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N° 40 July 1985

Rate of profit, business cycles and capital accumulation in West German industry, 1960-1981

Angelo REATI*

Internal Paper

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Contents

SUMMARY

The main purpose of the paper is to study the trend in profitability and its components in German industry over the last twenty-three years, to contribute to a better understanding of the stagnation and the economic crisis which has bedevilled the Western world for more than a decade. The investigation is then extended to the relationship between the cycles in profitability and the cycles in production, as well as to the effects of capital accumulation on employment, through the changes in the capital intensity of production.

Over the 1960-81 period, the rate of profit displayed a declining trend, which was strongly influenced by the fall at the beginning of the Seventies. Capital accumulation did not exert an appreciable downward influence on profitability, mainly because the investment effort (measured by the increase in the capital intensity of production) has been quite rewarding in terms of labour productivity. The fall in profitability should be viewed more in the context of the decline of the income distribution ratio (or profits/wages ratio), a quite surprising phenomenon for a country which has in no way experienced social conflicts comparable to those of its partner countries.

The comparison of profiability cycles with production cycles shows a correlation between the two, except for the consumer goods sector. In the investment goods sector, profitability appears as a leading indicator for the production cycles, while in the intermediate goods sector, total manufacturing and the whole of industry, the two cycles tend to coincide.

Capital accumulation was generally "intensive", in the sense that the growth in the volume of capital stock served to increase the capital intensity of production, at the expense of employment. It is only in the investment goods sector that capital accumulation was "extensive": while increasing the capital intensity of production, the industries of this sector enlarged at the same time the productive base and thus employment.

The conclusion of economic policy to be drawn from these results is that an all-out policy to promote investment to solve the unemployment problem will not attain the target. This policy should rather be selective, and condition the investment grants to the achievement of suitable job targets.

I. INTRODUCTION

1. This paper - which follows a similar study on the UK[1] - takes as its starting point the hypothesis that the rate of profit is one of the chief factors explaining the fluctuation in the level of activity of enterprises. Consequently, the study of long run profitability trends, and the comparison of profitability cycles with production cycles, is vey useful in helping us to understand the economic crisis which has bedevilled the western world for a decade. Of course, the importance of profitability does not mean that other factors of comparable weight have not also influenced the economy. In order to understand the present "crisis" satisfactorily, we must therefore refer to theoretical models which are far more complex that one which merely considers profitability, even if profitability already subsumes other fundamental explantory factors (income distribution, capital accumulation, productivity).

2. In economic analysis, the relationship between the rate of profit and the level of activity is treated in a variety of ways. No theory assumes a direct link between the two variables, but usually the causal link between investment and production is acknowledged. Investment exerts a fundamental influence on production, as regards both aggregate demand and supply, through the creation of production capacity. The point at issue is how to explain investment, and notably the influence of profit on capital accumulation, and hence on the level of activity.

In the neoclassical model, the link between profits and investment is merely implicit and is situated within the framework of the technical possibilities of a production function where the scope for more or less continuous factor substitution is possible. In this context, investment would be determined by the user cost of capital

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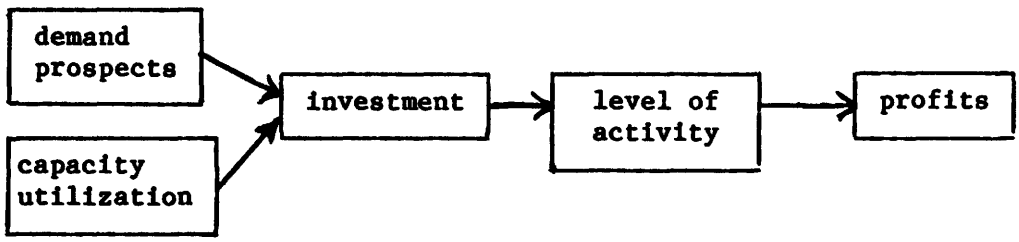
[1]See Economic Papers n° 35. The case of Italy is analysed in document II/63/82 of February 1982.

