

**TECHNOLOGICAL CHANGE,
DISTRIBUTION
AND STABILITY***

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RÉSUMÉ

CHANGEMENT TECHNOLOGIQUE, REPARTITION, ET STABILITÉ

Cette étude propose une interprétation générale de l'histoire économique des États-Unis depuis la guerre de Sécession, fondée sur la description de l'évolution de la technologie et de la répartition, d'une part, et de la stabilité, d'autre part. On distingue trois périodes : jusqu'à la fin du XIX^{ème} siècle, du début du XX^{ème} siècle jusqu'aux années cinquante, et depuis lors. On caractérise les première et dernière périodes comme périodes "à la Marx", avec un taux de profit qui baisse, mais la seconde période est une période de restauration correspondant à la première étape d'une révolution managériale (cadres d'entreprise). L'étude de la stabilité qui s'appuie sur des modèles dynamiques, fournit une interprétation de l'importance de la rentabilité, qui affecte la condition de stabilité. Le progrès de la gestion des entreprises est instabilisant et cet effet doit être contrecarré par le développement du contrôle social de la stabilité. Ce contrôle a été l'objet d'une seconde étape de la révolution managériale (au niveau des institutions étatiques), à la suite de la crise de 1929 et de la seconde guerre mondiale.

ABSTRACT

TECHNOLOGICAL CHANGE, DISTRIBUTION AND STABILITY

This study provides an overall interpretation of the economic history of the U.S. economy since the Civil War, based on the description of the evolution of technology and distribution, on the one hand, and the analysis of stability, on the other. We distinguish three periods. The first extends to the turn of the 20th century. The second stretches from the early 20th century to the 1950s. The third extends from the 1950s to the present. We characterize the first and third periods as periods "à la Marx", with a falling profit rate, but the intermediate period is a period of restoration corresponding to the first stage of a managerial revolution (business staffs). From the analysis of stability, based on dynamics models developed earlier, we derive an interpretation of the impact of profitability, as affecting the stability conditions. The progress of firm management is destabilizing and this effect must be checked by the development of the social control of stability. This control was the object of the second stage of the managerial revolution (at the level of state institutions), following the Great Depression and World War II.

MOTS CLEFS : Progrès technique, Taux de profit, Stabilité, Crise, Cadres

KEYWORDS : Technical Progress, Rate of Profit, Stability, Crisis, Managers

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INTRODUCTION

This study provides an overall interpretation of the evolution of the U.S. economy since the Civil War, based on the description of the historical profile of *distribution* and *technology*, and the analysis of *stability* phenomena. Although this analysis does not ignore the impact of the transformations of relations of production and institutions, only the major features of this evolution are mentioned in the interest of brevity. This choice of focus is in accord with our view that tendential laws (concerning technology and distribution) and the mechanisms which determine the stability of the general levels of activity and prices are two key elements in the interpretation of economic history. This perspective, although not fully original, does contrast with many other interpretations which stress the transformations of competition (competitive vs monopolistic capitalism).

What is presented below relies heavily on two other studies DUMÉNIL G., GLICK M., LÉVY D. 1991 and DUMÉNIL G., LÉVY D. 1991(a) (later denoted as "DGL" and "DL"), where we derived a periodization of the evolution of the U.S. economy in three stages, based on the observation of the transformations of distribution and technology: *Up to the turn of the century / From the early 20th century to the aftermaths of World War II / Since the 1950s*.¹ For labor cost and the productivity of labor, it is the growth of the variable which manifests a similar configuration, *Slow / Fast and increasing / Diminishing*. In the earlier and later periods, labor cost and labor productivity both rise simultaneously at a low rate, whereas the technical composition of capital is increased, and the productivity of capital and profit rates diminish. In the intermediate period, the growth of labor cost and labor productivity are accelerated, and the trends of the capital productivity and profit rate are now upward. This intermediate period appears as a period of restoration in which the trends are upward (but the growing heterogeneity of technology which accompanied this restoration undermined the continuation of prosperity and was dramatically manifested in the Great Depression).

The first and third periods, up to the turn of the century and since the 1950s, can be characterized as patterns of evolution *à la Marx*, with a constant rate of surplus value, an increasing organic composition of capital and a falling profit rate. The intermediate period appears as exceptional from the point of view of the fundamental laws of motion of capitalism. We attribute this specificity to a revolution in organization and technology, related to the development of "business staffs", which we describe as

¹ In DGL, we derived a slightly different periodization: *From the Civil War to World War I, from World War I to the 1950s and since the 1950s*. In DL, we develop our analysis of technological change by considering the vintage technology, that is the technology which is characteristic of each new vintage of fixed capital. With this approach to technological change, the beginning of the transformation of technology can be dated as early as the turn of the century. This is the date that we use here for the transition between the two first periods.

the first stage of a *managerial revolution*, which developed at the turn of the century, as a response to the long slide downward of the profit rate, in the context of a severe depression. This revolution had a profound impact on the profile of technical progress until the 1950s. The response of the system to the second episode *à la Marx*, since the 1950s, is different. No revolution in technology is apparent in the U.S. Only the speed at which the economy follows this track was reduced, and this reduction was manifested in the slowdown of the growth of the labor cost and labor productivity.

To this first account of the evolution of the U.S. economy, we combine a second aspect: *the analysis of stability*. By “stability”, we mean the ability of the economic system to correct for disequilibrium, by re-allocating resources among industries, adjusting relative outputs and prices, and limiting the fluctuations in the general level of activity and prices. Our analysis of the stability of capitalism is based on the construction of dynamics models in which the agents act in disequilibrium and, specifically, react to the observation of disequilibrium. We show that capitalism is very stable with respect to its ability to allocate capital among industries, to determine relative prices or outputs, what we call “(in)stability in proportions”, but very unstable with respect to the determination of the general level of activity and prices, what we call “(in)stability in dimension”.

There is a relationship between the two types of phenomena, tendential laws affecting distribution and technology, on the one hand, and instability in dimension, on the other, via the determination of the behaviors of economic agents, and this relation accounts for the importance of profitability. First, the value of the profit rate has a direct impact on behavior: If the profit rate falls, the behavior of individual firms is modified and the instability of the system is increased. Second, the historical movement of the profit rate induces the progress of management, which also materializes in modified behaviors. Even when the progress of management was able to offset the tendency for the profit rate to fall, as was the case in the intermediate period, this restoration was obtained at the expense of an increasing instability.

This inner tendency toward an increasing instability was not outwardly manifested, because it was constantly checked by the development of the economywide institutions (state intervention: Laws, Regulations and Economic Policy). Although this progress of social control has been continuous over the history of U.S. capitalism, it accelerated in the aftermath of the Great Depression and World War II. We denote this transformation as the second stage of the managerial revolution — at the center, in opposition to the earlier stage concentrated at the level of the private management of firms.

Thus, our general thesis concerning stability (in dimension) in capitalism combines the two notions of a *tendential instability* resulting from the progress of the private management of firms and of the simultaneous historical progress of the *social control of stability*. The outcome of these two movements is that capitalism is constantly maintained at the limit between stability and instability. Recurrent lags in the development of controls are observed for limited periods of time, since these con-

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trols are usually improved following the actual experience of instability. For brevity, we denote this thesis as the “Tendential Instability Thesis” It should be clear that we do not mean, by this expression, that the system was more and more unstable historically, but that it is constantly driven back to instability, in spite of the progress of controls.

From this analysis, one can derive several possible scenarios for the future. A first hypothesis is that the movement along the present pattern *à la Marx* will be maintained, with a slow technical progress. The profit rate will fall unless the growth rate of the labor cost is reduced to very low levels (in relation to the growth rate of technical progress which is very slow). A second scenario is that a new revolution in technology, again reversing or only relaxing the pressure of historical trends as in the intermediate period, is under way (in the U.S. or in an other country), and new opportunities will be opened for the progress of labor productivity and the purchasing power of wage earners. However, the signs of this restoration are not clearly evident in the series up to 1989 for the U.S. economy. A third scenario concerns the emergence of a really new stage in the history of capitalism, with a different type of dynamics of the variables, but it is difficult to be specific in this respect. In each case, it appears clear that important institutional transformations will likely be observed.

The study divides into three parts. Part 1 is devoted to historical tendencies. We discuss the relevance of Marx’s notion of historical tendencies and interpret the transformation of technology and distribution in the U.S. economy using an explanatory scheme derived from this analysis. Part 2 addresses the issue of stability. We present a framework for the analysis of stability and make explicit our thesis, denoted above as the “Tendential Instability Thesis”, on which we base our view of the relationship between profitability and stability. Part 3 briefly sketches the general interpretation of the economic history of the U.S. economy since the Civil War which follows from this analysis.

1 - HISTORICAL TENDENCIES

Section 1.1 discusses Marx’s analysis of historical tendencies from both a theoretical and factual point of view. In Section 1.2, we derive from this analysis the analytical framework which we use to interpret the history of the U.S. economy.

1.1 THE RELEVANCE OF MARX’S ANALYSIS

In this section, we first outline Marx’s analysis (Subsection 1.1.1) and then discuss its factual relevance (Subsection 1.1.2). We show that the first and third stages which

we distinguish in the history of U.S. capitalism correspond to patterns described by Marx, but that the evolution in the intermediate period does not.

1.1.1 Theory

Marx, in his analysis (MARX K. 1894, Section III, Ch. 13 to 15) of historical tendencies in Capitalism, described a tendency for the rate of profit to fall (already present in Adam Smith and David Ricardo, with different explanatory schemes). In Marx's analysis, the tendency for the rate of profit to fall is part of a broader set of historical tendencies. He actually refers to five such laws: 1) The diminishing labor value of commodities, 2) The increasing technical and organic compositions of capital, 3) The rising rate of surplus value, 4) The falling rate of profit, and 5) The acceleration of accumulation.

This analysis must be understood in relation to the Industrial Revolution in England that Marx directly observed. As such, it is not surprising that he insisted on the effects of mechanization and the development of the composition of capital. Ricardo stressed the consequences of the rising value of labor power and its consequences on the profit rate via the profit share. Marx replied that, even with a constant rate of surplus value (or share of profits in total income), the profit rate could diminish because of the increasing organic composition of capital.

