THE PROFIT RATE: WHERE AND HOW MUCH DID IT FALL? DID IT RECOVER? (USA 1948-2000)

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RESUME

LE TAUX DE PROFIT: OU ET DE COMBIEN A-T-IL DIMINUÉ? EST-IL REMONTÉ? (USA 1948-2000)

La baisse du taux de profit depuis la Seconde Guerre mondiale est maintenant un phénomène largement reconnu, et l'existence d'une nouvelle tendance à la hausse est désormais connue. Cette étude propose de nouvelles estimations du taux de profit dans une définition proche de celle utilisée par Marx au livre III du *Capital*, où les profits correspondent à la plus-value totale, et une définition plus proche de la pratique des entreprises, prenant en compte les intérêts, les impôts et les stocks. On montre que les taux de profit d'un sous-ensemble de branches (comme les *Chemins de fer*), dont le rapport capital-travail est particulièrement élevé et qu'on nomme *branches hautement capitalistiques*, sont tout à fait différents de ceux des autres branches, tant en niveau qu'en tendance (leur taux de profit est très bas et n'a pas baissé). La baisse du taux de profit et sa remontée partielle peuvent être plus clairement saisies, lorsque ces branches sont éliminées. Au total, entre 1948 et 1982, le taux de profit fut divisé par un coefficient compris entre 2 et 7, selon les secteurs et les définitions du taux de profit considérés. En 2000, le taux profit n'a encore retrouvé que la moitié de sa valeur de 1948. On montre enfin que la baisse de la productivité du capital fut le principal facteur de la chute du taux de profit, bien que la baisse de la part des profits ait également contribué à cette évolution.

ABSTRACT

THE PROFIT RATE: WHERE AND HOW MUCH DID IT FALL? DID IT RECOVER? (USA 1948-2000)

The decline of the profit rate since World War II, up to the early 1980s, is now widely acknowledged, and a new upward trend has been identified. This study presents new computations of profit rates using a definition like that used by Marx in Volume III of *Capital*, where profits correspond to total surplus-value, as well as a definition of the rate of profit that impacts individual firms, taking account of interest, taxes, and inventories. We show that both the level and trend of a specific group of industries (such as *Railroads*), called *Highly capital intensive industries*, whose capital-labor ratio is very large, are totally different from that of other industries. (Their profit rate is very low and did not decline.) When these industries are removed from the data set, the downward trend of the profit rate and the limited recovery can be more clearly observed. Overall, between 1948 and 1982, the profit rate was divided by a coefficient ranging between 2 and 7, depending on the sector and definition of the profit rate. The profit rate in 2000 is still only half of its value in 1948. Finally, we show that the decline of the productivity of capital was the main factor of the fall of the profit rate, though the decline of the share of profits also contributed to this evolution.

Introduction

The profit rates of major capitalist countries declined to a considerable extent since World War II, in particular from the 1960s onward. This evolution was only interrupted in the early 1980s. Since then, a new upward trend is apparent, and it has resulted in a partial recovery. The fall of the profit rate was a crucial factor of the structural crisis of the 1970s, and its recent recovery may signal the emergence of a new phase in the history of capitalism in the 20th century. These developments sparked a new interest in Marx's famous "tendency for the rate of profit to fall", and what we call "trajectories à la Marx"--combining a falling profit rate, a rising composition of capital, a productivity slowdown, stagnating wages, etc. Much work has been devoted to these issues.[1]

This study focuses entirely on the empirical aspects of these evolutions, and is limited to the US economy since World War II. The purpose of the investigation is to address several simple questions. Did the profit rate decline? If so, where did it fall and by how much? Is a recovery underway? If so, what caused the recovery? In addition to the assessment of the magnitude of the fall, we consider carefully: (1) the identification of the sector(s) of the economy in which the fall was observed, and (2) the extent of the recent recovery.

The major findings can be summarized as follows:

1. Where did the profit rate fall? The answer to this first question is all sectors and industries (at the level of disaggregation considered in this study), with the exception of a quite specific subset of industries. A major result of this investigation is the identification of several industries (such as *Railroads*), which own very large amounts of fixed capital, denoted as *Highly capital intensive industries*. (In the average, since World War II, they accounted for 13.2% of the net product of the nonresidential private economy.) Both the level and trend of the profit rate in these industries *are totally different* from that of other industries: The profit rate remained very low and did not have a downward trend. It is not simply that the profit rate of the economy appears to decline more when *Highly capital intensive industries* are excluded, but that these industries represented a real exception to a rather general movement observable throughout the economy. They hide underlying evolutions which become quite conspicuous when these industries are eliminated.

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[1] See the list of references at the end of this paper. We devoted a number of studies to the theoretical analysis of the tendency for the profit rate to fall (G. Duménil, D. Lévy, 1995 and 2000(a)). For a critical analysis of a broad set of studies, see A. Shaikh, E.A. Tonak, 1994, ch. 6. The paper does not discuss the consequences of the decline of the profit rate (G. Duménil, D. Lévy, 1993(a), 1993(b), and 2000(b)).

2. How much did the profit rate fall? Excluding *Highly capital intensive industries*, and comparing the average value of the profit rate over the decade 1956-1965 to its value in 1982, the profit rate fell by more than 50% (with secondary differences depending on the sector considered and the definition of the profit rate used).

3. What was the extent of the recovery since 1982? Still excluding *Highly capital intensive industries,* the profit rate had recovered, by 2000, less than half of the total decline. Overall, the value of the profit rate in 2000 is still only half of its value of 1948, and between 50 and 70% of its average value for the decade 1956-1965.

This paper does not provide a theoretical analysis of these movements of the profit rate, but only emphasizes major stylized facts:

1. The fall of the profit rate was the expression of a decline of the ratio of output to fixed capital (output and capital being measured in current dollars), *i.e.*, the productivity of capital[2] and of a reduction of the share of profits. More specifically, we show that the fall in the profit rate was the combined outcome of several simultaneous trends: (1) the decline of the productivity of capital in real terms, *i.e.*, the ratio of output to fixed capital with both variables measured in constant dollars, (2) the decline of the relative price of output to fixed capital (or the rise of the relative price of fixed capital), and (3) the larger reduction of the growth rate of labor productivity in comparison to the reduction of the growth rate of real wages.

2. The recovery of the profit rate within *Business* (corporate and noncorporate) since the 1980s was the combined effect of a rise in the productivity of capital (with a favorable price effect due to the more rapid technical progress within the corporate sector which produces capital goods) and a rise of the share of profits. These two variables are still significantly below their levels of after World War II.

Section 1 decomposes the economy in various units of analysis: *Business*, *Nonfinancial business*, *Corporate* and *Noncorporate*, *Highly capital intensive industries*, etc. This section also introduces the two basic definitions of the profit rate used: (1) the profit rate as determined by technology and distribution (a "large" measure), reminiscent of Marx's analysis in Volume III of *Capital*, and (2) a definition of the profit rate that impacts individual firms, taking account of inventories, interest, and taxes (a "narrow" measure). Section 2 provides the main results of this investigation: the measures of the fall and recovery of the two above measures of the profit rate in various sectors. Section 3 analyses the movement of the profit rate as the combination of the

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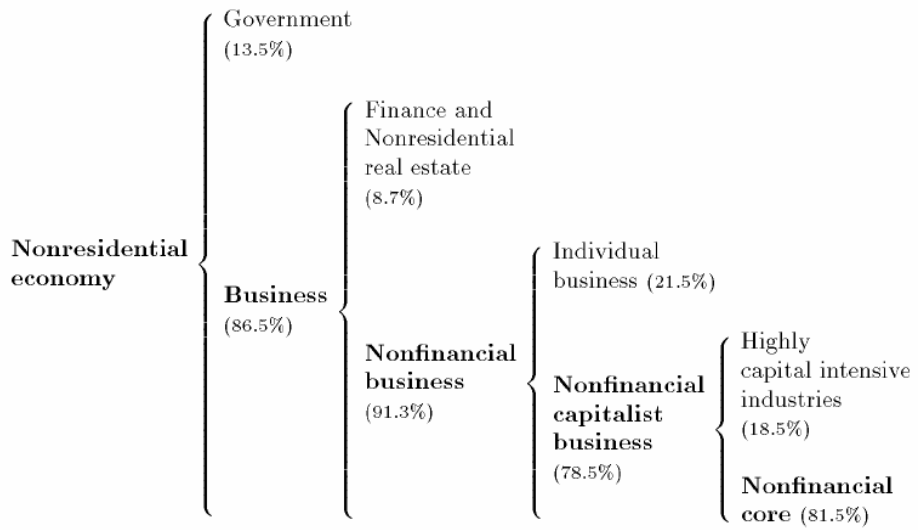
[2] Obviously, the expression *productivity of capital* does not imply that capital *per se* "produces" in any sense.

trends of the productivity of capital, labor productivity, the real wage, and the relative price of output to fixed capital.[3]

1 - Units of analysis and profit rates

All studies of profit rates in the US economy since World War II identify the same stylized facts. There was a major decline of the profit rate from the first decades following the war to the early 1980s; since then a new upward trend is apparent. Divergences concern the exact timing, and the degree of the fall and recovery, and are basically due to the use of distinct units of analysis and definitions of the profit rate. To a lesser extent, the technicalities of the computation may also be at issue, and will be discussed in appendix A.2.