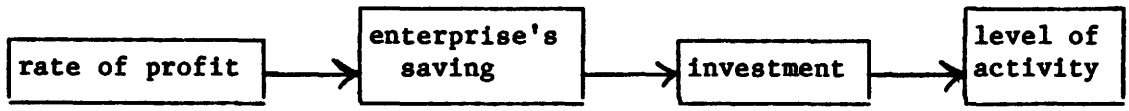
When this price falls, as compared with labour, enterprises tend to invest more, and thus become relatively more capital intensive.

In the cruder versions of Keynesian theory, the role of profit is more explicit, although it is placed at the end of a dynamic process which is chiefly determined by other factors. In this "demand/investment" model, investment is primarily determined by demand prospects and by the rate of utilisation of production capacity (the accelerator principle). The resulting level of activity in turn determines the size of the profits; graphically:



Profit is thus the last link in the chain, and the savings of the enteprise come from its investments. In particular, in the accelerator mechanism, the only profitability hypothesis is that at the expected level of production the rate of profit is sufficient to permit the enterprise to continue its activity.

In a third model - which will be called "profits/investment" - the sequence is reversed and profit plays a central role. Because the objective of a enterprise is to make a profit, profitability becomes the motive force for capital accumulation; it is then the enterprise's saving (resulting from profit) which determines investment, and not the reverse. We thus have:



This model thus implies a correlation between rate-of-profit cycles and production cycles, in that the former should anticipate the latter. There will normally be a time lag before changes in profits work through to production, because it takes time to implement investment projects, and because a certain sluggishness in the corporate decision-making process may entail delays in adjusting to new market conditions.

This paper starts by defining the concepts and methods used, and then goes on to analyse the trends of the rate of profit and of its components from 1960 to 1981. Next, it turns to the empirical verification of the relationship between profitability cycles and production cycles. The final section studies the trends of capital accumulation underlying production cycles.

To conclude this introduction, it is worth emphasizing the limitations of the work and to spend some words on the somewhat "heterodox" approach taken. Most of the time the relationships are identities. As such, they do not show the causual link between the variables nor they offer any single behavioural explanation. This gap is partly filled by a brief discussion on the underlying mechanisms provided above.

Concerning the approach, the major source of inspiration have been the neo-Ricardians and the classical tradition from which they spring. Instead of considering the theory of optimum allocation of a stock of scarce resources, the basic reference is rather a model of "production of commodities by means of commodities". In particular, relying on Sraffa's critique of the marginalist theory and on his result on the "reswitching of techniques", none of the conventional assumptions are made about the underlying production function, nor is it supposed that an inverse and monotonic relation between the relative factors prices and the capital/labour ratio exists.

It should nevertheless be acknowledged that the main results of the paper could also be derived from a neo-classical framework, the fundamental differences being the behavioural mechanism.

II CONCEPTS AND METHODS

The profitability indicator chosen is the rate of profit on capital advanced, i.e. on all capital which contributes to production (fixed capital and circulating capital). Before defining this concept of capital in greater detail, we turn first to the measurement of the numerator itself.

1. The national accounts enable us to capture profits in a variety of ways, which lie quantitatively between two boundaries; gross operating surplus and the net disposable income. The process of moving from the first of these to the second is illustrated in Table 1, which gives the 1970 and 1980 figures for the group of non-financial enterprises, similar data for industry not being available.