The weak point in this analysis is the absence of any reference to the real wage or labor cost. This absence is felt at several points:

1. There is no analysis of the historical tendency of the real wage and of the mechanisms involved in its determination. It is well-known that this deficiency resulted in endless controversies among radical economists concerning the relative or absolute impoverishment of the workers.
2. In his description of the mechanism which induces capitalists toward technological change, Marx contends that new techniques are adopted which guarantee superprofits to their users when they are introduced, but are less profitable when they are generalized. It has been shown by Nobuo Okishio (OKISHIO N. 1961) that this result cannot be obtained, under the assumption of a constant real wage. (The mechanism described by Marx is compatible with the assumption of a constant share of profits, or constant rate of surplus value).
3. More generally, the relationship between the movement of labor cost and that of the technical composition of capital is not treated explicitly, only cursory remarks can be found in Marx's *Capital*.²

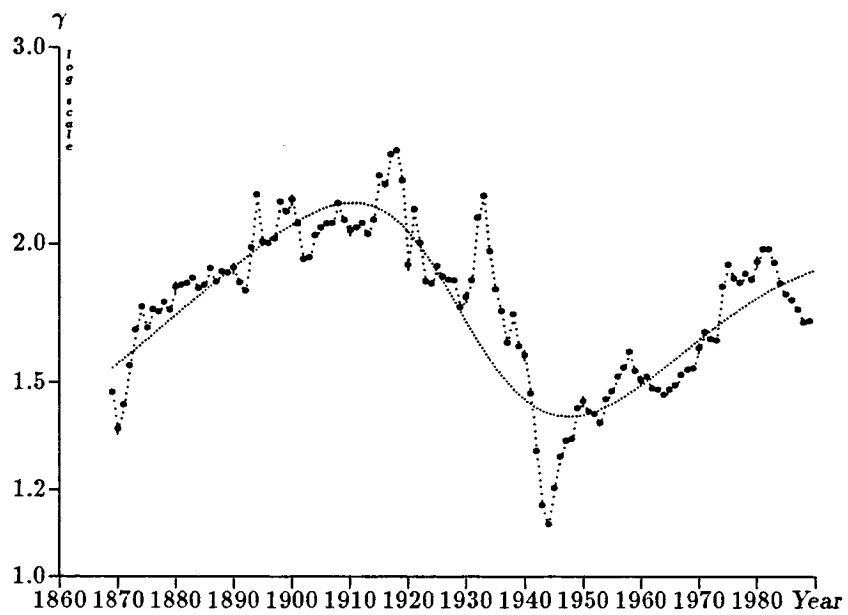
²In Volume I (MARX K. 1867, Ch. 15 (2), pp. 515-517), for example, Marx elaborates on Ricardo's analysis in chapter XXXI of *The Principles...* "On Machinery". He quotes Ricardo: "Machinery and labor are in constant competition, and the former can frequently not be employed until labor rises" (RICARDO D. 1817, p. 270). Following Ricardo and Marx the criterion used by capitalists for the introduction of a new

1.1.2 Facts

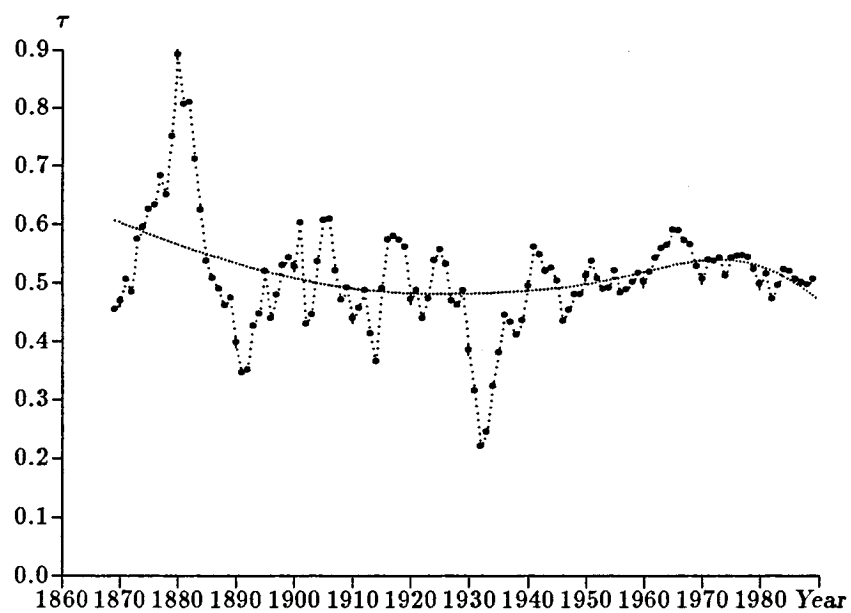
Abstracting from a number of well-known difficulties (for example, the difference between labor values and prices, the distinction between productive and unproductive labor, the heterogeneity of labor, the definition of the capitalist sector of the economy as opposed to self-employed and so on), Marx's five laws refer to the following variables:

1. The value of commodities is derived from their labor content, that is to the inverse of labor productivity. We denote the Net National Product (NNP) in constant dollars as Q , and the total number of hours worked as L . The average value of commodities is L/Q , and labor productivity is $P_L = Q/L$. A downward tendency of the first ratio is equivalent to an upward tendency of the second. The upward trend of labor productivity is well-known (cf. Figures 7 in DGL and 3 in DL).
2. K denotes the net stock of capital in constant dollars. Therefore, the *technical composition of capital* is K/L . With w denoting the wage rate deflated by the NNP deflator, and p the price of fixed capital also deflated by the NNP deflator, the *organic composition of capital* is $\gamma = Kp/Lw$. These two ratios display a pattern in three stages *Upward/Downward/Upward*. The technical composition of capital is presented in Figure 9 in DGL. The organic composition is displayed in Figure 1 in this paper. The trend line in this figure is derived as in Part III of DGL from the trends of the variables chosen as "basic".
3. With Π denoting total profits deflated with the NNP deflator, the rate of surplus value is $\tau = \Pi/Lw$. The profit share is $\pi = \Pi/Q$, and the two variables are linked by the relation: $\pi = \tau/(1 + \tau)$. The two ratios move in the same direction (upward, according to Marx). The profit share is presented in Figure 10 of DGL and the rate of surplus value in Figure 2 of the present paper. As above, the trend lines have been reconstructed as in DGL. The productivity of capital, $P_K = Q/Kp$, is defined as the ratio of NNP in current dollars to the net stock of capital also in current dollars. Since, $\gamma = (1 + \tau)/P_K$, an increasing organic composition of capital is approximately equivalent to a diminishing capital productivity under the assumption of a nearly constant rate of surplus value τ . These properties explain the similarities between Figures 1 in this paper and 4 in DGL.
4. The profit rate is $r = \Pi/Kp$. One has $r = \tau/\gamma$, and not $r = \tau/(1 + \gamma)$ as in Marx's analysis, since only the stock of fixed capital is considered. Using the productivity of capital, one can also write $r = \pi P_K$. With the assumption of the constancy of the profit share, the profit rate reproduces the movements of capital

machinery is that of the reduction of the value, or more rigorously the cost, of the commodity: The machine will be used only if this cost is comparatively lower, and this might be the case only for higher wages. This is equivalent to saying that the capitalists maximize their profits. An even more rigorous formulation would be to refer to the profit rate.



**Figure 1 - The Organic Composition of Capital
(1869-1989)**



**Figure 2 - The Rate of Surplus Value
(1869-1989)**

productivity and the inverse of the organic composition of capital. The profile of the profit rate has been discussed in DGL, where it has been shown that it is actually similar to that of P_K (cf. Figures 4 and 8 in DGL).

5. In Marx's analysis, the acceleration of accumulation seems to refer to the increase of the share of profits devoted to accumulation.

Consider first the period 1869-1900. *Globally the factual relevance of Marx's analysis is remarkable for the last decades of the 19th century.* The main series very convincingly support Marx's vision: diminishing value of commodities, increasing organic composition of capital and falling profit rate. A first difference between Marx's description and our observations is that the share of profits, or rate of surplus, value is constant or even diminishing in the 19th century. It is not possible, however, to be conclusive in this matter because of the huge oscillation of the share of profits observed during this period and the absence of an adjustment for unproductive workers (cf. MOSELEY F. 1988). Another problem concerns the acceleration of accumulation: If one considers the share of net investment in net profits, this rate has actually been rather constant during this first period. Again the absence of separation of the strictly capitalist section of the economy from the rest of the productive system does not allow an outright rejection of Marx's insights.

The same series show clearly that the pattern of evolution described by Marx was interrupted in the early 20th century by the rise of the profit rate and productivity of capital (or the declining compositions of capital), for a period of about 40 years. This interruption would naturally lead to the conclusion that the explanatory power of Marx's analysis was limited to a particular stage of development of capitalism. However, the observation that a similar pattern is again apparent since the 1950s basically questions this interpretation. Another view that is plausible is that *the intermediate stage is presented as a revolution—limited in duration—interrupting a set of basic inherent tendencies.* We favor this last interpretation which stresses the combination of a law of motion and a revolution.

Concerning the first and third stages, all the components of Marx's analysis are not necessarily relevant, but the basic insights are clearly remarkable:

1. The disconnection between the movement of the rate of surplus value, or the profit share (approximately constant), and that of the profit rate (diminishing)—since the productivity of capital manifests a clear trend downward.
2. The view that the progress of labor productivity is a function of the increasing technical composition of capital.
3. The notion that this dependency poses a threat to the profitability of capital.

The core of this analysis is a specific view of the relationships among the variables involved in the description of technological change. It is the purpose of the following section to investigate more thoroughly the exact relations implied in this pattern, and to illustrate its explanatory power.

1.2 A MARXIST FRAMEWORK OF ANALYSIS

In this section, we will present three explanatory schemes based on Marx's analysis of historical tendencies, which differ in the number of variables treated as endogenous or exogenous (among labor cost, technical composition, labor productivity and technical progress).

A first choice concerns the interpretation which is given of Marx's analysis of technological change, that is the relationship between his first and second laws, linking the diminishing value of commodities (that is the rise of labor productivity) and the increasing composition of capital. Depending on the exact specification of this relationship, as an *ex post* or *ex ante* mechanism (Subsections 1.2.1 and 1.2.2), two or three variables will be treated as exogenous. In a more ambitious interpretation, it is possible to relate the profiles of labor cost and technical progress to that of the profit rate, through feedback mechanisms, and to articulate all variables in a coherent set of interrelations. This project is discussed in Subsection 1.2.3.