DIAGRAM I:



The figures within parentheses indicate, for each sector, its relative contribution to the net product of the sector on the left of the brace, in the average for the period 1948-2000. (One can add that the NF-core accounts for 50.6% of the product of the Nonresidential economy.)

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[3] This study supplements a previous investigation concerning the gravitation of the profit rates of various industries around a common value: G. Duménil, D. Lévy, 2002. Both this latter study and the present one borrow from G. Duménil, D. Lévy, 1999, which provides a more detailed and technical information.

The tendency for the profit rate to fall concerns the capitalist sector of the economy. For this reason, we first exclude residential capital (and the corresponding income), which is primarily owned by households for their own use, or rented to other households. Thus, the broadest sector considered below is the *Nonresidential economy* (diagram I). Second, we set aside *Government*, including government enterprises. We denote the remaining sectors of the economy as *Business*. We will compute profit rates in this sector and for a set of gradually narrower units of analysis:

1. The financial sector is certainly a central component of the capitalist economy, but it is not part of the production economy in a strict sense. In addition, the computation of its profit rate requires the use of specific definitions. (Capital cannot be measured by tangible assets.) After the elimination of *Finance*, the new unit of analysis is labeled the *Nonfinancial business*: *NF-Business*. For simplicity, we also exclude the nonresidential real estate which is small. (It corresponds to nonresidential fixed capital owned by households and used in various industries.)

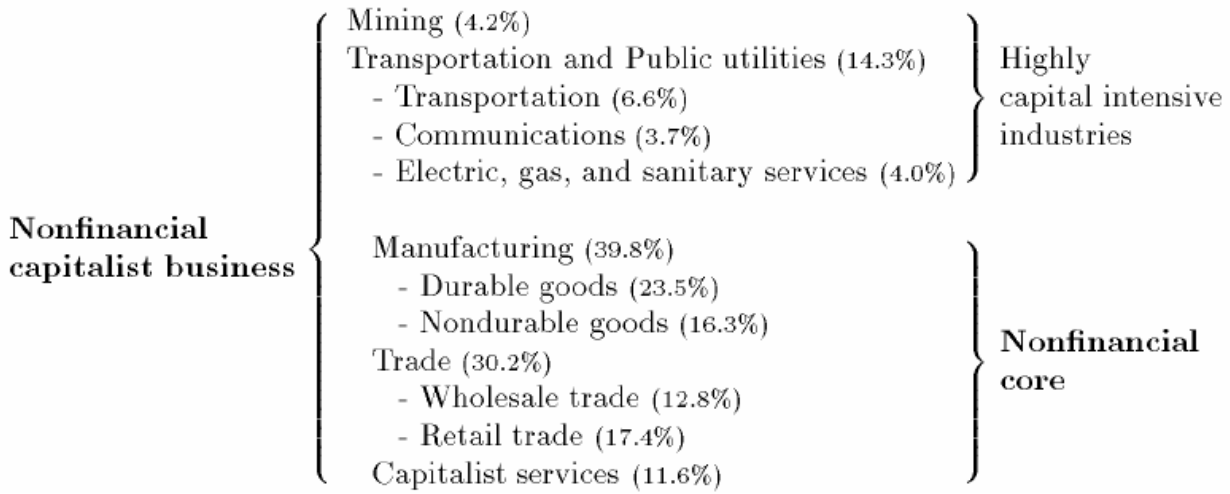
2. A fraction of the economy, which we call *Individual business*, does not possess clearly established capitalist features. For example, maids produce services, but should not be included in a treatment of the tendency for the profit rate to fall. Even the activity of medical doctors is only secondarily capitalist, in the sense that they use some capital to make their living. The features of *Agriculture* are also quite specific, and *Construction* is still performed, in addition to big companies, by a large population of craftsmen, such as carpenters or plumbers. National accounting frameworks do not allow for the separation of corporations from small producers within particular industries, and the average characteristics of these industries suggest that they can be treated separately. The selection process, based on quantitative criteria, in particular the discussion of the various categories of services, is presented in another study devoted to the gravitation of the profit rates of various industries.[4] Once *Individual business* eliminated, we obtain the *Nonfinancial capitalist business*.

3. In the same study devoted to gravitation, we found that *Mining* and the three components of *Transportation and public utilities* are very different from other industries. They own exceptionally large amounts of fixed capital. These stocks of capital, as estimated by national accountants, seem not to be acknowledged within basic capitalist mechanisms (concerning investment or the gravitation of profit rates). Their profit rates are very low and do not move in tandem with the profit rates of other industries. We call them *Highly capital intensive industries*. We label the remaining sector of the economy, after their elimination, the *Nonfinancial core*. The

[4] G. Duménil, D. Lévy, 2002.

components of *Highly capital intensive industries* and of the *Nonfinancial core* are listed in diagram II. Both the gravitation of profit rates and, from World War II to the early 1980s, the decline of the profit rate are observable in this unit analysis, and this justifies the expression *capitalist core* (*Finance* having been excluded for specific reasons).

DIAGRAM II :



Because of the central role played by *Highly capital intensive industries* in the trend of profit rate, we will also refer to the three first sectors in diagram I (*Nonresidential economy*, *Business*, and *NF-Business*), excluding *Highly capital intensive industries*. We denote these sectors as "restricted". Thus, the *Restricted nonresidential economy* is the *Nonresidential economy* minus *Highly capital intensive industries*; the *Restricted business* is *Business* minus *Highly capital intensive industries*; and the *Restricted NF-Business* is the *NF-Business* minus *Highly capital intensive industries*. Using this terminology, the *NF-Core* could be called the *Restricted NF-Capitalist business*.

Business can also be decomposed into the *corporate* and *noncorporate* sectors (diagram III).[5] The *corporate* sector is made of three components:

1. A first sector is *Corporate finance* which includes *Insurance* and the *Corporate nonresidential*

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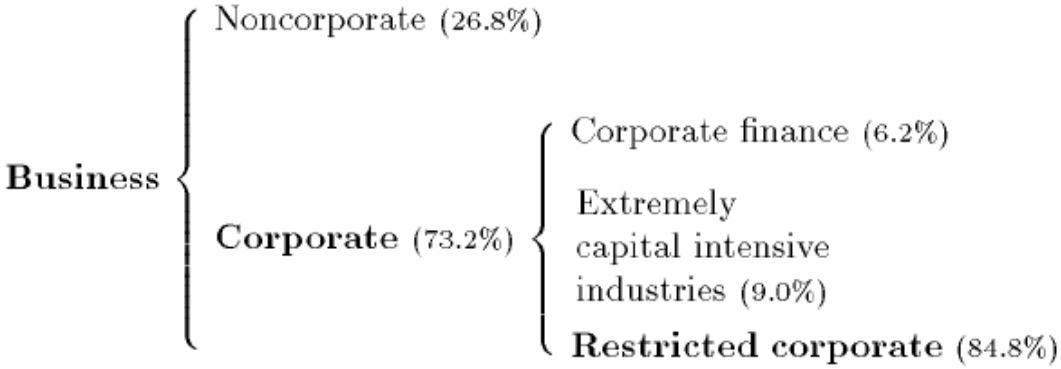
[5] The *Noncorporate sector* is the sum of "persons" as *Self-employed persons*, and persons who rent capital and receive, on this account, the *rental income of persons*.

real estate.