Table 1 - Income account of non-financial enterprises (NFE)

	1970		1980	
	Mio DM	% GOS	Mio DM	% GOS
Value added at factor cost[1]	524 650		1 113 190	
- Wages (including employers' social contribution)[1]	280 140		619 490	
= Gross operating surplus (GOS)	244 510	100.0	493 700	100.0
- Depreciation	62 940	25.7	158 780	32.2
= Net operating surplus	181 570	74.3	334 920	67.8
- Actual interest, net	33 130	13.6	88 020	17.8
- Direct taxes	11 010	4.5	21 260	4.3
- Dividends & other income distributed, net	6 920	2.8	12 830	2.6
- Withdrawals from the entrepreneurial income of NFE	115 540	47.3	242 910	49.2
+ Imputed social contributions	7 080	2.9	20 680	4.2
- Social benefits	6 700	2.7	15 460	3.1
- Accident insurance, net[2]	350	0.1	650	0.1
+ Other transfers, net	2 490	1.0	6 150	1.2
Net disposable income	17 490	7.2	-19 380	-3.9

[1]Value added and wages refer both to enterprises and to households since, for these variables, the ESA gives no sectoral breakdown.
[2]Difference between net accident insurance premiums and accident insurance claims.

Source: EUROSTAT, National Accounts ESA. Detailed tables by sector, 1970-1981, Luxembourg 1983.

The operating surplus (gross and net) is an indicator of the return on economic activity, whereas net disposable income - the equivalent of net retained profits - is a measure of the scope for self-financing the widening of the production capacities. The gross operating surplus is thus a production concept; disposable income becomes relevant when the structure of financing has to be determined.

It is arguable that, in order to study the long-term profitability trends and to establish their influence on the economic cycle, it is necessary to attach greater importance to the "production" aspect, and therefore to take the operating surplus into consideration. The return on economic activity for example does exert a determining influence on the establishment of corporate plans and is an essential benchmark for those who have to finance their implementation.

In this paper, profit is considered from four viewpoints: gross (gross operating surplus), net, adjusted and unadjusted. The gross unadjusted profit has been taken at factor cost rather than at market prices, to take account of the fact that the return of enterprises is influenced by subsidies. Indirect taxes are excluded because, although they form part of value added, they are paid directly to the State.

Net profit was obtained by using "economic" depreciation (at replacement cost)[2], calculated when estimating the stock of fixed capital.

It then seemed appropriate to correct the gross and net operating surpluses in order to take into account that they not only cover profits, but also payment for the work of the self-employed, who are numerous in branches dominated by small and medium-sized firms. This part of wages has been estimated by putting forward the hypothesis that the wages of the self-employed correspond to the average wages of

[2]The national accounts perspective - which is different from balance sheet data, at historic costs - gives a better picture of reality: the replacement cost technique allows for the fact that the replacement of equipment involves increased costs because of inflation.

employees. The adjusted (gross and net) profit has thus been obtained by subtracting the wages of the self-employed from the operating surplus. They have instead been added to the sum total of wages.

2. Turning to the denominator, the stock of fixed capital used is the net capital at the half-year, at replacement cost.

It might be argued that it would be more appropriate to use gross fixed capital in order to calculate the rate of profit. But this is not the case, because gross fixed capital is not capital advanced: the fraction of fixed capital already written off, if it still exists in its physical form, has already been incorporated into costs (depreciation) and recovered by the sale of products.

3. The stock of circulating capital represents those funds which are permanently tied up in the enterprise in order to finance the compensation of the labour force employed during a production period, and to purchase the goods and services which are entirely consumed during the production cycle (intermediate consumption). It differs from fixed capital because it is entirely recovered at the end of the cycle production and realization, to be invested in it once more. The amount of circulating capital advanced thus depends on technical aspects (length of the production cycle) as well as on market conditions. This rises when short run fluctuations in sales make stocks larger than usual, so lengthening the realization period. The stock of circulating capital must therefore not be confused, for example, with the demands for funds which are simply due to the fact that wages are paid weekly or monthly.