1.2.1 The *Ex post* Function of Technological Change

One interpretation of the relationship between Marx's first and second laws is the following:

*The progress of labor productivity was paid for historically
by an increasing technical composition of capital.*

We denote this relation as the *ex post* function of technological change. The two variables involved are, $P_L = Q/L$, the productivity of labor, and, K/L , the technical composition of capital:

$$P_L = f\left(\frac{K}{L}\right) \quad (1)$$

in which f is an increasing function of its argument. This function may depend on time, and this dependency defines a type of "exogenous" technical progress, in the sense that this progress is not explained by the variables under consideration.³

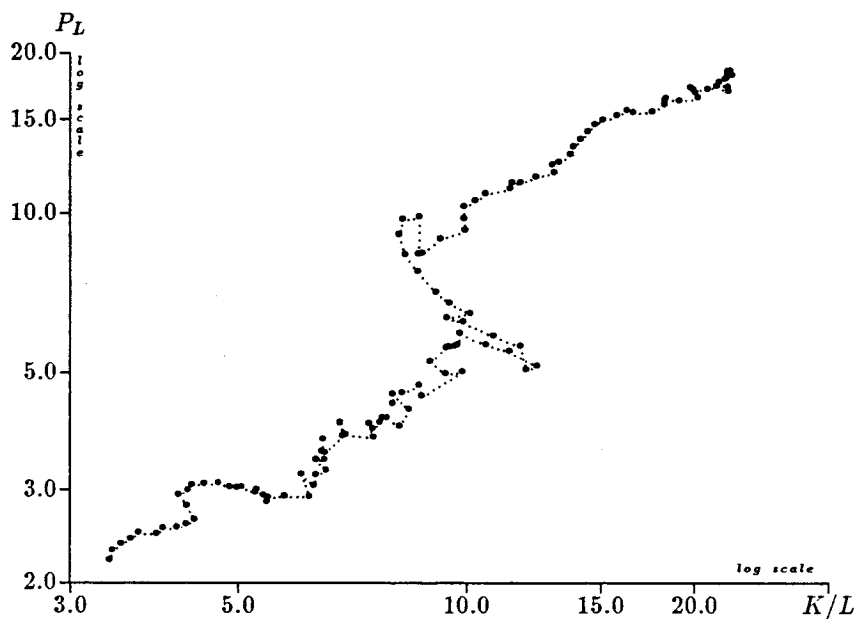
As shown in Figure 3 this relation is solidly grounded in the empirical evidence. It is not surprising to notice that a break can be observed in the intermediate years during which labor productivity is increased, whereas the technical composition of capital remains constant or diminishes slightly.

We specify equation 1 as:

$$\ln P_L = \ln A(t) + \alpha(t) \ln \frac{K}{L} \quad (2)$$

This formalism expresses the idea that the progress of labor productivity has two distinct origins: 1) The rise of the technical composition of capital (an expression of

³ Obviously, "exogenous" or "endogenous" must always be understood in relation to a specific framework of analysis, and never as an intrinsic characterization of a variable.



**Figure 3 - Labor Productivity vs Technical Composition of Capital
(1869-1989)**

“mechanization”), and 2) Exogenous technical progress (or technical progress in the strict sense, as in the remainder of this paper). *The interpretation of Marx’s view of technological change which follows from this analysis is that the first mechanism is far more important than the second.*

We adopt for $A(t)$ a model similar to that introduced in Section II.A of DGL:

$$\ln A(t) = a + bt + c \frac{\exp \frac{t - \bar{t}}{\Delta} - 1}{\exp \frac{t - \bar{t}}{\Delta} + 1} \quad (3)$$

and for $\alpha(t)$: $\alpha_0 + \alpha_1 t$.

The results of the regression are presented in the two first lines of table 1.⁴ The results displayed in the first line demonstrate that α ’s dependence on time cannot be maintained, since parameter α_1 is not significant. The results for α constant are presented in the second line. The slope of the asymptotes corresponds to an annual

⁴ As in the remainder of this paper, we do not present the values of the Durbin-Watson test which are usually smaller than 2. The series are serially correlated since they reflect business fluctuations, and no other variable is available to account for this dependence.

Table 1 - The Trend Exogenous Technical Progress ($\ln A(t)$) (1869-1989)								
	a	b	c	α_0	α_1	$\bar{t}$	Δ	R^2
(1) <i>Ex post</i> Function	1.47 ($t=3.0$)	0.00682 ($t=2.7$)	0.824 ($t=1.2$)	0.253 ($t=3.4$)	-0.00247 ($t=0.7$)	43.0 ($t=6.3$)	16.6 ($t=2.1$)	0.997
(2) <i>Ex post</i> Function	1.23 ($t=7.3$)	0.00500 ($t=2.6$)	0.507 ($t=6.7$)	0.245 ($t=2.7$)		37.3 ($t=32.2$)	12.4 ($t=6.9$)	0.997
(3) <i>Ex ante</i> Function	1.08 ($t=25.5$)	0.00333 ($t=2.8$)	0.518 ($t=7.4$)	0.334		36.6 ($t=46.2$)	11.8 ($t=8.5$)	0.994

growth rate of technical progress of only 0.5 percent. The maximum growth rate, in 1937 ($\bar{t}$), is equal to 2.5 percent ($b + c/2\Delta$).

The profile of $A(t)$ is displayed in Figure 4 (○). One can recognize in this figure the usual configuration in three stages: *Slow / Fast / Slow*.

In DGL, the profit rate has been expressed as a function of three "basic" variables, the productivity of labor P_L , the productivity of capital P_K (with numerator and denominator in current dollars) and labor cost w : $r = P_K(1 - w/P_L)$. The function of technical progress above suggests that r should be expressed in a different manner:

$$r = \frac{Q - wL}{pK} = \frac{Q/L - w}{pK/L} = \frac{A(t)(K/L)^\alpha - w}{pK/L} \quad (4)$$

With this interpretation of Marx's analysis, the movements of the profit rate is still explained by those of three exogenous variables, but different from those selected in DGL: the *technical composition of capital*, the *labor cost* and *time* (exogenous progress), to which one should add the relative price of fixed capital whose variation was limited historically.

1.2.2 The *Ex ante* Function of Technological Change

The analysis in DGL also revealed two other striking historical patterns:

1. The profit share in total income is approximately constant, and this invariance reaffirms the correlation between the productivity of labor and labor cost. The scatter diagram of the logarithm of the two variables is displayed in Figure 5. A nearly perfect straight line is observed. This corresponds to one of the most puzzling laws of motion of U.S. capitalism since the Civil War.
2. The technical composition of capital is also well correlated to the labor cost (cf. Figures 6 and 9 in DGL), in the first and third stages.

In order to account for these two relationships, one need only to *slightly* modify Marx's idea that the progress of labor productivity has been paid for historically by increasing the technical composition of capital:

At each stage of development, the progress of labor productivity can be obtained

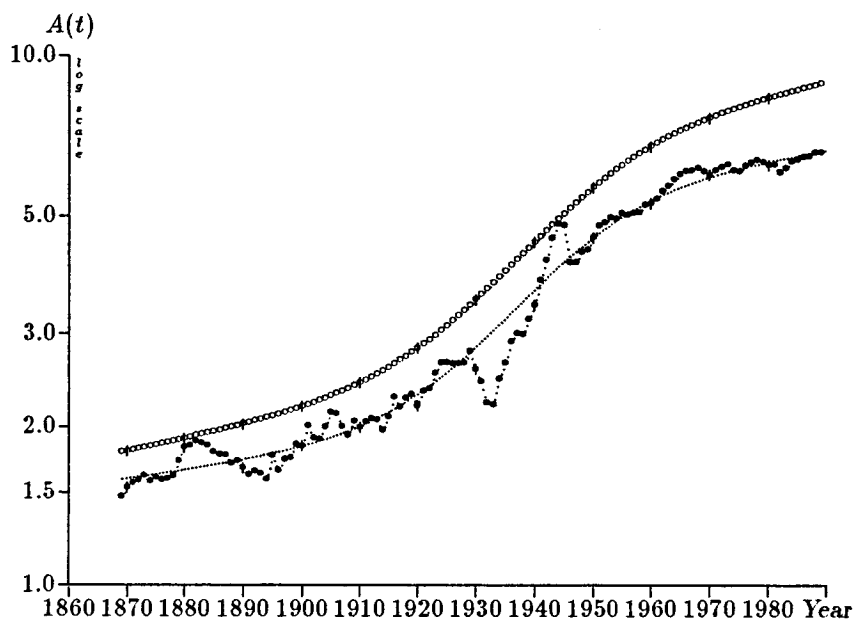


Figure 4 - Two Measures of Technical Progress
Ex post Model (o) and *Ex ante* Model (•) (1869-1989)

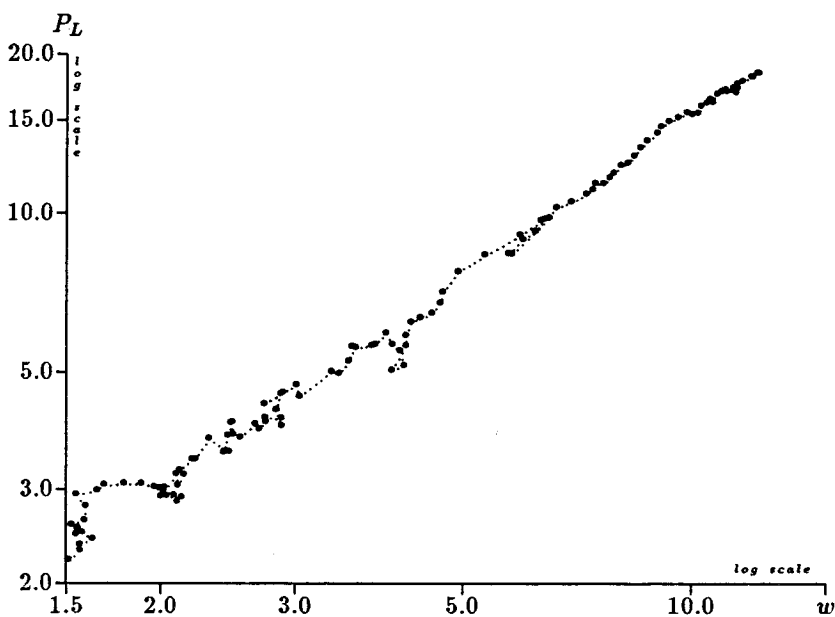


Figure 5 - Labor Productivity vs Labor Cost
 (1869-1989)

by an increasing technical composition of capital.

This statement defines an *ex ante* function of technological change whose formal expression is identical to that presented in equations 1 or 2. Labor productivity and the technical composition of capital are not considered here only for the values which have been observed historically: The relation defines a set of technological combinations at each given point in time. The actual combination is assumed to be the one which maximizes the profit rate.

The maximisation of the profit rate as in equation 4 allows for the determination of the optimal productive combination characterized by its productivity of labor and technical composition of capital, $\left(\frac{Q}{L}\right)^*$ and $\left(\frac{K}{L}\right)^*$:

$$\left(\frac{Q}{L}\right)^* = \frac{w}{1-\alpha} \quad \text{and} \quad \left(\frac{K}{L}\right)^* = \left(\frac{w}{A(1-\alpha)}\right)^{\frac{1}{\alpha}} \quad (5)$$

A priori, both parameters A and α may have varied historically, and this is easy to verify since they can be computed from the values of Q/L and K/L actually observed:

$$\alpha(t) = \frac{Q/L - w}{Q/L} \quad \text{and} \quad \ln A(t) = \ln \frac{Q}{L} - \alpha \ln \frac{K}{L}$$

In the regression of α on time, the trend is not significative. (The t score is 1.30). For this reason, we will consider α as constant (as in the *ex post* function). It can be estimated as the average value of π over the period, that is 0.334. This constancy is another expression of that of the profit share ($\pi = \alpha$), or of the correlation between labor cost and labor productivity, $w = (1 - \alpha)P_L$, (*cf.* the first of equations 5). On the contrary, A varied historically, as shown in Figure 4 (•). The pattern obtained is very similar to that resulting from the *ex post* function (◦). We again use the model defined in equation 3 to determine the trend of this variable. The results are presented in the third line of table 1 (see the dotted line in Figure 4). The slope of the asymptotes corresponds to an annual growth rate of technical progress of 0.3 percent, even smaller than for the *ex post* model. The maximum growth is unchanged.