2. A second sector is a subset of *Highly capital intensive industries*, which: (1) is nearly entirely incorporated and (2) whose highly capital intensive features are extreme. It includes industries such as *Railroad transportation* and *Pipelines except natural gas*, and holds a large fraction of the capital stock of the *Corporate sector*. The capital-labor ratios of the *Extremely capital intensive industries* are truly dramatic. In the average since 1948, the capital stock per worker in these industries was nearly 800,000 dollars [1996], *i.e.*, about 20 times larger than the average of the other components of *Business* (44,000 dollars). We denote this sector the *Extremely capital intensive industries*.

3. The remaining corporations define the *Restricted corporate sector*. ("Restricted" refers here to the exclusion of the *Extremely capital intensive industries* and not the larger sector of *Highly capital intensive industries*, as well as of *Corporate finance*.)

DIAGRAM III :



One can add that the Restricted corporate sector accounts for 62.1% of the product of Business. It is not possible to combine the disaggregations of diagrams I and II with that of diagram III.

The investigation in this paper is limited to the computation of profit rates using straightforward definitions.[6] The first profit rate, r_b, is the ratio of a "broad" measure of profits (the net product

[6] We do not attempt to account for the movements of the profit rate using Marxian categories, as in various studies, where "value profit rates" are estimated, or where the separation between productive and unproductive labor is considered with important consequences concerning the rate of surplus-value (see A. Shaikh, E.A. Tonak, 1994; F. Moseley, 2000; S. Mohun, 1999; E. Wolff, 1999).

minus total labor compensation) to fixed capital. It is appropriate in an analysis *à la Marx* of the trend of the profit rate, focusing on technology and distribution. The second profit rate, r_n, is the ratio of a "narrow" measure of profits (profits after indirect business tax and interest) to the sum of fixed capital plus inventories.[7] This measure of the profit rate that impacts individual firms is appropriate in an investigation of the effects of profit rates, in particular the consequences of low profit rates.

2 - The fall and recovery of the profit rate: A sectoral analysis

The following sections provide measures of the fall and recovery of the profit rate in various sectors, for the two above definitions of the profit rate (sections 1 and 2). Section 3 examines specifically the corporate sector. Section 4 is devoted to *Highly capital intensive industries*. The overall picture, summarized in section 5, is that of a large decline since World War II, and a limited recovery.

2.1 - Profit rates as determined by technology and distribution

We begin with the *broad* definition of the profit rate, r_b, within six sectors: (1) *Business*, (2) *NF-Business*, (3) *NF-capitalist business*, and the same sectors, excluding *Highly capital intensive industries*, *i.e.*, (4) *Restricted business*, (5) *Restricted NF-business*, and (6) *NF-Core*. The profit rates of these sectors are presented in figure 1. They differ significantly, due to the features of the various units of analysis.

One can first notice a significant difference in the three first measures, which are smaller, and the three last ones, which are larger. This finding shows that the important distinction for the level of the profit rate is the inclusion of the *Highly capital intensive industries*. The impact of *Nonresidential real estate*, *Finance*, or *Individual business* is considerably smaller.

Because of these differences in level, the direct comparison of the *trends* in figure 1 is difficult. The same profit rates have been normalized to 1 for the decade 1956- 1965 in figure 2.[8] The succession of a common period of decline and of an also common period of recovery becomes even more evident. The data reveal a downward trend from 1948 to 1982, interrupted by a bulge during the 1960s. (Averages are provided in table 1 for the *NF-Core*.)

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[7] It is the definition which is used in the analysis of gravitation in G. Duménil, D. Lévy, 2002.

[8] The value of the profit rate just after World War II, such as in 1948, does not appear well established. We choose the decade 1956-1965, which combines the recession of 1958 and the boom of 1965, as a benchmark.

Figure 1. Broad profit rate: Six sectors

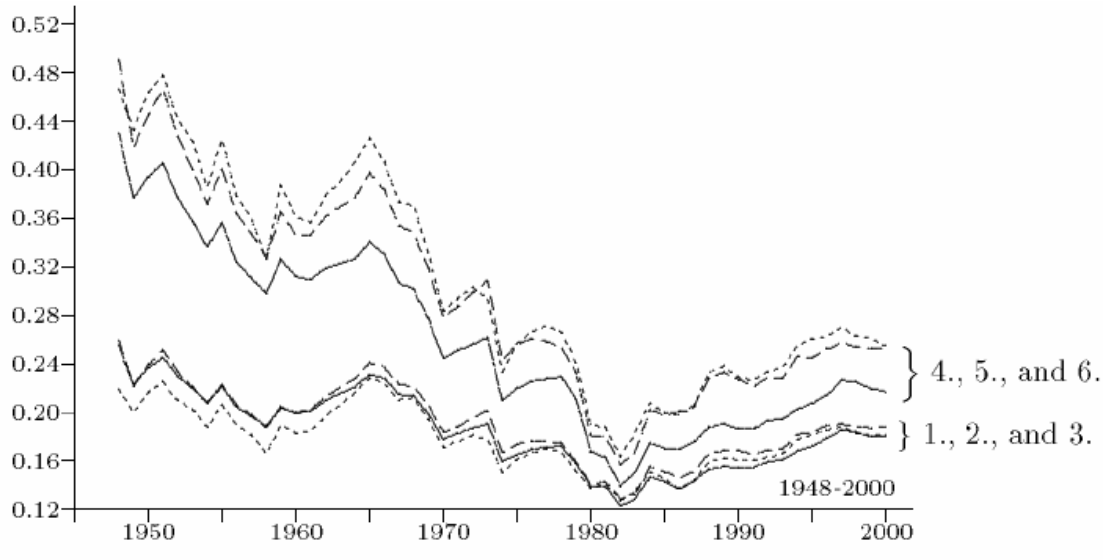
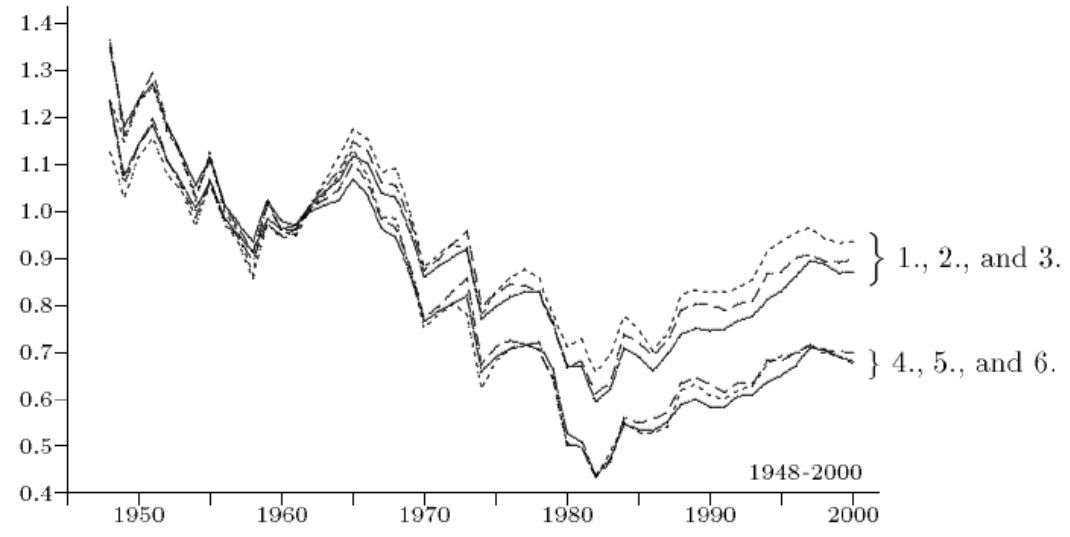


Figure 2. Profit rate as in figure 1 normalized to 1 for 1956-1965



First group:
1. *Business* (—);
2. *NF-Business* (– –);
3. *NF-capitalist business* (---).
Second group (4.,5., and 6.), restricted sectors: as above after exclusion of *Highly capital intensive industries*.
Profit rate = (Net product - Labor compensation) / Fixed capital.

Table 1 - Ten-year average profit rates (%): *NF-Core*

1950-1959	41
1960-1969	38
1970-1979	27
1980-1989	20

Broad profit rate as in figure 1.