Circulating capital may be considered either from the technical viewpoint (the capital necessary, which must be advanced in one way or another), or as capital financed by the enterprise[3]. From the first point of view, the only one considered here, it successively takes three forms (see fig. 1):

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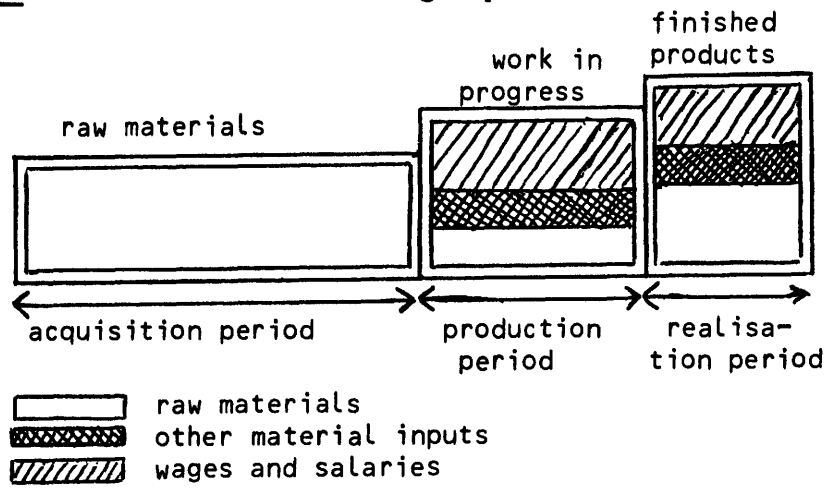
[3]The sometimes considerable difference between "financial" and "technical" circulating capital is due to the credit which the enterprise receives (through banks, suppliers, and advances by customers) or which it grants (to customers and by advances to suppliers).

(a) productive circulating capital, which consists of the stock of raw materials and other material inputs, as well as the labour force;

(b) commodity circulating capital, which is made up of stocks of work in progress and finished products, including transported goods. Their value includes wages, raw materials and other types of intermediate consumption;

(c) monetary circulating capital, obtained from the sale of the stock of finished goods.

Figure 1: The stock of circulating capital



Each form is converted into the next through the activities of production, acquisition and realization, which give rise to flows (intermediate consumption, wages, receipts from the sale of finished products). There is therefore a one-to-one correspondence between flows and stocks, which means that changes in stocks are accurately reflected in flows.

In the case which concerns us here, the problem is to assess the fraction of annual flows of wages and intermediate consumption which is tied up in the enterprise in relation to the length of acquisition, production and marketing periods. This means that one must know the rate of turnover of circulating capital (r), i.e. the number of times a year in which the advances in question are recovered. Because this information is not recorded in the statistics, it was estimated as follows:

$$r = \frac{IC+W}{ST} \qquad (I)$$

where IC = intermediate consumption

W = wages and salaries (hereinafter "wages")

ST = average annual levels of stocks of raw materials, finished products and work in progress (hereinafter "stock levels")[5]

This definition of r therefore implies that the number of times in which circulating capital for wages and circulating capital for raw materials is recovered corresponds, on average, to the ratio of stock renewal to total costs. This hypothesis, the only one possible in the absence of data, is thus an approximation to the underlying real magnitudes.

4. The formula for the rate of profit on capital advanced used in this paper is the following (see Levy-Garboua and Weymuller 1981, page 113), in which all magnitudes are at current prices:

$$p = \frac{S}{K+\frac{IC}{r}+\frac{W}{r}} = \frac{S}{W} r \frac{1}{1+sa} \qquad (II)$$

where S = profits (operating surplus)

K = stock of net fixed capital at replacement costs, at the half-year

r = rate of turnover of circulating capital

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[4] In reality, two rates of turnover would be needed - one for circulating capital for raw materials (r_m), and another for ciulating capital for wages (r_w) - because the periods during which they are tied up do not exactly coincide. However, the data available did not permit this refinement in calculating the rate of profit, and it is therefore assumed that:

$r_w = r_m = r$

[5] ST is equal to the arithmetic mean of stock levels at the beginning and end of each year, at current prices. This mean is virtually the same as the similar mean which is obtained from national accounts data, where stocks are valued at the constant prices of the year. In order to calculate the changes in stocks in the national accounts, the end-of-year stocks are deflated by the rise in prices for the period, and the reverse is applied to the beginning-of-year stocks. As a result, even in periods of high inflation, the differences between the mean at current prices and the mean at constant prices are tiny.