Using the second of equations 5, one can see that the direction of variation of K/L depends on the degree of exogenous technical progress. When technical progress is slow, that is when it grows slower than labor cost, as during the first and third periods, the substitution effect is dominant and the technical composition of capital varies with labor cost. When technical progress is strong, as was the case during the intermediate period, the technical composition of capital rises slowly, or even diminishes if A grows faster than w .

With this *ex ante* interpretation, only two exogenous variables are now considered, the *labor cost* and *technical progress*. They explain the technical composition of capital, labor productivity, and the profit rate. Again Marx's thesis refers to the limitation of technical progress. Thus, the movement of the profit rate appears even more clearly as the outcome of a conflict between the two exogenous variables. With

the function of technological change as in equation 2, the rate of growth of the profit rate, labor cost and technical progress are linked by the relation :

$$\rho(r) = \frac{1}{\alpha}\rho(A) - \frac{1-\alpha}{\alpha}\rho(w)$$

Exogenous technical progress alleviates the pressure on the profit rate resulting from an increasing labor cost.

1.2.3 Feedback Mechanisms : Labor Cost and Technical Progress

In the analysis of technological change and profitability with the *ex ante* model, two variables are still treated as exogenous, technical progress and labor cost. This observation does not mean, however, that the movements of these variables cannot be explained, related to one another or, through feedback mechanisms, linked to the evolution of the variables that they determine (although we believe that they cannot be made endogenous in the strict sense of the term, as in a model.) On the contrary, we believe that they should be interpreted as components of a specific historical pattern of events.

Consider first labor cost. The series depicted in DGL suggests the existence of a relationship between the acceleration of labor cost (*cf.* Figure 6 in DGL) in the intermediate period and that of technical progress and, consequently, the corresponding rise of the profit rate, which occurred about ten years before.⁵ It is puzzling that the maximum value of the trend profit rate was attained in 1948 and the maximum growth rate of labor cost in 1947 in Figures 6 and 8 of DGL. In response, it is possible to introduce, at least as a research hypothesis, the notion of an impact of technical progress on the movement of wages, via the profit rate.

In this line of argument, technical progress is defined by $A(t)$, but never by P_L for which the causality runs from labor cost to labor productivity, and not the reverse (*cf.* equation 5). Our analysis, in this respect, is quite different from the common point of view in the literature which emphasises the determination of labor cost by labor productivity.

With a declining profit rate the resistance of capitalists to rising wages is strong. Technical progress in the intermediate period, and the corresponding restoration of the profit rate, was an inducement for capitalists to accept higher wages. Technical progress created the historical possibility of an increasing labor cost.

⁵ *It is clear that further investigation will be needed to clarify the difficult issue of the determination of wages. Several competing explanations could be proposed: Did enterprises confront an increased difficulty in recruiting workers at the turn of the century (in relation to the controls on immigration and the limitation of the work week)? Did political conditions (the situation of the labor movement on a world basis) account for the acceleration of the growth of labor cost? Should this acceleration be related to the growing heterogeneity of technology or increase of business staffs? Or should these factors be considered in combination?*

The same sort of mechanism may be at work with respect to the present stagnation of the purchasing power of wages, in relation to the falling profitability of capital since the late 1960s. The feedback mechanism evoked here suggests a causal relation running from the falling profit rate to stagnating wages. One may even surmise that, if there were a rise of technical progress similar to that which occurred at the turn of the century, real wages might again increase in the future. In the absence of such a rise of technical progress, rising wages would pull the profit rate further downward, and enterprises would be expected to strongly resist any such pressure from the workers.

Consider now technical progress. Although it is not possible to fully endogenize its movement, we believe that there is also a type of feedback mechanism at work from the decline of the profit rate in the first stage to the revolution of technology which was manifested during the intermediate period. This revolution, as already suggested, responded to the slide of the profit rate in the 19th century and the ensuing depression. Concerning the present situation of capitalism, the question is now posed of a similar feedback, from low levels of profitability to a new surge of technical progress. It is not obvious, however, that history will repeat itself in this respect.

At the center of this third interpretation, in which two feedback mechanisms are considered, still lies the same distinction of three stages, with two patterns *à la Marx*, interrupted by a period of restoration, but we now contend that :

1. The first episode *à la Marx* produced both a first revolution in technology (technical progress) and the acceleration of the growth of the purchasing power of workers.
2. The second pattern *à la Marx* put an end to the acceleration of the labor cost and labor productivity, which returned to growth rates similar to those observed in the 19th century. (In the present circumstances, the profit rate is low, as was the case in the late 19th century, and the situation is difficult to manage.)

2 - PROFITABILITY AND STABILITY

Already, underlying the analysis in the previous part, is the notion that historical tendencies and, in particular, the movement of the profit rate are important. In this second part we provide a justification for this role conferred on these tendencies. The crucial idea is that profitability is a determinant of *stability*.

In order to make explicit this relationship between profitability and stability, it is necessary to make an important detour through the analysis of stability, but Section 2.1 briefly summarizes the few principles which are strictly required for the understanding of the argument developed in Part 3.

The analysis of stability is developed in three sections. In Section 2.2, we intro-

duce the general framework: the various terms considered, the treatment of disequilibrium and the models of adjustment behaviors. The main results are summarized in Section 2.3. We distinguish between stability in proportions and in dimension and discuss the condition for stability in dimension. In this section, we present our first thesis concerning stability in capitalism: It is very stable in proportions, but unstable in dimension. However, these sections abstract from the historical aspects of these phenomena, which are left for Section 2.4 which makes explicit the relationship between profitability and stability and presents our second thesis concerning stability, which we call the "tendential instability thesis".

2.1 HOW DOES PROFITABILITY MATTER ?

We believe that profitability is a crucial variable in the evolution of capitalism in several respects.

As already noted in the previous part of this study, the simultaneous increase of the profit rate (in relation to an *autonomous* wave of technical progress) and of the growth rate of labor cost, in the intermediate period, suggests the existence of a feedback from the movement of profitability on wages (Subsection 1.2.3). This, in itself, would be sufficient to contend that profitability makes a difference, since its trend conditioned the evolution of the purchasing power of workers. In a similar manner, a lengthy decline of the profit rate in the 19th century has been evoked as a possible trigger for a revolution in technology, and this achievement is no less important. It is also clear that the variations of the profit rate impact on the division of profits. One share of profits is transferred to the state (Federal, State and Local) through taxation (cf. DGL, Figure 2). Another share is destined for accumulation through various channels.

Without denying the importance of these mechanisms or others, we will insist here on the fact that *profitability is related to the stability of the general level of activity*, that is to business fluctuations. Marx himself linked low levels of profitability to the occurrence of crises:

"[A fall in the rate of profit] promotes overproduction, speculation and crises, and leads to the existence of excess capital alongside a surplus population."

(MARX K. 1894, Ch. XV, p. 350)

The idea of a relationship between profitability and the determination of the general level of activity, through demand mechanisms, is rather common in the literature of *Marxist-Keynesian* inspiration, to which we devote the appendix of this study.

In order to make explicit the relationship between profitability and crises, it is necessary to develop a theoretical interpretation of business fluctuations. We believe that the investigation of the mechanisms which insure the *correction of disequilibrium* in the economy and prevent them from becoming cumulative, that is stability analysis, is crucial in the interpretation of business fluctuations. The *overall cor-*

rection of disequilibrium in a private economy actually results from the *individual* reactions of each agent to the disequilibria that he/she confronts (for example, the reaction of firms to disequilibrium between supply and demand). However, this outcome is not automatic: Individual reactions to disequilibrium do not result, under every circumstances, in the overall stability of the system. In other words, stability is *conditional*. A crisis corresponds to a situation in which this transformation of individual corrections into an overall stabilization process fails.

This approach to business fluctuations in terms of stability is not common in the economic literature. In the formation of economic theory much attention has been paid to *equilibrium* phenomena, while far less research has been devoted to the analysis of stability. It was clear, however, that Adam Smith's famous allusion to the "invisible hand", which is supposed to insure the coordination of the actions of private agents through market mechanisms, directly referred to the stability of equilibrium.

Obviously, the stability of the general level of activity depends on a complex network of relationships and mechanisms (monetary, real and institutional), and cannot be reduced to any single factor (Sections 2.2 and 2.3 below). However, within each institutional context, the profit rate is a crucial determinant of stability (Section 2.4 below), via its impact on firm behaviors. More precisely, it is important to distinguish between two types of relationships between profitability and stability:

1. The profit rate is one of the parameters to be considered by management, at each stage of its historical development. Thus, the variations of the profit rate are reflected in firm behavior which, in turn, impacts on stability.
2. The notion of technical progress is more common in the literature than that of the progress of management, but we believe that the progressive development of management is no less important. (Actually, the two processes are tightly related and should be considered simultaneously.) A falling profit rate stimulates the progress of management (in the same manner as it induces technical progress) and, thus, impacts on stability.

Finally, the stability of the system depends on two types of conflicting forces:

1. The actual fall of the profit rate and the continuous progress of management induced by the tendency for the profit rate to fall both provoke similar transformations of firm behavior in directions which are *destabilizing* from the point of view of the general level of activity.
2. This evolution toward an increasing instability stimulates the progress of institutions which control the overall stability of the system. They are progressively developed as a response to the manifestations of instability: overheatings, recessions and depressions.

We denote this analysis the *Tendential Instability Thesis*. We do not mean by this ex-

pression that instability has been increasing along the history of capitalism⁶, but that capitalism is constantly driven back to the stability frontier in spite of the constant improvement of the social controls of stability.

This analysis of the history of U.S. capitalism stresses the importance of specific types of institutions, those in charge of the social control of stability.

2.2 A FRAMEWORK FOR THE ANALYSIS OF STABILITY

In this section, we will very briefly summarize the main aspects of our analysis of stability in capitalism, as developed by earlier studies.⁷ This analysis is based on the construction and investigation of the properties of a set of dynamic models, developed along the same principles. In Subsection 2.2.1, we distinguish between three “terms”: short term, long term and the term of historical tendencies. Subsection 2.2.2 introduces the modeling of behaviors in terms of adjustment, which we call “disequilibrium microeconomics”. A first example of adjustment is presented in Subsection 2.2.3, concerning the decision to produce. Subsection 2.2.4 is devoted to money and credit.

The notation and equations are borrowed from DUMÉNIL G., LÉVY D. 1990(b). We abstract here from any historical considerations, which will be developed in section 2.4.