Thus, these computations confirm the existence of a significant and lasting decline of the profit rate since World War II. This downward trend is evident from the war to 1982, in spite of the temporary recovery of the profit rate during the 1960s.

As in the case of levels, the important issue in the investigation of *trends* is the consideration of *Highly capital intensive industries*. Compare the decade 1956-1965, normalized to 1, to 1982. When the *Highly capital intensive industries* are included (1., 2., and 3.), the profit rate fell, in the average, to 0.62. When the restricted sectors are considered (4., 5., and 6.), it fell significantly more, to 0.44.

The recovery from 1982 to 2000 can be assessed in various ways (see also table 3):

1. Comparing 2000 to 1982, taken as the benchmark, the profit rate increased by approximately half of its value in 1982. This is the case independently of whether *Highly capital intensive industries* are included.

2. When the question is what fraction of the fall was regained (the ratio: (r[2000]-r[1982])/(r[1956-65)-r[1982])), the impact of *Highly capital intensive industries* is large. Two thirds of the fall were recovered when *Highly capital intensive industries* are included, and only one half when they are excluded.

The consideration of the *Nonresidential economy*, *i.e.*, the inclusion of *Government* considerably modifies the levels of profit rates, but not the trends. Once the series have been normalized to the same level for 1956-1965, the profit rates of the *Nonresidential economy* and that of *Business* are practically identical, and is also the case for the *Restricted nonresidential economy* and *Restricted business*. As in the case of levels, it is the inclusion of *Highly capital intensive industries* which matters concerning the trends.

2.2 - Profit rates that impact individual firms

This section repeats the same investigation, but for the narrow definition of the profit rate, r_n, which is closer to the variables recognized by firm managers. Profits are defined net of indirect business taxes and interest, and inventories are added to fixed capital in the measure of fixed capital.

Figure 3. Narrow profit rate: Six sectors, normalized to 1 for 1956-1965

Sectors as in figures 1 and 2.
Profit rate = (Net product - Labor compensation - Indirect business taxes - Net interest) / (Fixed capital + Inventories).

In this narrow measure, the profit rates of restricted sectors are lower than in the entire sector, as in the case of r_b in figure 1. The trends can be assessed from figure 3, where the profit rates of all sectors are normalized to the same level for the years 1956-1965. The following observations are noteworthy:

1. All profit rates display a clear downward trend.

2. In comparison to the previous investigation, one should notice the sharper decline in the early 1980s, due to the rise of interest rates. The minimum is now approximately equal to 0.3 or 0.4, reflecting a division by a coefficient of about 3 in comparison to the level of the decade 1956-1965. With little exception, the recovery appears larger in comparison to 1982, but smaller relative to 1948 or 1956-1965.

3. The steep drop in profit rates in the late 1960s actually mirrors a new relatively moderate decline of the trend after compensating for the fluctuation upward in the 1960s.

4. In sharp contrast with the previous investigation, there are no significant differences in the *trends* of profit rates of restricted and nonrestricted sectors. This is due to the large amounts of interest paid by *Highly capital intensive industries*. Thus, in this measure, the main difference between the two groups of industries is one of *level*.

As a result of the gravitation of the profit rates of the five components of the *NF-Core*, in the definition used in this section, a similar decline and recovery of the profit rate is observable in each of these industries.[9] The fact that the same trends are apparent within five industries, whose profit rates are determined independently of one another, considerably strengthens the thesis of a declining trend of the profit rate up to the early 1980s. Note that the profit rate also declined in the sectors excluded from this investigation: *Finance and Nonresidential real estate*, and *Individual business*.[10]

2.3 - The corporate and restricted corporate sectors

This section is devoted to the disaggregation of *Business* into the *Corporate* and *Noncorporate* sectors (diagram III). Figure 4 displays the profit rate using the broad measure, r_b, for three sectors, *Business* (as series 1, in figure 1), the *Corporate sector*, and the *Restricted corporate sector*. Figure 5 presents the same results, but the series have been normalized to 1 for the period 1956-1965, for comparison of the trends.

Several observations can be made:

1. The profit rate of the *Corporate sector* was lower than that of total *Business* up to the early 1980s, before reaching similar levels.

2. A corollary of the above observation is that, over the entire period, the *Corporate sector* declined less than *Business*. It diminished between 1965 and 1982 but, in 2000, it recovered to its level of the late 1950s. (The profit rate of the *Noncorporate* sector, which is not plotted in these figures, declined sharply up to 1983, and then diplayed a slight upward trend.)

3. The profit rate of the *Restricted corporate sector* is obviously larger than that of the *Corporate sector*. More interesting is the fact that it displays a strong downward trend, and a limited recovery. From the 1956-1965 decade to 1982, it was approximately divided by 2. In 2000, it is only equal to 64% of its average for 1956-1965.

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[9] This is shown in figure 4 of G. Duménil, D. Lévy, 2002.

[10] G. Duménil, D. Lévy, 1999.

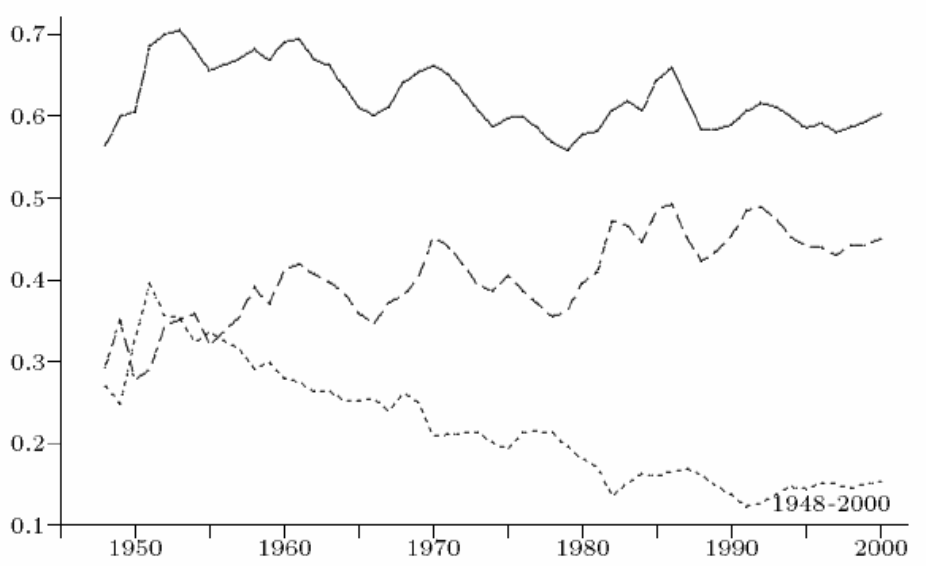
Figure 4. Broad profit rate: *Business*, the *Corporate* and *Restricted corporate* sectors

Figure 5. Profit rate as in figure 4 normalized to 1 for 1956-1965

Business (—)
Corporate sector (– –)
Restricted corporate sector (---).
Profit rate = (Net product - Labor compensation) / Fixed capital.

The following remarks can be made concerning the comparative trends of the profit rate of the *Restricted corporate sector* and of *Business* (figure 5). The two sectors which are excluded from *Business* to obtain the *Restricted corporate sector*, the *Extremely capital intensive industries* and the *noncorporate sector*, have an opposite effect on the trend of the profit rate. The *Extremely capital intensive industries* use a large fraction of the capital stock of the *Corporate sector*, and their exclusion contributes to *sharpening* the downward trend of the profit rate. The profit rate of the *Noncorporate sector* declined strongly. Therefore, its exclusion contributes to *flattening* the trend of the profit rate. These two effects approximately offset one another.

Figure 6. Share of taxes in profits before tax in the *Restricted corporate sector*.



All taxes (—)
Indirect business taxes (– –)
Profit taxes (---).

Considering the evolution of the profit rate since World War II, the recovery of the profit rate appears nearly complete within the entire *Corporate sector*. One should, however, be careful in interpreting this finding which is largely attributable to capital intensive industries (section 4).

A definition of the profit rate, in which indirect business taxes are subtracted from profits, was already considered in section 2, for various sectors. However, it is only for the *corporate* sector that profit taxes can be considered, since the noncorporate sector does not pay such taxes. The remainder of this section is devoted to the effects of the two categories of taxes in the *Restricted corporate sector*.