$$sa = \text{indicator of the structure of accumulation}$$

$$= \frac{K + (IC/r)}{W/r} \qquad \text{(III)}$$

$$S/W = \text{income distribution ratio}$$

Formula II shows that, for a given quantity of value added, the rate of profit is a function of three elements:

- income distribution (S/W);
- the rate of turnover of circulating capital (r), which reflects the relative size of this part of the capital advanced. A steady rise in r reflects greater efficiency in stock management just as much as technical changes inside or outside the sector concerned (e.g. improved transport conditions) which, by reducing the relative amount of circulating capital, have a favourable effect on profitability;
- capital accumulation, as summarized in the indicator sa (structure of accumulation). The changes in this indicator - which reflects the introduction of technical progress into the economy - show the extent to which accumulation places downward pressure on the rate of profit. Such pressure is exerted when, all other conditions being equal, the indicator sa increases as a result of a dynamic process caused by competition. There would then be an "overaccumulation" of capital relative to the sector's profit opportunities. We shall return to this aspect below[6/7].

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[6]We shall also see that sa can also grow in relationship with the interaction between the increase in per capita wages and the choice of production techniques.

[7]In a neo-classical framework an "overaccumulation" of capital, driving the growth of capital stock above its equilibrium path, can result from an economic policy which cheapens capital with respect to labour.

Formulae II and III could be further broken down to include the rate of capacity utilisation. This element - which is very important in order to explain the short-term fluctuations in profitability (i.e. within cycles) - has been ignored here, since the purpose of the paper is to study the long-term changes and their causes. The long-term dynamics of the rate of profit and of the indicator of the structure of accumulation would not be affected by the rate of capacity utilisation unless it showed a long-term upward or downward trend. Most probably, this is not the case, since the business cycles average out the capacity utilisation at its "normal" level[8].[9]

5. Formula II offers at least two advantages over the indicators most frequently used in macroeconomic studies (wage share in value added and return on stock of fixed capital). The first advantage stems from the fact that it gives more information than the wage share, since we have just seen that it can be broken down into an income distribution ratio and an indicator of the structure of accumulation. The second advantage is that it takes account of circulating capital, which not only is an important factor for the study of economic fluctuations, but makes intersectoral comparisons of rates of profit more meaning-

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[8]What is said here about the absence of a clear long run trend is not really contradicted by the "stagnationists"' theories, which emphasize the effects of the spread of oligopolies. They distinguish two cases of spare capacity: i) the planned one, that oligopolists maintain to erect barriers to entry; ii) the unplanned capacity, resulting from the absence of price competition: instead of engaging in a price war to throw out a newcomer, oligopolists prefer to accept some excess capacity (Steindl, 1981. See also, for both aspects, Cowling, 1982).Neither should produce a steady long run decrease, at least for the period covered by the present investigation. In fact, the planned spare capacity is a fairly fixed proportion of the actual capacity and thus it could show a clear upward trend only on a secular basis, with the increase in concentration. The unplanned unused capacity is a phenomenon which is certainly absorbed in the course of a few business cycles, since capacity utilisation cannot steadily decrease in the long run without exerting an intolerable pressure on profitability.

[9]The changes in capacity utilisation resulting from the business cycle are considered here. To this should be added the excess capacity due to the fact that after 1973 some plant and machinery has become obsolete because of the increase in energy prices. Since capital stock statistics do not take full account of this obsolescence, much of the increase in capital per employee is probably due to this statistical bias and not to technology.

ful. Since the proportion of fixed capital varies appreciably from one branch to another, if we do not consider the capital advanced as a whole, any comparison of profitability levels is not very meaningful.