2.2.1 Temporal Frameworks

In our analysis of the dynamics of capitalist economies, we distinguish between the short term, the long term and historical tendencies (or the very long term). The general idea in the distinction between these time periods is that the various variables considered have different speeds of adjustment. For example, output can be adjusted faster than the capital stock, or technology can only be modified as capital is renewed, and therefore changes at a slower rate than the capital stock. In the analysis of a specific term, one uses this difference of adjustment speed to assume that some variables are constant (those considered in longer terms) or that some equilibrations have already been realized (concerning variables involved in shorter terms).

The first distinction, between the long term and historical tendencies is fundamental in the works of the classics. The *long term* refers to the formation of prices of production as a result of the mobility of capitals led by profitability differentials. The classics developed this analysis assuming that distribution and technology are given. It is obvious that distribution and technology are continuously transformed,

⁶ *This issue is controversial. See, for example, ROMER C.D. 1989 and BALKE N.S., GORDON R.G. 1989.*

⁷ DUMÉNIL G., LÉVY D. 1987(a), 1987(b), 1987(c), 1989(a), 1991(c) and 1990(b).

and that prices of production vary historically. But the classics believed that these transformations do not prevent the gravitation of prices of production around this comparatively slowly moving target. The term of *historical tendencies* is that of the variation of the real wage or labor cost, and technological change. The issue in the analysis of this very long term is not that of the gravitation around a target, but the definition of a continuous movement of the variables. Our analyses in DGL and DL deal with historical tendencies.

The distinction between the long term and short term is common in the literature. The *short term* refers to mechanisms which can be analyzed assuming that the capital stocks are constant (and that distribution and technology are also given). Since the stocks of capital are constant in the short term, the variation of outputs implies changes in capacity utilization rates. This variable is crucial in the investigation of short-term phenomena.

2.2.2 Disequilibrium Microeconomics

By “disequilibrium microeconomics”, we refer to the description of the behavior of economic agents (decision to produce, to fix prices, to allocate capital and so on) within disequilibrium. “Disequilibrium” can refer to the following situations:

1. The commodity markets do not clear. This is equivalent to saying that involuntary stocks of inventories of finished goods exist. Since firms, because of the constant variations of demand, tend to maintain a certain volume of inventories (“normal” inventories), this means that inventories are larger or smaller than this volume.
2. The second disequilibrium concerns capacity utilization rates. Firms tend to use their productive capacities at a certain level (also called “normal”). The actual capacity utilization rates may differ from this normal level.
3. The profit rates on the various investments of a capitalist, or on his/her opportunities to invest, are not equal.
4. The general level of prices is not constant. This disequilibrium is not directly felt as such by individual agents, but perceived at a macroeconomic level by monetary authorities.

Obviously, other disequilibria could also be considered, concerning, for example, debts, the labor market, international trade and finance, and so on.

The behavior of economic agents is described in terms of *adjustment*. Agents observe disequilibria and react to these observations by modifying their behaviors. For example, in the analysis of the formation of prices of production by the classics, capitalists observe profitability differentials and move some fraction of their capital in response.

The degree of the reaction to the disequilibrium is crucial. The same accumulation of inventories or the same difference of profitability can entail reactions of quite

different amplitudes. In the modeling of behaviors, this sensitivity of economic agents will be represented by parameters which we call "reaction coefficients".

With this approach, equilibrium is always presented as the possible outcome of a dynamic mechanism (the "gravitation" of the classics), and not postulated *ex ante*.

2.2.3 The Decision to Produce

In this subsection, we give a first example of adjustment, corresponding to the decision to produce. The general idea is that firms will react to the disequilibrium between supply and demand by increasing or diminishing their output.

In the short term, the stock of capital and technology, therefore, the productive capacities are given. Thus, the decision to produce is, in fact, equivalent to the decision to use productive capacities at a certain level, that is the choice of a capacity utilization rate. We assume that firms decide on the use of their productive capacity on the basis of their capacity utilization rate at the previous period and the disequilibrium on their inventories (that is the difference between supply and demand). If, for examples, inventories are large, then the capacity utilization rate will be diminished.

We denote u_t , the capacity utilization rate in period t , and $\bar{u}$, the normal value of this rate. In a similar manner, s defines the ratio of inventories to productive capacities and $\bar{s}$ the normal value of this ratio. With this notation, the decision to use productive capacities in period $t + 1$ can be modeled by the following equation :

$$u_{t+1} = \bar{u} + \sigma(u_t - \bar{u}) - \varepsilon(s_t - \bar{s}) \quad (6)$$

In this equation $u_t - \bar{u}$ and $s_t - \bar{s}$ represent the two disequilibria, on productive capacities and inventories observed in t . Excessive stockpiling ($s_t - \bar{s} > 0$), for example, induces firms to diminish their output. Parameters σ and ε are two reaction coefficients.

2.2.4 Money

We believe that monetary mechanisms are crucial in the analysis of the dynamics of capitalism. The loop *Production* $\rightarrow$ *Income* $\rightarrow$ *Demand* $\rightarrow$ *Production* is perturbed by credit and the issuance of money.

The modeling of monetary mechanisms is complex, and we will only consider here credit granted to firms by the banking system for the purpose of investment, which we believe is critical to the analysis of business fluctuations. The capital aspect one must capture in describing credit mechanisms is that a high level of activity stimulates the demand for loans from enterprises, but inflation causes the banking system to call in these loans (and conversely).

We denote ΔL_{t+1} , the variation of the net stock of loans outstanding for investment, and consider the ratio of these loans to the value, K_t , of the stock of fixed capital in current dollars. This ratio is modeled as an increasing function of the level

of utilization of capacity and a decreasing function of the rate of variation of the general price level, denoted j_t :

$$\frac{\Delta L_{t+1}}{K_t} = \omega(u_t - \bar{u}) - \varphi j_t \quad (7)$$

in which $u_t - \bar{u}$ and j_t measure the two disequilibria considered in the negotiation between the firm and the bank, and ω and φ are two reaction coefficients.

2.3 RESULTS

In this section we present the main results of our stability analysis. Subsection 2.3.1 introduces the distinction between proportions and dimension, as well as our thesis concerning stability in proportions and instability in dimension. Subsection 2.3.2 is devoted to the condition for stability in dimension and Subsection 2.3.3 to a brief analysis of business fluctuations.

2.3.1 Proportions and Dimension

The description of behaviors supplemented by a number of accounting relations defines a dynamic model, from which the values of the variables in one period can be deducted from their values at the previous period. The problem is, then, to analyze the equilibria of this model and their stability.

Our models always possess an equilibrium position corresponding to the normal functioning of the economy. Other equilibria can also exist depending on the exact modeling of behaviors, but we will abstract here from these equilibria, and focus on the issue of the stability of normal equilibrium. The main results obtained concerning stability are the following:

1. Equilibrium can be stable.
2. This stability is subject to certain conditions regarding the value of reaction coefficients.
3. Two types of stability can be distinguished, with different properties:
 - Stability in proportions, that is stability with respect to the relative values of the variables (relative stocks of capital in each industry, relative prices and outputs).
 - Stability in dimension, that is stability with respect to the absolute values of the variables (general level of activity, general price level).

The conditions for stability in proportions are easily satisfied, whereas the conditions for stability in dimension are easily violated. This property corresponds to our first thesis about the stability of Capitalism: *Capitalism is very stable with respect to proportions and very unstable with respect to dimension.*

This distinction between proportions and dimension is not explicit in the literature, but it plays a crucial role in economic theory. In the Walrasian tradition, the problem of dimension is treated in a trivial manner. By adopting the point of view of macroeconomics, Keynes abstracts from proportions and focuses on dimension. The classics, in their analysis of the formation of prices of production treat a problem of proportions and overlook the issue of dimension.

Note that our thesis about stability in proportions and instability in dimension sheds some light on the traditional debate concerning private interest and state intervention :

1. Individual interest insures stability in proportions and, thereby, guarantees a certain form of efficiency in the system. (Capitals are allocated rather properly, commodities are usually available on the market in appropriate amounts for the customers who have the capability to pay.)
2. Individual interest at the level of individual firms is also responsible for the instability of the general level of activity. In combination with the management of monetary relations, individual behaviors may be responsible for the instability in dimension of the system. For this reason, monetary relations were subjected to specific institutional regulations.

2.3.2 The Condition for Stability in Dimension

In this subsection, we present more explicitly a few results concerning stability in dimension, and its relation to the analysis of business fluctuations. Since we abstract from all phenomena relative to proportions, it is possible to keep in mind the image of a single-commodity economy.

Stability in dimension refers to the stability of the loop *Production* $\rightarrow$ *Income* $\rightarrow$ *Demand* $\rightarrow$ *Production*, in which credit mechanisms and the issuance of money (cf. Subsection 2.2.4) are articulated. The crucial elements in this loop are: 1) The decision to produce, which commands the volume of output, but also income distribution, and 2) The decision to invest and borrow for investment (since we assume here that the decision to spend from a realized income is straightforward).

Instability in dimension is due to these decisions to produce and to invest. The decision to produce implies that a high level of demand in comparison to output, that is inventories below normal, will result in a stimulation of activity (*High activity* $\rightarrow$ *High activity*). A temporal problem is involved in the analysis of the effects of the decision to invest. Investment is stabilizing, or *countercyclical*, from the point of view of the long term. Firms decide to invest more or less in relation to their deficient or excessive capacity utilization rate in the present, to adjust this rate for the future (*High activity* $\rightarrow$ *Lower activity*). In the short term, however, this behavior is procyclical, since a large capacity utilization rate provokes an immediate reaction which stimulates demand and, thus, activity in the economy, that is tends to increase the capacity utilization rate (*High activity* $\rightarrow$ *High activity*). The converse is obviously

true for a low capacity utilization rate.

The loop *Production* → *Income* → *Demand* → *Production* is difficult to stabilize because of this dependency between short and long-term phenomena. It is controlled through the management of monetary institutions:

1. Firms are generally rationed concerning the financing of their investment plans for the future. They make decisions under a *capital or financing constraint*. This point of view has always been part of the classical perspective. It is essential to the notion of capital mobility.
2. This capital constraint is imposed by the monetary system, who holds the privilege to issue money.

The exact form of the condition for stability in dimension depends on the model, but some basic patterns recur. For example, in a very simple form of the model (a short-term model with fixed prices), the condition is:

$$\theta < 1 \quad \text{with} \quad \theta = \sigma + \varepsilon \frac{\omega}{\varphi} \quad (8)$$

In this equation, θ is a synthetic parameter, and σ , ε , ω and φ are the reaction coefficients which were introduced in equations 6 and 7.

If θ is larger than 1, stability in dimension is no longer insured. σ and ε correspond to the effect of demand on production, or supply (cf. equation 6). The ratio ω/φ accounts for the effect of the level of activity on the formation of demand, via credit relations (cf. equation 7). It is easy to recognize the pro and countercyclical effects of credit relations, corresponding respectively to ω in the numerator and φ in the denominator.