Taxation has important consequences on the level of profit rates. In 1948, the profit rate before all tax was equal to 24.9%, whereas it was 10.9% after tax. In 2000, the same figures are 15.7% and 6.2%.

Figure 6 displays the proportion in total profits (prior to the deduction of net interest and taxes) of: (1) all taxes, (2) indirect business taxes, and (3) profit taxes. A first observation is that the burden of taxation declined since the early 1950s. It reached its maximum in 1953 at 70.6% (instead of 56.4% in 1948). In 2000, it was equal to 60.3%. The weight of indirect business taxes rose from 29.4% in 1948 to 45.0% in 2000. Conversely, the weight of profit taxes declined from a maximum of 39.5% in 1951 to 15.3% in 2000 (with a minimum of 12.2% in 1991). This diverging evolution of the two types of taxes was observed up to the early 1980s. Since then, the proportion tends to stabilize.

Figure 7. Profit rate normalized to 1 for 1956-1965: Effects of taxation

Before tax (—); After indirect business tax (– –); After all tax (---).

Figure 7, where all series have been normalized to 1 for the decade 1956-1965, depicts the trends of the profit rates (before interest payment): (1) without subtracting any taxes; (2) subtracting indirect business taxes; and (3) subtracting all taxes (indirect business taxes and profit taxes). It appears that the deduction of indirect business taxes slightly increased the decline of the profit rate, whereas this trend is less steep when all taxes are subtracted, due to the countertendencial effect of the alleviation of profit taxes. Note that this effect was already evident during the 1970s.

Again, the decline of the profit rate appears as a very general phenomenon, with the exception of

capital intensive industries. It declined in both the the *Restricted corporate sector* and *Noncorporate sector*.

2.4 - Capital intensive industries

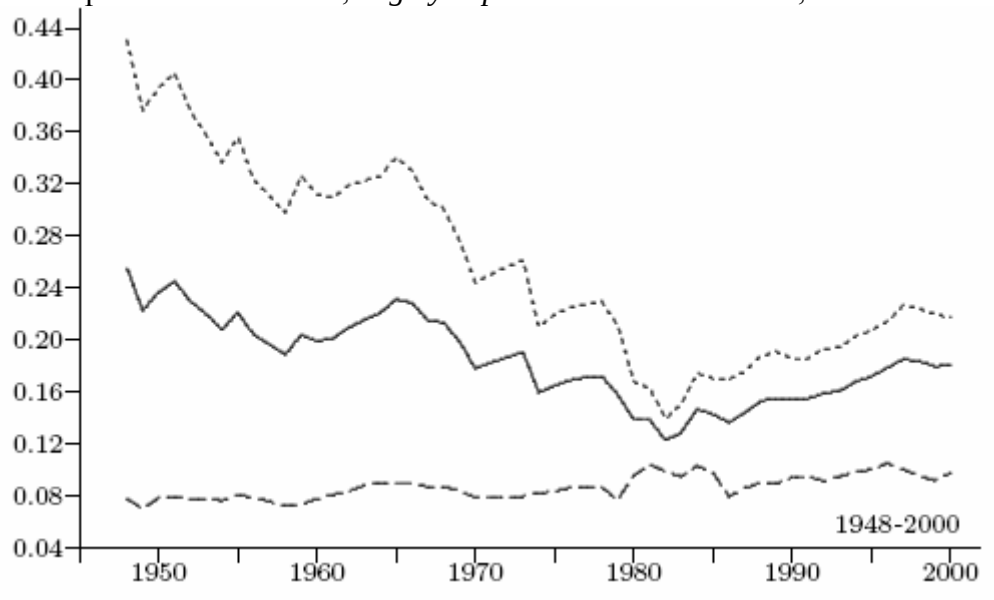
This section is devoted to a direct comparison of profit rates within capital intensive industries and other industries. Two subsets of such capital intensive industries have been considered: *Highly capital intensive industries* (whose components are displayed in diagram II) and *Extremely capital intensive industries*: *Oil and gas extraction* (from *Mining*), *Railroad transportation* (from *Transportation*), *Pipelines except natural gas* (from *Transportation*), and *Electricity, gas and sanitary services* (*i.e.*, *Public utilities*). In the average since World War II, the net products of *Highly capital intensive industries* and *Extremely capital intensive industries* represented respectively 13.2% and 6.5% of the net product of total business (table 2).

Table 2 - *Highly Capital Intensive Industries* (HCII) and *Extremely Capital Intensive Industries* (ECII) (average 1948-2000)

	NP (%)	L (%)	K (%)	K/L (10^3 \$96 per worker)
BUSINESS	100.0	100.0	100.0	100.0
Highly capital intensive industries (HCII)	13.2	7.7	41.0	308.6
Restricted business (Business - HCII)	86.8	92.3	59.0	38.0
Extremely capital intensive industries (ECII)	6.5	2.5	29.6	801.1
Business - ECII	93.5	97.5	70.4	41.6

Figure 8 depicts the broad definition, r_b, of the profit rate for (1) *Business*, (2) *Highly capital intensive industries* (3) *Restricted business*. (The profit rate of *Extremely capital intensive industries*, its level and trend, is very similar to the one of *Highly capital intensive industries*, and we only consider the latter.) The differences in level and trend appear clearly in figure 8. The profit rates of capital intensive industries are dramatically low and display a slight upward trend. It is striking that capital intensive industries which account for such a small proportion of the net product alter to such an extent the level and trend of the profit rate of *Business*, as a result of the large amounts of fixed capital that they hold.

Figure 8. Broad profit rate: *Business*, *Highly capital intensive industries*, and *Restricted business*



Business (—);
Highly capital intensive industries (---);
Restricted business (– –).
Profit rate = (Net product - Labor compensation) / Fixed capital.

The specific features or capital intensive industries in this paper echo the findings in the study that we devoted to the gravitation of profit rates among industries.[11] The two types of properties are obviously related. All industries whose profit rates tend to gravitate around a common value necessarily have a same trend. They all decline together up to the early 1980s and then rise. Limited divergences are apparent because gravitation is not strict. Conversely, the profit rates of capital intensive industries (highly and extremely capital intensive industries) were very low in comparison to the rest of the economy after World War II. They do not decline.

As already stated, the point is not only that the profit rate of *Highly capital intensive industries* displays different level and trend than the profit rate of the rest of the economy considered globally, but that its profile is unique (at the level of disaggregation considered in this study).

As explained in our paper on gravitation, the specific features of capitalistic industries simultaneously reflect problems of measurement (how to estimate the stock of capital for *Railroads*?) and the effects of regulation (since many of these industries are regulated). More research is needed and requires the use of new sources of data (other than national accounting frameworks).

[11] G. Duménil, D. Lévy, 1999.

2.5 - A comparative assessment of trends

Table 3 and figure 9 document the major stylized facts concerning profit rate trends. We focus on four sectors: *Business*, the *NF-Core*, the *Corporate sector*, and the *Restricted corporate sector*. Columns (1) and (2) are devoted to the decline of the profit rate up to 1982; column (3) measures the rise from 1982 to 2000, using the level of 1982 as the benchmark; columns (4) and (5) compare the level of 2000 to the levels following the war for 1948 and the decade 1956-1965; column (6) displays the ratio of the rise between 1982 and 2000 to the fall as between 1956-1965 and 1982; column (7) indicates the earliest year after 1965 whose profit rate has been recovered in 2000.

Column (1) displays the ratio of the profit rate in 1982 to the profit rate in 1948. The following results are apparent: (1) Overall, the profit rate was divided by a coefficient ranging between 2 and 7; (2) The *corporate sector* declined less than total *Business*, signaling that the *Noncorporate sector* fell more; (3) The decline was larger for the *NF-Core* and the *Restricted corporate sector*. This is due to the fact that both of these sectors exclude capital intensive industries whose profit rate did not decline (remaining very low). (4) The use of the second definition, the profit rate, r_n, reveals a steeper downward trend, due to the impact of interest paid. Similar results are displayed in column (2), where profit rates in 1982 are compared to profit rates for the decades 1956-1965. Obviously, the declines are smaller (a division by a coefficient ranging between 1.5 and 3.5).