6. The indicator of the structure of accumulation might seem somewhat ambiguous, since at the same time it reflects the effects of technology and of income distribution[10]. Nevertheless, it does have the advantage of establishing a relationship between these two factors, which are often interdpendent and may exert conflicting pressures on profitability. All things considered, it therefore seems prefereable to formula V, which takes account of technology only.

In order to show the contradictory effect of the elements which determine the indicator sa, let us express formula III in terms of the capital intensity of production. This can be done from two points of view, one which emphasizes the efficiency of technological change, and the other the interaction between technological change and income distribution.

Taking the first approach, we have:[11]

$$sa = \frac{QT}{PDT} \quad \frac{PKCA}{PVA} \quad \left(\frac{W/r}{VA}\right)^{-1} \qquad \text{(VI)}$$

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[10]To avoid this drawback, some authors break down the rate of profit as follows:

$$p = \frac{S}{KA} = \frac{S}{VA} \cdot \frac{VAV}{KAV} \cdot \frac{PVA}{PKA} \qquad \text{(IV)}$$

where: KA = capital advanced, at current prices
VA = gross value added, at current prices
V = volume
PVA and PKA = price of value added and of (total) capital advanced.
When the rate of profit is presented in this way, the indicator of the structure of accumulation is replaced by the following expression:

$$ca = \frac{VAV}{KAV} \cdot \frac{PVA}{PKA} = \frac{KAV}{L} \left(\frac{VAV}{L}\right)^{-1} \frac{PVA}{PKA} \qquad \text{(V)}$$

where: L = number of employees.
We shall see that formula V is only a part of the indicator of the structure of accumulation used here.

[11]For this purpose, it is sufficient to multiply and divide formula III by the number of employees (L) and by the gross value added at constant prices (VAV) respectively, and to take account of the change-over from aggregates at constant prices to aggregates at current prices

VA = VAV.PVA
KCA = KCAV . PKCA

where: KCA = stock of fixed capital and circulating capital for raw materials advanced, at current prices = K + (IC/r)
PKCA = implicit prices of KCA.

where QT = capital intensity of production = KCAV/L

PDT = labour productivity = VAV/L

The influence of technology can be seen in the term (QT/PDT), which records the net effect of technological change and of its impact on productivity. When the growth of the capital intensity of production is greater than the growth of the productivity associated with it (QT/PDT increases), the indicator sa is subject to upward pressure (and the rate of profit to downward pressure): accumulation is not efficient, since the improvement to productivity requires too much capital[12].

This initial impact is rectified by two factors: (a) the movement of the relative prices of capital advanced, which reflects the strength of the investment goods sector relative to the others; and (b) income distribution, adjusted by changes in the relative proportion of circulating capital for wages (W/r). A rise in r (fall in the proportion of circulating capital) pushes sa upward, because it reduces the influence of the wage share in value added (the last term of formula VI increases) and hence gives greater importance to fixed capital.

The evolution of the indicator of the structure of accumulation is thus the outcome of a set of factors which do not all necessarily act in the same direction. The fact that their action is synthesized in a single indicator is a strong point which makes it more useful than others for analysing profitability. For example, if we note that sa is not increasing, and that at the same time the rate of profit is falling, we can immediately discard the hypothesis that this fall is due to an "overaccumulation" of capital. By contrast, if we had taken into consideration only the "changes in technologies" aspect (formula

[12]The approach followed here implies that technical change, once adopted, is "clay". Consequently, the problem of distinguishing between movements along the growth path due to factor substitution and shifts in it, due to technical change, as is the case when technology is assumed to be "putty-putty", does not arise.

V), we would have arrived at this conclusion only if the term QT/PDT had fallen or remained stationary. If it increases, all that we learn from formula V is that technology exerts downward pressure on profitability. There is therefore no way of immediately establishing, as in the case of formula VI, whether this first stimulus has become less important because of the upward movement of wages.