2.3.3 Business Fluctuations

With this model, it is possible to account for business fluctuations. Consider, for example, the business cycle as described by Marx for the 19th century:

"If we consider the turnover cycle in which modern industry moves—in-activity, growing animation, prosperity, overproduction, crash, stagnation, inactivity, etc., ..." (MARX K. 1894, Ch. 22, p. 482)

The cycle can be described as a succession of periods in which condition 8 is satisfied and then violated. When condition 8 is satisfied, the model converges toward an equilibrium (what Marx calls "prosperity"). When the condition is violated, the outcome is different: "Overproduction", "Stagnation", and so on.

In order to describe what exactly happens when the stability of normal equilibrium is not insured, it is necessary to be more specific concerning the description of behaviors at a distance from equilibrium (and to take non-linearities into account). Other equilibria can exist and be stable. We refer to two such equilibria as *overheating* ($u > \bar{u}$ and $s < \bar{s}$) and *stagnation* ($u < \bar{u}$ and $s > \bar{s}$), and interpret the business cycle

as a succession of switches between the three equilibria (see, for example, DUMÉNIL G., LÉVY D. 1987(b)).

Marx's description corresponds to the sequence: *Stagnation – Balanced Growth – Overheating – Stagnation*. The passage from Balanced Growth to Overheating results from the violation of what we called the "Capital Constraint", manifested in the rise of ω/φ in equation 8. The switch from Overheating to Stagnation is easily initiated by an economic shock and develop into the cumulative contraction of the level of activity (the "Crash") due to the combined effects of ϵ and ω .

In this interpretation of the business cycle, θ fluctuates around 1, sometimes above and sometimes below, but *remains in a vicinity of 1*. This is a general feature of business fluctuations (independently of their exact form which varied historically). It is the mathematical expression of the general thesis of the instability of capitalism with respect to dimension. In the next section, we will provide an historical interpretation of this property, and introduce the corresponding notion of "stability frontier".

2.4 THE TENDENTIAL INSTABILITY THESIS: TENDENTIAL INSTABILITY AND INCREASED SOCIAL CONTROLS

This section is specifically devoted to the "Tendential instability thesis", from which we derive our view of the relationship between profitability, and more generally historical tendencies. Subsection 2.4.1 introduces the central idea in this analysis, which opposes the growing instability due to the transformation of firm management to the corresponding development of the social control of stability. Subsection 2.4.2 discusses more thoroughly the role conferred to the transformation of management in relation to the analysis of stability in the two previous sections and the tendency for the profit rate to fall. For brevity, the evolution of the institutional framework in charge of the control of stability will not receive a similar discussion. Subsection 2.4.3 restates the role conferred to profitability in this analysis in relation to the periodization in three stages established in DGL.

2.4.1 Destabilizing Behaviors, Increasing Social Controls of Stability, and the Stability Frontier

Our general analysis, which we denote as the "Tendential instability thesis", can be summarized in three points:

1. The historical transformation of internal management creates in the economy an historical tendency toward an increasing instability.
2. The institutional framework (Laws, Regulations, Policies) in charge of the social control of stability is developed in response to this growing instability.
3. Because of the combined effects of these two types of forces, stabilizing and destabilizing, the system is constantly maintained in the vicinity of the condition

for stability which we call the "Stability frontier".

The first of the three elements above, provides an explanation for the paradoxical observation that in spite of the growing social control of stability, capitalist economies are constantly close to overheatings, recessions, or depressions.

There is in a capitalist system a tendency toward "tighter" management which ultimately increases instability in dimension. This increased instability results periodically in the multiplication of overheatings, recessions, or depressions. Confronted with these manifestations of instability, the control of stability is progressively improved at the center. These innovations do not usually anticipate the difficulties, but follow the experience of macroeconomic disequilibrium. Thus, in the history of capitalism, stability is constantly checked and then reestablished in new configurations in which the individual contribution to the overall instability is increased as well as the social control of stability.

These mechanisms can be easily understood using the model presented in the two previous sections:

1. Firm behavior is represented by equations such as 6 and, for one part, such as equation 7: The form of these equations is important as well as the value of the reaction coefficients such as σ , ϵ and ω . These coefficients are involved in the condition for stability (cf. equation 8). Assuming that ϵ and ω increase, this accounts for the first statement that the transformation of firm behavior may impact on stability.
2. The reaction of the institutional framework in charge of the social control of stability is represented by coefficient φ in equation 7. As shown by equation 8, the rise of φ may counteract the increase of ϵ and ω . But the transformation of this coefficient implies the progress of a complex set of institutions (in particular, the banking system and its functionings).
3. The notion of stability frontier refers to the fact that θ is constantly maintained in the vicinity of 1, whereas the values of ϵ and ω , on the one hand, and φ , on the other hand, are constantly increasing.

2.4.2 Management, Instability and Profitability

In this subsection, we discuss the reasons why changes in management have historically increased instability.

In our opinion, the evolution of management should be approached using a distinction similar to that which is used in the analysis of technological change, which considers both the impact of prices (in particular labor cost) on the choice of the optimal combination (substitution), and technical progress. Applied to the analysis of management, this distinction opposes the two following mechanisms:

1. In a given state of knowledge, the choice of optimal behaviors (optimal reaction coefficients) depends on "price" variables such as the cost of holding inventories

or unused capacities, the cost of changing the level of activity and so on, and the profit rate. The profit rate, when it is actually falling, changes firm arbitration between present and future returns, implying the simultaneous rise of ε (for the short term) and ω (for the long term).

2. Management procedures have been the object of a constant progress along the history of capitalism. New procedures and practices have increased efficiency from the point of view of individual firms. Consider first the decision to produce in the short term. The profit rate will benefit from any improvement in the ability of the firm to maintain itself with lower levels of inventories (to minimize $\bar{s}$), or to use more intensively its productive capacities (to maximize $\bar{u}$), provided that the firm preserves the capability to supply the good, possibly with the delay considered as normal in the course of business in the industry. This implies a modification of coefficients σ and ε , in the direction of a faster response to the evidence of disequilibrium. This is equivalent to saying that ε must be larger.⁸ Similar outcomes are obtained for the decision to invest. The improvement of management leads firms to strictly control the use and growth of their productive capacities. This is equivalent to the increase in the coefficient ω .

The development of capitalism has been accompanied by a progressive deepening in the layers of management, and a growing specialisation of tasks. The individual capitalist in charge of the financing of the activity, the conception and organization of production, the supervision of the workers, the purchase of materials and the commercialization of goods, the control of inventories and liquidities and so on, has been progressively compartmentalized and the object of specific business staffs. This evolution is not recent and was already well identified by Marx :

"Joint-stock companies in general (developed with the credit system) have the tendency to separate this function of managerial work more and more from the possession of capital, whether one's own or borrowed ; [...] since on the other hand the mere manager, who does not possess capital under any title, neither by loan nor in any other way, takes care of all real functions that fall to the functioning capitalist as such, there remains only the functionary, and the capitalist vanishes from the production process as someone superfluous." (MARX K. 1894, Ch. 23, p. 512)

2.4.3 Profitability and Stability: A Summing Up

It is important to stress here the exact nature of the relationship between profitability and stability in relation to the periodization in three stages which was established earlier in DGL.

Along a trajectory à la Marx, as in the first and third periods, both mechanisms

⁸ See DUMÉNIL G., LÉVY D. 1990(a) where the determination of these coefficients is analyzed. We also show that the improvement of the information of firms will produce a similar effect.

discussed in the previous subsection work in the same direction. The falling profit rate implies directly a tighter management, as well as the progress of management and, consequently, a tendency toward an increasing instability in two respects. In these periods, technical progress was not sufficient to offset the tendency. From this observation one can surmise that the progress in management was also slow. Therefore, its contribution to the growing instability of the system must have remained limited in comparison to the straightforward impact of diminishing profit rates.

During the intermediate period, a revolution in technology and organization occurred. One can hypothesize that this revolution was also manifested in the overall management of firms (not only in the workshop). However, during this period, the two mechanisms were working in opposite directions, since the profit rate was actually restored. We have no evidence to base a contention that one mechanism was dominant. Still, one can notice that two major crises occurred in this intermediate period (1921 and 1929).

Consider now, the social control of stability. It is well-known that the succession of the New Deal and World War II coincided with a major revolution in this evolution. This observation introduces here a second element of periodization in two stages, which is actually quite traditional, between two periods, prior to and after World War II. We see this transition as an acceleration in the permanent historical tendency toward increasing central control.

In this interpretation, the profitability factor plays a central role, since it is, directly, the historical stimulus to the transformation of management and, indirectly, to the social control of stability. This analysis also sheds some light on the notion of a minimal profit rate, which could be defined as the smallest profit rate tolerable from the point of view of stability in a given institutional context. This notion is obviously relative.

3 - HISTORY

In this part, we will briefly illustrate the explanatory power of the analysis presented in this study with respect to the interpretation of the history of the U.S. economy since the Civil War, also using the descriptions provided in DGL and DL. We combine the description of historical tendencies and the analysis of stability, as well as the corresponding periodizations. This part divides into four sections. The three first sections correspond to the three stages which we distinguish in the history of the U.S. economy (before the turn of the century in Section 3.1, between the turn of the century and the 1950s in Section 3.2, and since the 1950s in Section 3.3). Last, Section 3.4 briefly discusses plausible scenarios for the future.

3.1 THE FIRST HISTORICAL PATTERN A LA MARX AND THE FIRST STAGE OF THE MANAGERIAL REVOLUTION

We interpret the last decades of the 19th century as a typical period *à la Marx*. Recall that this is the period that Marx himself observed, which he called modern industry.

In this first stage, real wages were slowly increasing and technology was correspondingly modified with a continuous substitution of fixed capital for labor. Technical progress in the strict sense existed, but it was not sufficient to offset the tendency for the profit rate to fall. We can hypothesize that management was also progressing slowly. What we know from business fluctuations reveals that the general level of activity was not very stable, and the institutional social control of stability was archaic.

Obviously, this evolution could not be maintained forever, and capitalism moved toward a deadlock. This situation culminated in the depression at the turn of the century, with unemployment rates skyrocketing to levels similar to those which would be reached in the 1930s (18.4 percent in 1894 and 25.2 in 1933). The U.S. economy, to which the world economy could obviously not be reduced, provided in those years a good illustration that there was some grounds to Lenin's thesis concerning Imperialism as the "Last Stage of Capitalism".

The outcome of this situation was not the proletarian revolution, but the acceleration of the progress of managers and, more generally, business staffs. The importance of this movement is such that we believe that it should be characterized as the first stage of a *managerial revolution*. The result of this transformation was the overwhelming empire of organization, in the workshop and outside, and its main achievement was the surge of technical progress. However, a complete justification of the role conferred to business staffs in this interpretation oversteps the limits of the present study.

3.2 STRENGTH AND FRAGILITY OF THE INTERMEDIATE STAGE, AND THE SECOND STAGE OF THE MANAGERIAL REVOLUTION

The profile of the variables in this intermediate period, which lasted approximately until the 1950s, was in many respects quite specific. The productivity of capital and profit rate rose, and the growth of labor cost and labor productivity was accelerated.