The remaining columns are devoted to assessing the amplitude of the recovery. When the lowest value of the profit rate, in 1982, is taken as a benchmark, as in column (3)--independently of the amplitude of the earlier fall--it appears that the profit rate in 2000 increased by approximately 35% to slightly more then 100% of its lowest value. In most instance, it rose more for r_n, due to the recent reduction in the burden of interest. Columns (4) and (5) show that the level reached in 2000 is still comparatively low. Together with the ratio in column (6), these observations document the following features of the recovery:

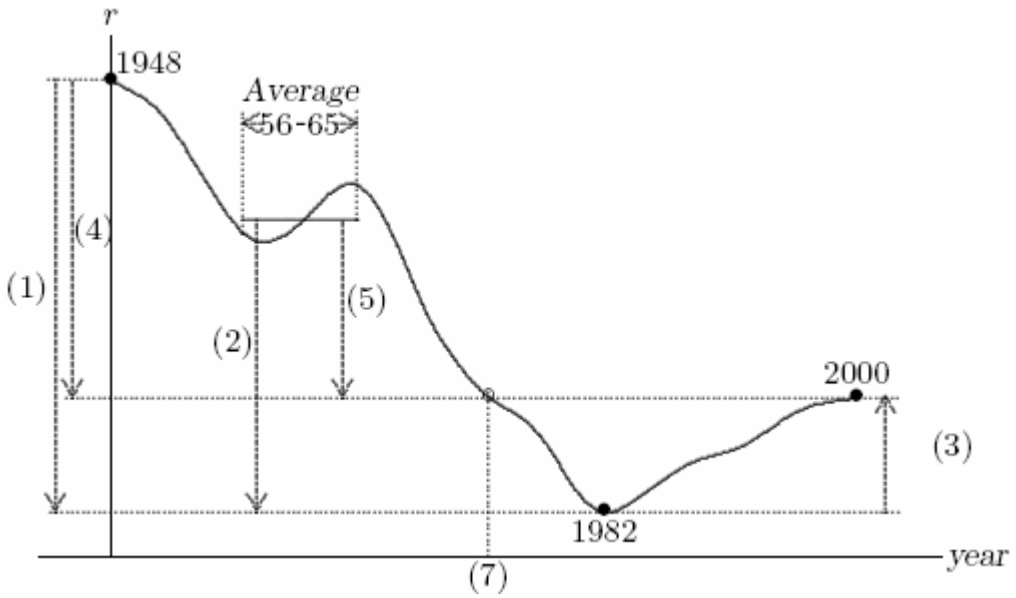
1. They show that the largest recovery is observed in the *Corporate sector* for r_b, where the profit rate nearly recovered its early level. When indirect business taxes and interest are subtracted, as in r_n, the fraction of the fall recovered appears more limited.
2. Again, the capital intensive industries play a crucial role, hiding the fall of the profit rate. When they are excluded, as in the *NF-Core* or in the *Restricted corporate sector*, the value of the profit rate in 2000 is still only half of its value of 1948, and between 50 and 70% of its average value for the decade 1956-1965. Only 40%, or even less, of the fall since this decade was corrected by the recent rise.

Table 3 - The trends of the profit rate in four sectors (columns (1) to (6) are in percentage points)

Sector	r	(1) 82/48	(2) 82/56-65	(3) 00/82	(4) 00/48	(5) 00/56-65	(6) (3)/(2)	(7)
Business	r_b	48.3	59.4	146.5	70.7	87.1	68.1	1970
Business	r_n	25.6	34.6	211.5	54.1	73.2	59.0	1975
NF-Core	r_b	35.1	43.4	155.8	54.7	67.6	42.8	1974
NF-Core	r_n	25.6	38.7	135.9	34.8	52.6	22.7	1982
Corporate sector	r_b	58.5	65.1	144.9	84.8	94.3	83.6	1970
Corporate sector	r_n	26.3	41.0	180.2	47.4	73.8	55.6	1975
Restricted corporate	r_b	40.9	46.6	137.0	56.0	63.9	32.4	1974
Restricted corporate	r_n	14.4	28.4	183.0	26.4	51.9	32.9	1980

(1) Ratio of the profit rate in 1982 to that of 1948.
(2) Ratio of the profit rate in 1982 to its average value for the decade 1956-1965.
(3) Ratio of the profit rate in 2000 to that of 1982.
(4) Ratio of the profit rate in 2000 to that of 1948.
(5) Ratio of the profit rate in 2000 to the average for 1956-1965.
(6) Ratio of the rise between 1982 and 2000 to the fall as between 1956-1965 and 1982.
(7) Earliest year after 1965 whose profit rate has been recovered in 2000.

Figure 9. Assessment of the trends of the profit rate



Last, column (7) indicates that the profit rate recovered its value of the first half of the 1970s or early 1980s.

3 - Technology, distribution and prices in the fall and recovery

This section is devoted to the "analysis" of the trend of the profit rate in relation to the evolution of technology, distribution, and prices. The issue is simply how to express the profit rate as the product of a number of factors. The definition of the profit rate which is directly adapted to this investigation is r_b.

As shown earlier, *Highly capital intensive industries* considerably bias the analysis of the trends of the profit rate in the whole economy. For this reason, we limit the unit of analysis to "restricted" sectors, that exclude *Highly capital intensive industries*.

Section 1 is devoted to the decomposition of the profit rate as the product of the productivity of capital and the share of profit (and variables closer to the traditional Marxian categories: composition of capital and rate of surplus-value). Section 2 discusses the effect of relative prices and their relation to technical change, in particular concerning the new upward trend of the productivity of capital in the last fifteen years. The major findings are summarized in section 3.

3.1 - Productivity of capital and share of profits

Consider first the familiar decomposition of the profit rate:

$$\text{Profit rate} = \text{Productivity of capital} \times \text{Share of profits} \qquad (1)$$

The productivity of capital is the ratio of output to the capital stock. The share of profits is the ratio of profits (net product minus total labor compensation) to the net product, or 1 *minus* the share of wages. The share of wages can, in turn, be analyzed as: Hourly labor cost in constant dollars / Labor productivity:

$$\text{Share of profits} = 1 - \text{Share of wages}$$

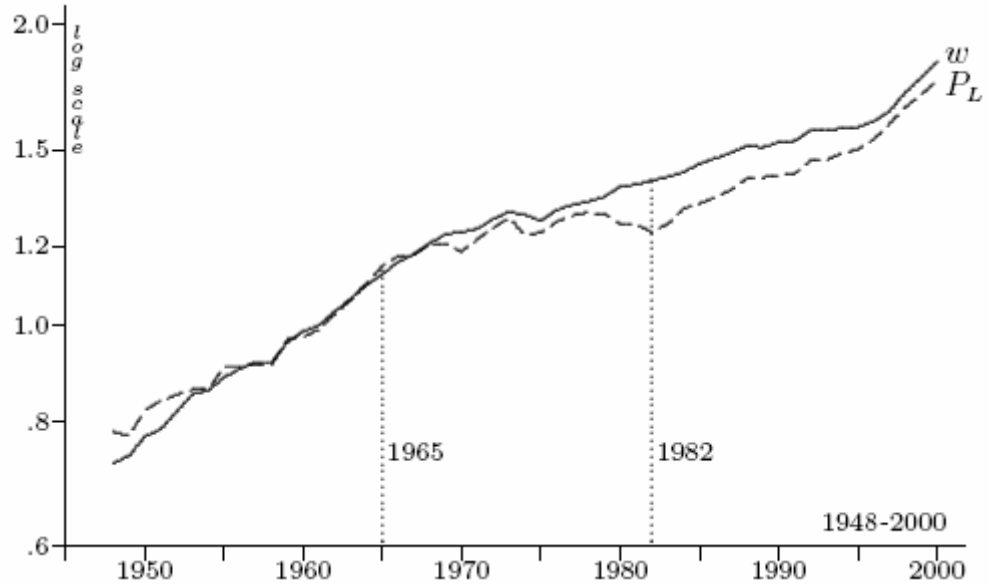
$$= 1 - \frac{\text{Hourly labor cost in constant dollars}}{\text{Labor productivity}} \qquad (2)$$

The hourly labor cost is the hourly labor compensation deflated by the GNP deflator (or the "real wage").

Figure 10. Profit rate, productivity of capital, and share of profits in the *Restricted business*

Profit rate = (Net product-Labor compensation) / Fixed capital (—) (r)
Productivity of capital = Net product / Fixed capital (– –) (P_K)
Share of profits = Profits / Net product (---) (π).
Normalized to 1 for 1956-1965.