The other way of breaking down the indicator of the structure of accumulation is the following:

$$sa = \frac{QT}{RWL/r} \cdot \frac{PKCA}{PC} \qquad \text{(VII)}$$

where RWL = real wages per employee

PC = consumer price index

As stated earlier, this presentation of sa shows in particular the possible interaction between technological change (which is statistically reflected in QT) and income distribution. For, while it can be taken that the search for productivity gains gives rise to a trend increase in the volume of capital per employee (indicator QT), income distribution probably influences this trend also. Thus, enterprises can react to real or expected rises in wage costs by introducing more capital intensive or labour efficient technological advances which increase productivity: rising wages accelerate the adoption of a technical change that would have taken place in any case[13]. In fact, a social conflict interpretation of the neo-Ricardian schema would suggest that enterprises are strongly motivated to free themselves of labour not only in order to increase productivity but also to achieve a better control over the production process (machines do not strike, are not absenteist, do not claims for "excessive" wage increases, etc.). If wage increases are big enough, they can produce faster scrapping and, for the reason just stated, the new plant and machinery will be more capital intensive.

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[13]Furthermore, the upward movement of real wages creates outlets for the additional goods resulting from increased productivity. Wage increases are thus both a motive for achieving productivity gains and a condition permitting them to take place.

Lastly, before concluding this section, it may be useful to provide further information on the mechanisms by which capital accumulation can exert a downward pressure on the rate of profit.

7. Here it should be noted that when an oligopolist increases QT, a competitive struggle is likely, culminating in an increase in capital intensity throughout the branch and a reduction in the rate of profit. The increase in the profit margin (difference between unit prices and costs) resulting from the new techniques, enables the innovator to bring down prices; in order to preserve market shares, his competitors react by investing in the same techniques and adjusting their prices. The result is a chain reaction affecting both the organization of production (choice of techniques) and pricing policy, the possible outcome of which is indicated above.