This period was obviously a period of restoration. However, it was also undermined by a number of inherent weaknesses:

1. The Rate of Return on Investment (cf. DL, in particular Figure 6) was increasing in a totally unusual manner. It resulted in the 1920s in a sharp movement upward in the financial markets, which, although not deprived of real foundations, was

difficult to control.

2. Important and unusual risks were also associated with the accelerated rate of technical progress. As was shown in DL, technology became progressively more and more heterogeneous and considerable fractions of the stock of capital had to be discarded ahead of schedule (cf. DL, in particular Figure 7) in relation to the rise of labor cost. The threat came from the possible acceleration of such discards in the occurrence of a recession, and the ensuing transformation of this recession into a depression.
3. The implementation of the institutional framework in charge of the social control of stability was progressing very slowly, in comparison to the destabilizing transformation of firm behavior and the two specific threats introduced above. The development of capitalism was accompanied by the growth of *private centralized institutions* such as the financial market and the banking system, with inappropriate regulations and deficient state intervention.

These three features explain the dramatic character of the Great Depression: the speculation on the financial market, the exceptional extension and duration of the devalorisation of capital, and the inability of the state to intervene effectively. With this interpretation, a double historical function is conferred to the Great Depression:

1. Considerable fractions of the capital stock rendered obsolete by the rise of labor cost were discarded.
2. The institutional framework in charge of the social control of stability was thoroughly transformed by the combined experiences of the New Deal and World War II.

This second effect of the depression transformed so profoundly the working of the system, that one can refer to this transformation as a *second stage of the managerial revolution*, affecting mainly state agencies, instead of private enterprises.

The U.S. economy emerged from World War II under exceptionally favorable conditions, cumulating the advantages of the two revolutions in technology and control of stability, and freed from the burden of obsolete vintages of capital. This juncture accounts for the prosperous character of the post-war years.

In this study, as well as in DGL and DL, the U.S. economy has been considered in isolation, abstracting from the rest of the world. We can, however, hypothesize that the U.S. economy was the first to undertake these transformations, in particular, to escape from the historical pattern *à la Marx*, at the turn of the century, anticipating the movement in the rest of developed countries by several tens of years. After World War I, its industry became progressively dominant in the world economy. It was deeply affected by the Great Depression, but the depression can be interpreted as a specific stage in this transformation. Finally, the U.S. economy emerged from World War II in the position of a world leader.

3.3 THE SECOND PATTERN A LA MARX

In the analysis of the period following World War II, we will distinguish two subperiods as suggested in DGL: 1) The two glorious decades of the 1950s and the 1960s (Subsection 3.3.1) in which the growth rates of labor productivity and labor cost remained high, although decelerating, and 2) The famous "productivity slowdown" since the 1970s (Subsection 3.3.2), a period in which these two rates of growth are low (and still decelerating).

3.3.1 Up to the Late 1960s: The Benefits of Two Revolutions

It is important to understand that all the dividends of the intermediate stage had been harvested in the 1950s. This means simultaneously that the performance of the U.S. economy concerning technological change and distribution were very high, and that a new stage was initiated with new features *à la Marx*. The situation was, indeed, still very favorable, but the progressive erosion of this advantageous position was already under way. This situation was manifested in a different manner in the 1950s and 1960s.

a. *The 1950s: High Performance and Instability*

In spite of the beginning of the deceleration in the *progress of technology and labor cost*, the 1950s must be described as a very prosperous period. This feature has not always been acknowledged, because of the even higher records obtained in the 1960s in some respects.

The profitability of capital is very high, but the benefit of this restoration has been transferred to the state through taxation (cf. DGL, Figure 2). Considering exclusively the effects of the transformation of firm management, the *inherent instability* in the economy is high. The progress of the social control of stability benefited from the transformation, manifested in the new stabilization policy, which we characterize as the second stage of the managerial revolution (at the center). However, this transformation was never consolidated, and policies oscillated constantly between conflicting objectives (stimulation of the economy, retirement of the public debt and so on). Globally, the period can be described as a period of constant fluctuation of the general level of activity, from high to low utilization rates, but without depression or cumulative inflation.

b. *The 1960s: The Keynesian Reprieve*

At the beginning of the 1960s, it became clear to President John F. Kennedy's advisers that the economy had never fully recovered from the 1958 recession. They initiated an unprecedented effort to pull the economy upward toward high levels of utilization of capacity, combining demand and fiscal policies.

Thus, the decline corresponding to the beginning of the second pattern *à la Marx*

was, at first, hidden by the effects of policies in the 1960s⁹, and the rate of growth of wages was maintained.

This policy was successful until the end of the 1960s, when it became clear that the low value of the profit rate could no longer be explained by the effects of the fluctuations in the general level of activity. (Again we abstract here from the international dimension of these phenomena.) This is when it was acknowledged that the trend of the profit rate was downward (see references in the appendix to DGL), and that the rate of growth of labor productivity was diminishing. Simultaneously, inflation continued to ratchet upward.

3.3.2 Post 1970s: The Slowdown, Stagflation and the New Stability

Beginning in the 1970s, the tensions over income distribution, associated with the falling profit rate (even after taxes), were followed by the reduction of the growth rate of labor cost and the increasing difficulty to finance state expenses. In relation to the very slow progress of labor cost, labor productivity also entered a phase of stagnation.

This period can, again, be divided into two subperiods corresponding to: 1) The return to technological and distribution trends (after the evasion in the 1960s) characterized by new instability and stagflation, and 2) A possible restoration of stability since 1983.

a. *The 1970s: The Return to the Trend and the "Crisis"*

The new pattern of evolution *à la Marx* was in many respects, similar to that observed in the last decades of the 19th century. However, the situation in the 1970s, was specific in, at least, two respects (with opposite effects):

1. Not only were the trends in technology and distribution downward, but the variables abruptly returned to this trend, after what has been called above the "Keynesian reprieve".
2. The benefits of the second stage of the managerial revolution (the increased ability to manage stability in dimension) were now felt. Thus, history did not repeat itself in every respects, and the "crisis" seems to have been less severe than at the turn of the century.

Instead of a depression, the economy entered a stage of latent "crisis", as a new policy was implemented emphasizing monetary policy. A new instability was observed, in relation to the diminished profitability of capital, with recurrent recessions of unusual amplitude (in 1970, 1974, 1980, 1981-1982). The experience of the low levels of profitability by firms lead to the adoption of new responses with respect to

⁹ The average rate of growth of the profit rate over the period 1946-1968 is positive, whereas the trend determined in figure 8 is downward.

investment and prices. These adjustments were reflected in the rise of unemployment and a new type of inflation resistant to low levels of activity (called "stagflation").

This episode had several important effects, in particular :

1. The alleviation of the burden of debts and, probably, the discard of obsolete fractions of the capital stock of enterprises.
2. The sharp decrease in the growth rate of labor cost, and its reduction to levels "compatible" with the pattern *à la Marx*.

Parenthetically, one can notice that this analysis sheds some light on the effects of Keynesian policies in the 1960s. These policies pulled the economy toward very high capacity utilization rates, and very low rates of unemployment. This movement certainly contributed to the continuation of the rise of labor cost, whereas technical progress in the strict sense was already slowing down. However, it seems clear that this rise cannot be interpreted as the cause of the difficulties still faced by the U.S. economy, since the return to the trend has been realized.

b. The 1980s: Back to the Trend and the New Stability

It is always difficult to identify new trends in recent developments. For this reason, we will base our interpretation on several *hypotheses*, and only present a few tentative comments on the 1980s or, more precisely, the period 1983-1989.

In order to understand the specificity of this last episode, it is important to distinguish between the analysis of the historical trends of technology and distribution, and the social management of stability :

1. Technology and the profit rate are back to the trend, and the movement along the pattern *à la Marx* is slow.
2. After the latent crisis in the 1970s and early 1980s, the progress accomplished in the social management of stability was able to check the increased instability. As a result, the general level of activity and prices were stabilized.

This analysis is based on three hypotheses concerning the interpretation of recent series: 1) The capacity utilization rate returned to normal and the phase of stagflation is terminated (a quite optimistic description¹⁰), 2) No inflexion upward of technical progress in the strict sense is evident, and 3) No accelerations of labor cost and labor productivity are under way. The thorough discussion of these three hypotheses oversteps the limits of the present study, and would require a specific investigation.

The second point above (the restoration of stability) must be related to the remark made in Subsection 2.4.3 above, concerning the relative character of a "minimum" profit rate. Once again this limit has been lifted as a result of the progress of policies.

¹⁰ Figures recently released suggest that "stagflation" might still be a good characterization of the economic situation in 1990.

3.4 THREE SCENARIOS FOR THE FUTURE

This analysis does not suggest any easy remedy to the present difficulties of capitalism. The economy emerged from the latent crisis of the 1970s in a situation similar to that reached after an open crisis. This recovery was evident in the release of the inflationary pressure, and a certain restoration of stability. However, the constraint associated with the pattern *à la Marx* has not been relaxed: The economy continues to follow the same track at a very slow pace (slow growth of wages and labor productivity, and slowly diminishing capital productivity and profit rate).

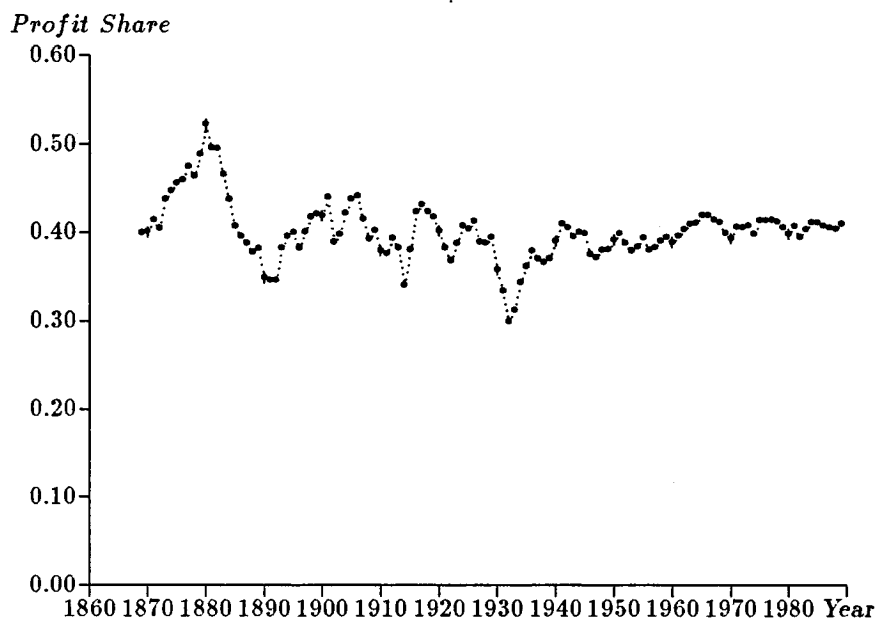
Beginning with this situation several scenarios can be devised for the future:

1. If the movement along the trajectory *à la Marx* continues, the difficulty will be to maintain stability and to manage social conflicts in the long term, in situation of stronger oppositions over distribution. Note that, if the rate of growth of the labor cost is controlled (in relation to the limited rate of technical progress), the profit rate might be stabilized, and this would define a new pattern.
2. The most favorable event would be the repetition of a revolution similar to that recorded at the turn of the century. This new progress could correspond to significantly different mechanisms, for example, an increased "socialisation" of technical progress, instead of the transformation of private management, and be followed by new acceleration of the growth rate of wages. Concerning the U.S. economy, to which this study is devoted, no such restoration is clearly apparent in the series up to 1989.
3. A third scenario would be the emergence of a new stage in which a type of social coordination would be achieved between technical progress in the strict sense, labor cost, and the control of stability, with a prominent role conferred to technical progress. The growth of labor cost would be fully endogenized and dependent on technical progress, but not necessarily stagnating. One can wonder, however, whether these new relationships could be obtained without a *third stage in the managerial revolution*.