Figure 11. Hourly labor cost in constant dollars and labor productivity in the *Restricted business*



Hourly labor cost (—) (w)
Labor productivity (– –) (P_L).
Normalized to 1 for 1956-1965.

Figure 10 plots the profit rate, r_b, together with the productivity of capital and the share of profits (as in equation 1) for the *Restricted business sector*. This figure demonstrates that *both* the productivity of capital and the share of profits contributed to the downward trend of the profit rate up to the early 1980s and its partial recovery since then, although the contribution of the productivity of capital to the fall was larger. The two variables are still significantly below the levels reached after World War II.

Figure 11 displays the hourly labor cost in constant dollars and the productivity of labor. Their quotient is the *share of wages*. The distance between the two curves in the figure measures the logarithm of this ratio.[12] It clearly appears that the increase in the share of wages (*i.e.*, the decline of the share of profits) after 1965 was the expression of the larger decrease of the growth rate of labor productivity in comparison to the simultaneous decrease in the growth rate of the hourly labor cost between 1965 and 1982 (table 4). Both growth rates diminished, but the growth rate of labor productivity diminished more. An opposite situation prevails since 1982.

Table 4 - Average annual growth rates of the hourly labor costs and labor productivity, % (*Restricted business*)

	1948-1965	1965-1982	1982-2000
Hourly labor cost	2.60	1.28	1.54
Labor productivity	2.28	0.46	1.97

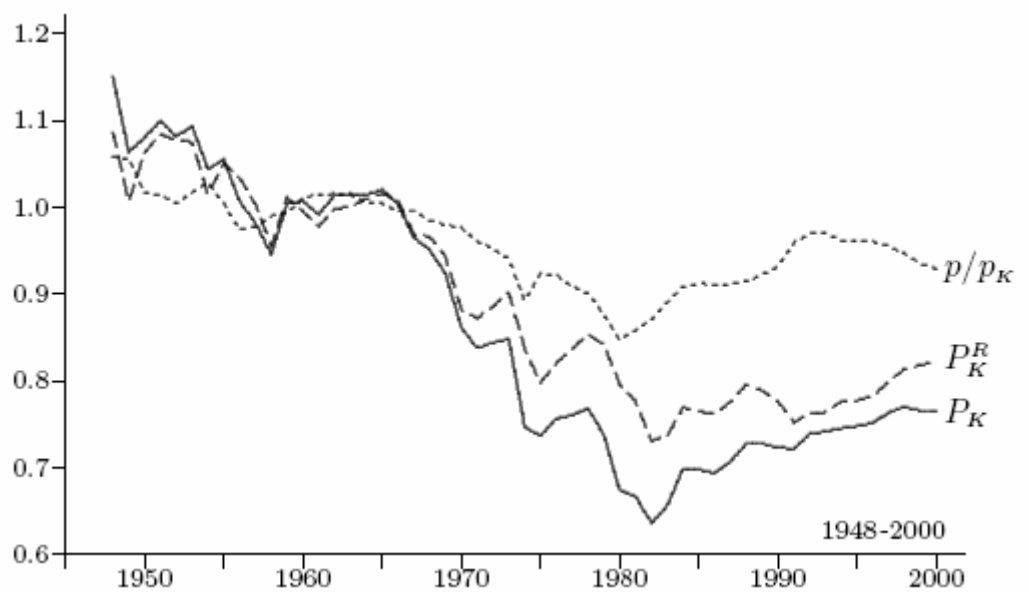
It is also possible to perform a similar decomposition as in figure 10, using variables closer to the traditional Marxian categories, the composition of capital (the ratio of total wages to the capital stock) and the rate of surplus-value (the ratio of profits to wages), all variables being measured in current prices:

$$\text{Profit rate} = \text{Inverse of the composition of capital} \times \text{Rate of surplus-value}$$

The results are displayed in figure 12. It appears that both variables contributed in similar proportions to the decline and limited recovery of the profit rate. Taking the decade 1956-1965 as 1, the inverse of the composition of capital and the rate of surplus-value were reduced to about 0.66, and the profit rate to about 0.43. From 1948 to 1982, the profit rate was approximately divided by 3; the inverse of the composition of capital was divided by 1.5 (the composition of capital was multiplied by 1.5); and the rate of surplus-value was divided by slightly less than 2.

[12] To within a constant reflecting the normalization over the decade 1956-1965.

Figure 12. Profit rate in the *Restricted business*: Rate of surplus-value and inverse of the composition of capital



Profit rate=(Net product-Labor compensation) / Fixed capital (—) (r)
Inverse of the composition of capital = Labor compensation/Fixed capital (– –) ($1/\gamma$)
Rate of surplus-value = Profits / Labor compensation (---) (τ).
Normalized to 1 for 1956-1965.

3.2 - Technology and prices

In the above expression of the productivity of capital, both the output and the capital stock are measured in current dollars. The productivity of capital can be further expressed as:Productivity of capital using aggregates in constant dollars

Relative price of output to fixed capital

$$\text{Productivity of capital} = \begin{pmatrix}\text{Productivity of capital}\\ \text{using aggregates}\\ \text{in constant dollars}\end{pmatrix} \times \begin{pmatrix}\text{Relative price of}\\ \text{output to fixed capital}\end{pmatrix} \qquad (3)$$

We denote the constant-dollar measure of the productivity of capital as the *productivity of capital in real terms*.

Figure 13 plots the three variables: the productivity of capital, the productivity of capital in real terms, and the relative price of output to capital, for the *Restricted business sector*. As in figure 10, the first variable is equal to the product of the second and third (as in equation 3). It appears that the decline of the productivity of capital was the combined effect of the decline of its measure in real terms and the decline of the relative price of output to fixed capital.

Figure 13. Productivity of capital in the *Restricted business*: Current and constant-dollar measures (in real terms), and relative price

Figure 14. Productivity of capital in the *Restricted corporate sector*: Current and constant dollar measures (in real terms), and relative price

Productivity of capital (—) (P_K)
Productivity of capital in real terms (– –) (P_K^R)
Relative price of output to fixed capital (---) (p/p_K).
Normalized to 1 for 1956-1965

As shown in figure 14, the same was true for the *Restricted corporate sector*. Simultaneously, more and more fixed capital was used and each "unit" of capital gradually became more expensive. In the *Restricted business*, the contribution of the fall in the measure of the productivity of capital in real terms was, however, considerably larger than the price effect.

The recovery of the productivity of capital in the last fifteen years is apparent in both sectors, but with some distinct features. In the *Restricted business*, the productivity of capital is constant when measured in real terms, and the entire recovery appears as a price effect. Conversely, within the *Restricted corporate sector*, the relative price is constant during the recovery, and the rise of the productivity of capital can apparently be attributed to the productivity of capital in real terms. The remainder of this section is devoted to the interpretation of this puzzling result.

In this analysis, it is important to understand that "price effects" mirror in the long run "technological effects". For example, if technical progress advances faster in capital goods, their price will diminish in comparison to the price of total output.

A first hypothesis concerning the rise of the relative price of output to capital during the period of recovery, as in figure 13 (or equivalently the decline of the relative price of capital) in *Restricted business*, is that it may reflect the diminishing relative price of information technology (computers, communications,...) coupled with the dramatic rise of investment in information technology. The share of this investment within total investment in equipment rose from 10% to 47% between the early 1950s and 2000 (comparing nominal aggregates). This interpretation must, however, be rejected on two grounds:

1. The share of information technology in the total stock of non-residential capital (equipment and structures) grew since World War II, but it represented only 12% in 2000. This growth is not sufficient to explain the relative movement of prices.

2. That the *Restricted corporate sector* in figure 14 does not reveal any price effect during the period of recovery, confirms that this new upward trend of the productivity of capital cannot be attributed to the declining price of information technology.

The major price effect in the recovery is actually observed between the price of the output of the *Corporate sector* and that of the *Noncorporate sector*. This is reflected in the data in a parallel decline of the two following relative prices: *Price of the output of the corporate sector/Price of the output of total business* and *Price of the capital used in business/Price of the output of total business*. Conversely, there is no decline in the relative price: *Price of output of the corporate sector/Price of the capital used in the corporate sector*. These observations suggest that technical progress was stronger within the *Corporate sector* than in the rest of the economy, and that the

relative price of this sector declined for both the capital and consumption goods it produces.

