable character, of the the contraction of output.
- The amplitude and duration of the depression led to a protracted disruption of the functioning of the banking system, the *financial crisis*. The technical heterogeneity, and the corresponding profit-rate heterogeneity, were reflected in a strong financial heterogeneity among firms, which added to the severity of this disruption. This financial crisis had a significant feedback effect on the contraction of output.

2. Second, in addition to these *real* determinants and their financial consequences, the institutional framework in which economic activity was performed was flawed in important respects. Banking regulation was deficient, and no efficient tool was found to stem the financial crisis. Financial institutions and the state were not committed to the control of macroeconomic stability. The overall assessment of the period, in these respects, points to a double statement :
3. Several directions taken in the early 20th century were actually dangerous, and had to be abandoned ; and
4. Simultaneously, a transition to a new institutional framework was under way, but still incomplete.

The combination of these two sets of factors explains how a recession was transformed into a depression.

It is, however, possible to take this analysis one step further, and attempt to identify the coherence of these factors. The two components mentioned above, the favorable trends prevailing during our intermediary period and the corresponding technical heterogeneity, as well as the transformations of institutions, both converge to the increasing role of *management*, private and public. This will be made explicit in sections 7.1 and 7.2. The pieces of the puzzle actually match one another quite well, and suggest an overall interpretation of the Great Depression as *the manifestation of the gradual and painful genesis of a new stage of capitalism, managerial capitalism*, a deep metamorphosis of relations of production and class patterns (see section 7.3).[83]

7.1 PRIVATE MANAGEMENT AND THE RAPIDITY OF TECHNICAL PROGRESS

The industrial revolution in England, in the last part of the 18th century and first half of the 19th century, was associated with the person of the *capitalist* in

83. A similar view can be found in KINDLEBERGER C.P. 1973, who pushes this analysis even one step further, drawing a parallel between the Great Depression and the 1848 crisis : "*At a deeper level, it may be possible to detect a parallel between the crisis of 1848 on the European continent and the 1929 depression ; both represented failures of the economic system at a transitional stage from one set of institutions and forms to another.*" (p. 21).

the terminology of the classical economists (or the *entrepreneur*). We interpret the acceleration of technical progress in the early 20th century, as evidence of a transition toward a new network of social relations, associated with the rise of *managerial and clerical personnels* :

1. The first type of class relation was inherited from the Industrial Revolution in England. It is dominated by the factory system within industry (surrounded by more traditional organization within other sectors, such as agriculture or services). The main feature of technical change is *mechanization*. As in our first period (the late 19th century), the progress of labor productivity follows from the use of more and more sophisticated equipment, and the application of energy to production. The technical composition of capital, *i.e.*, the capital-labor ratio, grows rapidly, whereas labor productivity and real wages only grow slowly, and the productivity of capital and the profit rate decline.
2. The second category of relations corresponds to a "revolution" of a distinct type, a *revolution in management*: Firm management was transferred from traditional capitalist owners to managers, surrounded by numerous employees, *managerial and clerical personnel*. In Alfred Chandler's terminology, this movement coincided with the emergence of the *large modern industrial firm*, with its new organization, technology, and hierarchical management (CHANDLER A.D. 1977 and 1990).[84]

It is convenient to refer to the notion of technical (or socio-technical) *paradigm*[85] to account for the system of relations governing the organization of production, the emergence of innovations, their selection and diffusion, the corresponding institutional framework (education, research...), etc. This notion is, indeed, very broad, but still hinges around *technology* and *technical change*.

The new managers performed their task (still targeted to the obtainment of maximum profitability levels) with amazing efficiency. A new technology and organization appeared in the workshop, prompting new advances in labor productivity, simultaneously saving on fixed capital. The assembly line provides a typical example of these new directions in technical change. The high degree of mechanization that it represents allows for considerable progress of labor productivity, but the continuous and efficient use of fixed capital, without intermission, avoids the burden of an increased advance of fixed capital in comparison with output. In other words, the capital-labor ratio is only increased slowly, and the productivity of capital is actually *raised* (see table 1). This new intensive use of fixed capital (specifically devised for this purpose) is typical of the new forms of technical progress during our intermediary period (roughly the first half of the 20th century), and must be related to the organizing

84. One strong point of Chandler's analysis is that the emergence and diffusion of hierarchical management is seen as an actual *progress*. This view can be contrasted to that of Joseph Schumpeter, who interprets the development of the new large corporation in terms of bureaucracy — in some respects, a regression to a less innovative framework (SCHUMPETER J. 1942).

85. This terminology is used within analyses of evolutionary inspiration. Giovanni Dosi gives a rather narrow meaning to the notion of *technological paradigm* (DOSI G. 1988), that corresponds to a given type of equipment (such as the internal combustion engine) or industry (microelectronics, for example). Freeman and Perez's notion of *technico-economic paradigm* (FREEMAN C., PEREZ C. 1988) is broader, and, consequently, closer to our use of the term.

skills of these new groups.[86] It is, however, important to understand that this beneficial impact of management was broader, and was also felt *vis-à-vis* other aspects of management, concerning, for example, inventories and liquidities (see DUMÉNIL G., LÉVY D. 1993, Section 17.2), and was extended to marketing activities (actually to all components of the activity of firms, in particular R&D). Unfortunately, as a result of this formidable progress, the capital stock was fraught with considerable heterogeneity, that the system was not able to confront.