As for the question of the emergence of a new industrial paradigm in Japan, for example, corresponding to one of the last two scenarios above, it clearly lies beyond limits of the present study, and must be left for further research.

APPENDIX: PROFITABILITY AND STABILITY IN THE LITERATURE OF MARXIST INSPIRATION

We will first discuss, in this appendix, two justifications of the importance of profitability common in the Marxist and Keynesian literature. Both refer to the



**Figure 6 - The Share of Gross Profits in GNP
(1869-1989)**

occurrence of crises in relation to the formation of demand: *Excess profitability leads to a lack of demand for consumption goods, and deficient profitability leads to a lack of demand for investment goods.* These two mechanisms are sometimes considered in combination. Section 3.1 is devoted to the first mechanism (consumption), Section 3.2 to the second (investment). Then, in Section 3.3, we discuss the relationship between disproportions and profitability, in the explanation of crises.

3.1 DEMAND FOR CONSUMPTION GOODS

The view that crises arise from a deficient demand for consumption goods (underconsumption), in relation to the excessive profitability of capital, has always been a popular interpretation of business fluctuations. In the 1930s, it was denoted as the man-on-the-street interpretation of the Great Depression. It was given a theoretical foundation at the Brookings Institution, in particular, in the work of Harold Moulton (MOULTON H.G. 1935). It is also a common explanation in the Marxist literature (*cf.*, for example, BARAN P., SWEEZY P. 1966 or DEVINE J. 1983), and was revived, in France, by the Regulation School (AGLIETTA M. 1979).

Since the argument hinges on the formation of demand (consumption) in relation to income distribution, the crucial variable here is not the profit rate but the share

of gross profits in GNP.

The basic idea can be stated very simply in a Keynesian framework of analysis. The equality between the product and demand can be written $Q = I + C$, with an obvious notation. I is assumed constant, and C is proportional to the product: $C = cY$. The thesis under consideration implies that c is a decreasing function of the profit share π : $c = c(\pi)$. With this model, the product itself is a diminishing function of π : $Q = I/(1 - c(\pi))$.

Following this underconsumptionist interpretation of crises, the expectation is that the profit share increases before the occurrence of crises. In particular, this should be the case for the Great Depression to which this analysis has been mostly applied. It is easy to test for the factual relevance of this analysis. As shown in Figure 6, the share of gross profits in GNP is not exceptionally large or increasing in the 1920s.¹¹ The share of consumption is not exceptionally low either (cf. DUMÉNIL G., LÉVY D. 1989(c), Figure 3). The same is true for the crisis in the late 19th century or in the 1970s. As already noted, the profit share (net or gross) was very constant historically and its short-term variations reflect, and do not explain, business cycle fluctuations.

3.2 DEMAND FOR INVESTMENT GOODS

Another traditional interpretation of the importance of profitability is the idea that the profit rate motivates investment. Capitalists invest because they are attracted by a return on their investment that they judge sufficient. This mechanism is common in the literature. It was at the center of Keynes' theory of investment (the comparison between the marginal efficiency of capital, that is the expected profit rate, and the rate of interest):

"Now it is obvious that the actual rate of current investment will be pushed to the point where there is no longer any class of capital-asset of which the marginal efficiency exceeds the current rate of interest." (KEYNES J.M. 1936, p. 136)

This view can be stated in the same formalism as above. Investment is an increasing function of the profit rate $I = I(r)$, and c is constant. Thus, the product is an increasing function of r : $Q = I(r)/(1 - c)$.

We reject this relationship as a general mechanism in the functionings of capitalism. Investment is limited in the general case by a *capital constraint*, except during recessions (and the "recent" period of stagflation, but the discussion of these specific circumstances oversteps the limits of the present study, see DUMÉNIL G., LÉVY D. 1988). A deficient investment is not the cause, but the consequence of recessions.

¹¹ Since the issue is that of demand, the consideration of the share of gross profits in GNP is more adequate than the share of net profits in NNP as in figure 10 of DGL.

These two views of the importance of profitability are not exclusive and they can be easily combined. Following this interpretation, capitalist economies confront a permanent dilemma. If wages increase rapidly *vis-à-vis* technical progress, there will be a strong demand for consumption goods and a deficient demand for investment goods. On the contrary, if wages increase only slowly, and the profit share is inflated, there will be a deficient demand for consumption goods. The notion of an *optimum rate of profit* (that which maximizes Q , with I and c , both functions of r) or, at least, a tolerable range of variation of the profit rate, is actually implied in this analysis.

3.3 DISPROPORTIONS

Another interpretation of crises in relation to profitability refers to the old notion of disproportions, that Marx criticized in Ricardo's analysis. This thesis has been revived, for example, by Alain Lipietz (LIPETZ A. 1979), in relation to the effects of technological change.

Technological change may result in the transformation of the proportions among industries and, in particular, in the relative size of industries producing investment and consumption goods. If technological change is too rapid, it might, following this interpretation, outrun capital mobility. We refuted this view in DUMÉNIL G., LÉVY D. 1989(b).

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REFERENCES

- AGLIETTA M. 1979, *A Theory of Capitalist Regulation*, New Left Books, London.
- BALKE N.S., GORDON R.G. 1989, "The Estimation of Prewar Gross National Product: Methodology and New Evidence," *Journal of Political Economy*, Vol. 97, # 1, pp. 38-92.
- BARAN P., SWEEZY P. 1966, *The Monopoly Capital*, New York and London, Monthly Review Press.
- DEVINE J. 1983, "Underconsumption, Overinvestment, and the Origins of the Great Depression," *Review of Radical Political Economics*, Vol. 15, # 2, pp. 1-29.
- DUMÉNIL G., GLICK M., LÉVY D. 1991, Stages in the Development of U.S. Capitalism: Trends in Profitability and Technology since the Civil War, CEPREMAP, # 9119, Paris, in MOSELEY F., WOLFF E. 1991.
- DUMÉNIL G., LÉVY D. 1987(a), "The Dynamics of Competition: A Restoration of the Classical Analysis," *Cambridge Journal of Economics*, Vol. 11, # 2, pp. 133-164.
- DUMÉNIL G., LÉVY D. 1987(b), "The Macroeconomics of Disequilibrium," *Journal of Economic Behavior and Organization*, Vol. 8, pp. 377-395.
- DUMÉNIL G., LÉVY D. 1987(c), La concurrence capitaliste: un processus dynamique, pp. 127-154, in FITOUSSI J.P., MUET P.A. 1987.
- DUMÉNIL G., LÉVY D. 1988, Theory and Facts, What can we Learn from a Century of History of the U.S. Economy?, Colloque international sur la théorie de la Régulation, Barcelone.
- DUMÉNIL G., LÉVY D. 1989(a), "The Analytics of the Competitive Process in a Fixed Capital Environment," *The Manchester School*, Vol. LVII, # 1, pp. 34-57.
- DUMÉNIL G., LÉVY D. 1989(b), Les Régulationnistes pouvaient-ils apprendre davantage des classiques?: une analyse critique de quatre modèles, CEPREMAP, Paris, à paraître dans *Économie et société*.
- DUMÉNIL G., LÉVY D. 1989(c), The Regulation School in Light of One Century of the U.S. Economy, CEPREMAP, LAREA-CEDRA, Paris.
- DUMÉNIL G., LÉVY D. 1990(a), The Rationality of Adjustment Behavior in a Model of Monopolistic Competition, pp. 224-242, in QUANDT R.E., TRISKA D. 1990.
- DUMÉNIL G., LÉVY D. 1990(b), Stability in Capitalism: Are Long-Term Positions the Problem?, Paper presented at the Workshop on *Convergence to Long-Period Positions*, Siena, 5-7 April 1990, Forthcoming in *Political Economy*.
- DUMÉNIL G., LÉVY D. 1991(a), Investment and Technological Change since the

- Civil War in the U.S.: A Vintage Model, CEPREMAP, # 9120, Paris.
- DUMÉNIL G., LÉVY D. 1991(b), *The U.S. Economy since the Civil War: Sources and Construction of the Series*, CEPREMAP, LAREA-CEDRA, Paris.
- DUMÉNIL G., LÉVY D. 1991(c), "Micro Adjustment Toward Long-Term Equilibrium," *Journal of Economic Theory*, Vol. 53, # 2, pp. 369-395.
- FITOUSSI J.P., MUET P.A. 1987 (ed.), *Macrodynamique et déséquilibres*, Économica, Paris.
- KEYNES J.M. 1936, *The General Theory of Employment, Interest and Money*, Macmillan, London, Melbourne, Toronto, 1967.
- LIPIETZ A. 1979, *Crise et inflation: pourquoi?*, Maspero, Paris.
- MARX K. 1867, *Capital, Volume I*, First Vintage Book Edition, New York, 1981.
- MARX K. 1894, *Capital, Volume III*, First Vintage Book Edition, New York, 1981.
- MOSELEY F. 1988, *The Decline of the Rate of Profit in the Postwar U.S. Economy: Regulation and Marxian Explanations*, Colby College, Waterville.
- MOSELEY F., WOLFF E. 1991 (ed.), *International Perspectives on Profitability and Accumulation*, Elgar Publisher, forthcoming.
- MOULTON H.G. 1935, *Income and Economic Progress*, Brookings Institution, Washington, D.C.
- OKISHIO N. 1961, "Technical Change and the Rate of Profit," *Kobe University Economic Review*, Vol. 7, pp. 86-99.
- QUANDT R.E., TRISKA D. 1990 (ed.), *Optimal Decisions in Markets and Planned Economies*, Westview Press, Boulder, San Francisco, and London.
- RICARDO D. 1817, *The Principles of Political Economy and Taxation*, Dent and Son Ltd, London, 1960.
- ROMER C.D. 1989, "The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869-1908," *Journal of Political Economy*, Vol. 97, # 1, pp. 1-37.

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