These properties can be made explicit in a model such as that presented in appendix A.1, in which market prices are assumed to be linked to prices of production. Two sectors are considered. One, like the *Corporate sector*, produces capital goods and consumption goods such as those produced by Manufacturing. The second, analogous to the *Noncorporate sector*, only produces consumption goods such as personal services. For simplicity, we assume that technical progress only occurs within the first sector. The unequal pattern of technical change results in: (1) a parallel rise of the productivity of capital in the two sectors, (2) a rise of the productivity of capital in the first sector and a constant productivity of capital in the second sector when the productivity of capital is expressed in real terms, and (3) a rise of the relative price of output to capital in the second sector and a constant relative price in the first sector. The results of this model are well in line with the observations in figures 13 and 14.

Overall, one must keep in mind that the entire variation in the productivity of capital mirrors technical change with specific configurations in each sector. It is erroneous to contend that only the productivity of capital in real terms accounts for technical change. The variations of relative prices are an important secondary effect of the same technical change.

3.3 - A summing up

The features of both the *fall* of the profit rate and its *recovery* can be summarized as follows. The crucial phenomenon is the deterioration in the performances of technical change and its improvement during the last fifteen years:

1. From the mid-1960s onward, both the growth rates of labor productivity and of labor cost were significantly diminished. The growth rate of labor cost fell by 50%, but it remained larger than that of labor productivity during the 1970s. *There was a lag in the adjustment of the growth of real wages to the deterioration of the performances of technical change.* This accounts for the decline of the share of profits during the years in question. Conversely, from the 1980s onward, the growth rate of labor productivity exceeded the growth in wages, and the rise of the share of profits was a factor in the recovery.

2. The same deterioration of the performances of technical change is also apparent in the decline of the productivity of capital. Not only more fixed capital (in constant dollars) became necessary, but it became gradually more costly in all sectors (corporate and noncorporate). The movement of the relative price of output in comparison to fixed capital plays a role in the recovery during the last fifteen years, but this effect depends on the unit of analysis. Its impact is observed within the *Restricted business*, not within the *Restricted corporate sector*. A likely explanation of the

features of this recovery is that technical change was more rapid within the corporate sector (both in the production of capital and consumption goods) than in the rest of the economy, this characteristic being reflected in the relative decline of the price of capital (produced by the corporate sector) used within the entire business (corporate and noncorporate).

Appendices

A.1 - Technology and prices: A two-sector model

We now present a very compact form of a model such as that discussed in section 2. This model has been developed exclusively to account for the features of the period of recovery during the last fifteen years. The purpose of the analysis is to show that: (1) both the variations of the productivity of capital in real terms and the variations of the relative price of output to capital are the expression of technical change; (2) the decomposition, as in equation 3, of the productivity of capital into the product of the productivity of capital in real terms and the relative price of output to capital depends on the sector considered.

A first sector (*Corporate sector*) produces capital goods and consumption goods such as those produced within Manufacturing. Technical progress is comparatively rapid in this sector and affects equally the various components of output always considered globally.[13] A second sector (*Noncorporate sector* or *Individual business*) only produces consumption goods such as personal services. Technical progress is comparatively slow in this sector. In the following model we assume for simplicity that technology is constant in this sector. We use a *social-technical* description of technology, meaning that inputs and the consumption of workers are aggregated.

One unit of output of the first sector is produced using a_i^t unit of itself. This technical coefficient declines over time. One unit of output of the second sector is produced using a_2 unit of the output of the first sector. This coefficient is constant. Unit prices are p_1 and p_2.

Prices are equal to prices of production. One has:

$a_i^t \; p_1 \, (1+r) = p_1$

$a_2 \, p_1 \, (1+r) = p_2$

$1+r = 1/a_i^t \quad and \quad p_2/p_1 = a_2/a_i^t$.

[13] The analysis of the features of the period of decline of the profit rate would imply the distinction between the capital goods and the consumption goods produced by the corporate sector.

The productivities of capital with output and capital measured in real terms are: $P_1^R = 1/a_i^t$ and $P_2^R = 1/a_2$. P_1^R rises and P_2^R is constant. The relative price of the output of the first sector to its input is equal to 1 and is constant. The relative price of the output of the second sector to its input is equal to p_2/p_1, *i.e.*, a_2/a_i^t , and rises with time.

The productivities of capital, P_1 and P_2, are the products of the two above variables. One has $P_1 = P_2 = 1/a_i^t$. Thus, the two productivities of capital are equal[14] and both increase with time.

The following results are obtained, which echo the findings in figures 13 and 14:

1. Although technical change only occurs in the first sector, the variations of the productivity of capital are identical in the two sectors.

2. A decomposition such as equation 3 in section 2 yields opposite results in the two sectors. In one sector, the entire rise of the productivity of capital is the effect of the rise of the productivity of capital in real terms. The converse is true in the other sector where the entire rise can be imputed to a price effect.

A.2 - Sources and computations

The sources of the computations are presented in the technical appending of our study devoted to the gravitation of profit rates.[15] There are some differences between the findings in the present study and others.[16] They can usually be explained by differences in the units of analysis or definitions. There are, however, a number of technical problems, to which this appendix is devoted.

The BEA recently revised its estimates of the capital stock. These revisions affect unequally the various industries. For example, the ratio of the new estimates to the previous ones was slightly above one for *Manufacturing*. Within *Transportation*, it is equal to approximately 1.85 up to the 1980s, and reaches 2.21 for 2000. Thus, for *Transportation*, the new estimates doubled the capital stock. To our knowledge none of the recent papers use the new estimates, and this make the comparison difficult.

Another source of discrepancy is due to the alternative treatments of *self-employed persons*. They may own a capital and pay wages to employees. Their income is called *proprietors'*

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[14] Due to the specific assumptions of the model.

[15] G. Duménil, D. Lévy, 2002. Data for the *Corporate sector* are from table 1.16 of NIPA

[16] We do not discuss here Robert Brenner's recent study (R. Brenner, 1998), since the technical information required here is not provided.

income. In the computation of a profit rate, two possibilities are available. One option is to focus on the *Corporate sector*, thus eliminating all self-employed persons. Another option is to estimate a fictitious labor compensation for self-employed persons (called "wage equivalent") and to determine subtractively profits. We use either one of these two options. Section 3 is devoted to the *Corporate sector*; A wage equivalent is considered in sections 1 and 2.

In this study, the general principle of the computation of a wage equivalent for self-employed persons is the following: A unit wage is determined by employee, and this unit wage is multiplied by the number of self-employed persons to determine a wage equivalent. The unit wage per employee is the total compensation in the industry divided by the number of full-time and part-time employees. Different treatments can be found in other studies. Edward Wolff divides the proprietors' income into two halves, one aggregated with wages, and the other with profits.[17] Fred Moseley excludes all proprietors' income from profits, although their capital is still included in his measure of capital.[18] Anwar Shaikh and E. Ahmet Tonak use the same method as ours, except that they consider the numbers of full-time equivalent employees.[19]

The treatment of residential and nonresidential income, and rents, is also problematic. Usually, it is net stock of *Nonresidential capital* which is considered (with the exception of Shaikh and Tonak who use the gross stock (p. 125). Therefore, all income corresponding to residential capital (real and fictitious) should be excluded. Wolff retains, however, the *rental income of persons* which is primarily composed of these rents. Moseley, Mohun[20] and Shaikh and Tonak only exclude the fictitious rents corresponding to *owner-occupied homes*. We subtract all rents, using *Gross Product Originating* data (the line *Real-Estate Residential*).

Measurements in constant dollars are difficult.[21] As is well known, the definition of price indexes is very questionable whenever the composition and nature of the goods aggregated is considerably altered over time. Typical examples are computers and services.

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[17] E. Wolff, 1999.

[18] "[...] excluding the value added by self-employed persons", p. 40, F. Moseley, 2000. Note that, in 2000, the nonresidential fixed capital of the *Noncorporate sector* represented 2110 billions of dollars to be compared to 6 585 billions of dollars for the *Corporate sector*.

[19] A. Shaikh, E.A. Tonak, 1994, Appendix G.

[20] S. Mohun, 1999.

[21] The computation of profit rates is entirely based on nominal variables. The issue of relative prices is only relevant to decompositions such as those in section 3 (equations 2 and 3).

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