A number of students of the depression identified this link between the emergence of the new managerial corporation and the depression, in relation to the analysis of the real determinants of rise of the stock market (section 3.2), as in FISHER I. 1933 or WHITE E.N. 1990, or in relation to the analysis of technical or financial heterogeneity (sections 2.2 and 4.3), as in BRESNAHAN T.F., RAFF M. 1991 and HART A.G. 1948.[87]

The analysis of the transition to managerial capitalism cannot be separated from the transformations of competition. In the late 19th century, US capitalism was actually at a crossroad when the rise of "big business" represented a real threat on competition. Actually, two typical forms of consolidation were progressing simultaneously : *loose* consolidation (trusts, cartels, pools) in which firms survive with basically unchanged organizational features, and *tight* consolidation (actual mergers) (THORELLI H.B. 1955). The development of a new legal "antimonopoly" framework under the Sherman Act, and the superior efficiency of the new organization gave the advantage to tight consolidation, *i.e.*, the new managerial large corporation.

The fact itself of the alleged diminished degree of competition is questionable. The notion of an earlier stage of "pure and perfect" competition is a myth. Enterprises have always been price makers, and competition has always been monopolistic. The increased size of firms was paralleled :

3. by the development of markets (in relation to the progress of transportations and communications) ; and
4. by the development of the financial institutions performing what the classicals used to call *capital mobility* among sectors. As a result of the increased efficiency of these institutions in the detection of new profitability outlooks, capital mobility is stronger than ever.

Several interpretations of the depression blame it on the transformation of competition (price rigidity). This interpretation was important in the 1930s (see MILLS F.C. 1932, ROBBINS L. 1934, MEANS G.C. 1935 and 1936, BURNS A.R. 1936, and

86. In DUMÉNIL G., LÉVY D. 1995, we present a model in line with this interpretation. A stochastic model of technical change of evolutionary inspiration is laid out that accounts for the profiles of technology and distribution, within each paradigm. (Innovation is random, and new techniques are selected depending on their profitability.) By averaging the two sectors of the productive system corresponding to each paradigm, it is possible to reproduce the historical trends for each variable. For example, the model explains why the productivity of capital and the profit rate displayed successively downward, upward, and downward trends over the three subperiods, 1869-1910, 1910-1950, and 1950-1992. Both the emergence and erosion of the favorable features of the intermediate period, 1910-1950, are explained by the diffusion of the new paradigm.

87. For example : "*Part of this growth may be attributed to the emergence of large-scale commercial and industrial enterprises that took advantage of new continuous process technologies. Coordination by the emerging system of modern management, as described by Chandler (1977), produced more efficient vertically-integrated enterprises that captured economies of scale and scope.*" (WHITE E.N. 1990, p. 69).

HUMPHREY D.D. 1937). We believe, however, that it is misdirected. The coincidence of the transformation of technology and the emergence of large corporations is a fact, but the transformation of competition is not the crucial element in the explanation of the depression.

7.2 MANAGEMENT AND THE MACROECONOMY : THE TENDENTIAL INSTABILITY THESIS AND STATE INTERVENTION

The relationship between *management* and the stability of the *macroeconomy* is twofold. First, the progress of management has a destabilizing effect on the macroeconomy ; second, the social control of the macroeconomy and the definition of an appropriate institutional framework — traditionally labeled as *state intervention* — although performed by a different group of managers, is actually a managerial task. A corresponding advance of management at the center (government, agencies, legal system, etc.) must parallel that of private management within firms.

The progress of private management associated with the rise of managerial and clerical personnel — including some aspects of the functioning of financial institutions — is responsible for a *historical tendency toward increasing instability*. This analysis elaborates on our interpretation of business-cycle fluctuations briefly recalled in section 2.5, and our *disequilibrium microeconomics*, in which behaviors are modeled in terms of adjustment to disequilibrium (DUMÉNIL G., LÉVY D. 1993).

For rather intuitive reasons, the progress of management results in larger and faster reactions to disequilibrium (and can, thus, be appropriately denoted as "tighter" management). There is, however, a price to this progress : Such increases, in spite of their benefits with respect to individual firms, are responsible for a growing instability of the macroeconomy, causing unusual clusters of overheating, recessions, or depressions.

The system — partly private and partly public — responsible for the control of stability (since the concept of policies is too narrow here) gradually forces its way onto the agenda in response to this increasing instability. Its transformations and progressive metamorphoses respond to the *actual manifestations* of instability in the economy. The difficulties are usually not anticipated and stability is constantly destroyed and subsequently restored. It is under crisis circumstances that transformations are realized. These adjustments are obviously difficult because of the complexity of institutions, and also since political issues are involved. There is a constant resistance to any increased intervention of the government into the management of the economy (except when some vital interests are threatened).

As a result of these two components in the overall progress of private and public managements, the economy is constantly maintained at the *limit between stability and instability*. In spite of recurrent lags in the adjustment of the institutional framework in charge of the control of stability, the two aspects, destabilizing forces and growing checks to instability, are both expanding over time, and we denote this situation as a "stability frontier".

The thesis concerning a tendential instability within capitalism provides an explanation for the paradoxical observation that, in spite of the growing social control of stability and efforts to dampen fluctuations, capitalist economies are constantly

tottering on the brink of instability (as recalled in section 1.1, and as is evident from figure 2).

Consequently, the problem of the deficiency of the social control of stability in the 1930s has several aspects :

1. It is a constant feature of the transformation of institutions related to the stability of the macroeconomy that they may respond with a lag to the new challenges posed by the constant progress of management.
2. A specific challenge was posed to these institutions in the 1920s by the recent and specifically dramatic progress of management at the turn of the century, with two components, a macroeconomy more proned to business fluctuations, and a dangerous capital heterogeneity. As seems usual, sufficient time was required to implement the new transformations and the corresponding rising role of state intervention. The size of the problems to be tackled was quite exceptional, however.
3. As was shown in section 5, institutions in the early 20th century moved in a number of directions that represented a real threat *vis-à-vis* the stability of the economy.

7.3 RELATIONS OF PRODUCTION AND CLASS PATTERNS

This interpretation of the depression as a crisis of the transition to managerial capitalism can be expressed in terms of the transformation of the relations of production and class patterns—an analysis in which the declining power of capitalist owners, on the one hand, and the rising power of managers, on the other hand, are central.

The historical point of departure is provided by the economic and political conditions created by the fall of the profit rate in the late 19th century, in combination with new technical achievements. These conditions resulted in the development of large corporations and the transfer of the control of management to a new class of salaried managers, surrounded by employees. Simultaneously, the traditional capitalist, the owner, exited the productive system, retreating into new financial institutions. Within production firms, managerial and clerical personnel had now free grounds to exercise their skill and organize production and marketing efficiently. Simultaneously, capitalists in their new financial "stronghold" could now bestow their entire energy into their specific function, as financial investors, monitoring the "mobility" of capital among various firms and activities. This latter development relates to the exceptional growth of financial institutions during the 1920s, the role conferred on the stock market, and the specific channels governing the financing of firms (see sections 5.1 to 5.3).

Of course, this transformation was prepared by an earlier gradual movement. Salaried managers had already played a significant role during the Industrial Revolution (see POLLARD S. 1965), and their emergence was described by Marx in *Capital* (DUMÉNIL G., LÉVY D. 1994(b)). We stress here the acceleration of this movement, and its spreading to the entire economy, within a specific historical juncture.

It is important to acknowledge the true nature of this evolution as a transformation of relations of production and class patterns. Although property relations, in the strict sense of the term, were maintained, the traditional function of the capitalist blew up into two of its basic components, *ownership* and *control*. These transformations were reflected into new class patterns, with managerial and clerical personnel occupying a kind of intermediate position in the hierarchy of class relations, and the emergence of a new contradiction within this group, antagonizing initiative at the top of the hierarchy and execution at the bottom. However, the exact characterization of the class position(s) of these new groups oversteps the limits of the present investigation (see DUMÉNIL G., LÉVY D. 1994(b)).

Note that the transfer of firm management to managerial and clerical personnel does not imply that management is no longer targeted to the maximizing of the profit rate. Quite the contrary, we believe that diminished profitability levels strongly stimulated this transformation, and that these new groups devoted their efforts to the obtainment of maximum profit rates, and that they still do.

The new organization of monetary and financial institutions corresponds to the institutional framework in which capitalists "withdrew". This new structure echoed the basic function of this class, *viz.* financial investment, *i.e.*, what classical economists used to call the allocation of capital. The *monetary* component of this activity, credit and the issance of money, was tightly intertwined with the *financial* component, financial investment in general, and stock market operations in particular. Whereas managerial and clerical personnel enjoyed a large autonomy concerning the organization and management of non-financial corporations, money and finance remained within the hand of financiers, thus creating much fragility within the institutional framework prevailing during the first decades of the 20th century.

From the point of view of economic affairs, the traditional capitalist class still dominated political institutions and the state. The progressive shift from capitalists to managers within relations of production has not yet matured into a new political — more specifically "policy" — compromise. The two major aspects of traditional capitalist ideology with respects to economics, *viz.* free-market *laissez-faire* and fear of inflation, defined the contours of the first stage of the depression, with the weak involvement of the state in the control of the macroeconomy. It is under the pressure of facts (the succession of the Great Depression — the New Deal — and World War II), that the new compromise, now named after Keynes, emerged (though painfully), calling for state intervention, but simultaneously confining this intervention within strict limits preserving private initiative.

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Contents