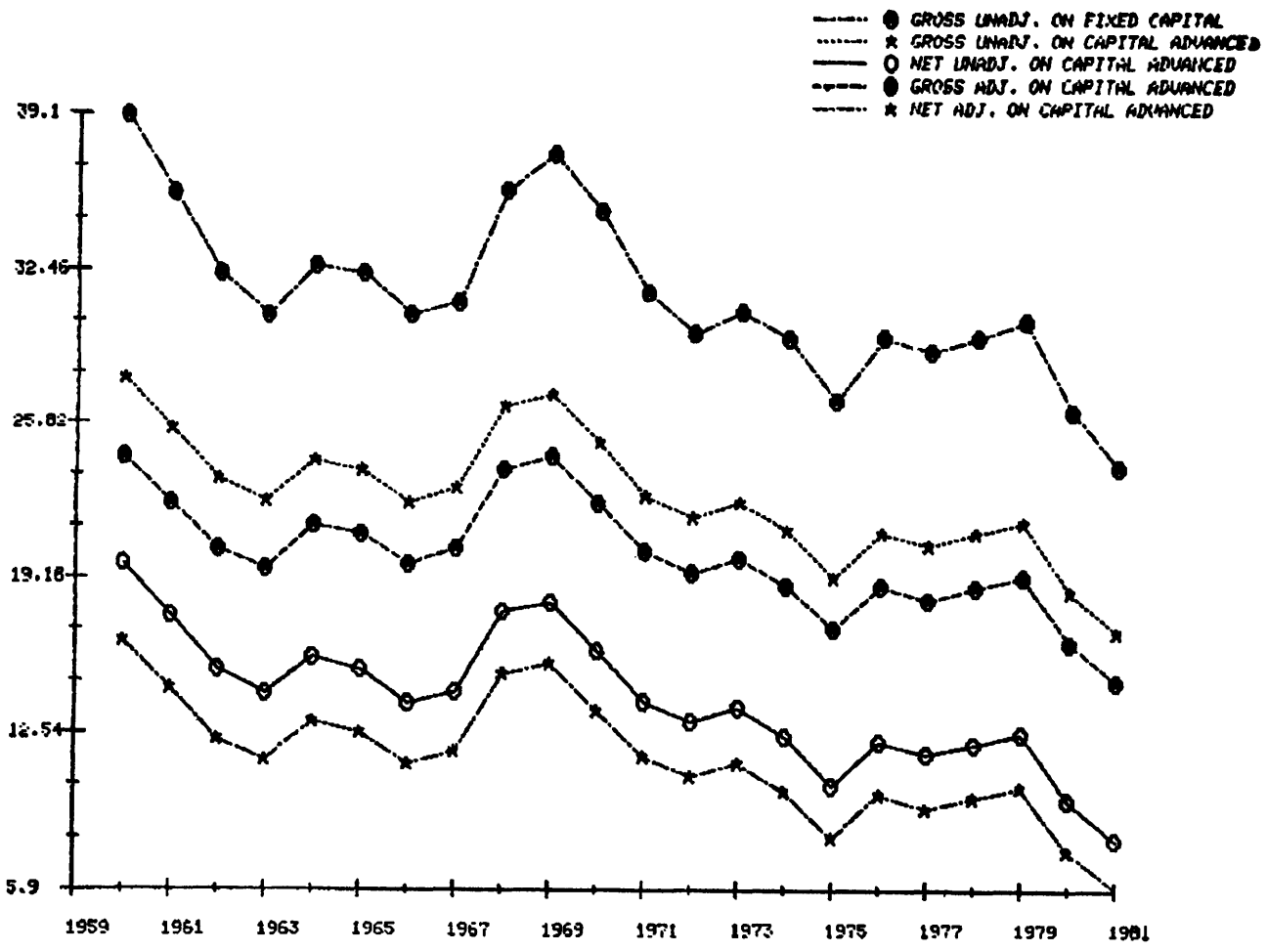
Let us now examine the empirical results. Details about the sources of the data (national accounts) and the calculation procedures are given in the Appendix, where it is also shown how the 34 industrial branches of the German national accounts have been grouped into large sectors: sector I, investment goods; sector II, intermediate goods and sector III, consumer goods. Here let us just recall that sector I essentially covers vehicles and mechanical, instrument and electrical engineering. Sector II refers primarily to energy products, other mining and quarrying, metals, chemistry and paper, while sector III to food, textiles, clothing, furniture and some other consumer goods. Manufacturing includes all industrial branches except energy and construction. This latter has also been excluded from total industry, because it was not possible to find a reliable estimate of stocks.

Part I

III LONG-RUN PROFITABILITY TRENDS

1. The four rates of profit on capital advanced mentioned above (gross and net, adjusted and unadjusted) as well as the gross rate of profit on the stock of fixed capital followed very similar trends (for an example, see Figure 2). Consequently, unless otherwise stated, the terms "rate of profit" and "profitability" henceforth refer to the net rate of profit on capital advanced.

Figure 2: The rates of profit
Total industry (excluding construction)



2. All the large sectors showed long-run downward trends (see Table 2, where the parameters b, times 100, refer to the average annual percent changes of the exponential trend).

Table 2 : Exponential Trend of Profitability 1960-1981*

	a	b	r^2	Trend level** 1960	1981
Investment goods***	2.99	-0.027	0.480	19.4	11.1
		(-4.29)			
Intermediate goods	2.67	-0.029	0.514	14.0	7.6
		(-4.60)			
Consumer goods	3.27	-0.020	0.704	26.0	17.1
		(-6.90)			
Manufacturing	3.11	-0.030	0.717	21.7	11.6
		(-7.11)			
Total industry***	2.93	-0.027	0.682	18.2	10.2
		(-6.55)			

* Regressions of the exponential function:
$p = a. e^{bt}$, or $\log p = \log a + bt$
where p = unadjusted net rate of profit on capital advanced
t = time (1, 2, ..., 22)
t statistics in brackets
Since the residuals are autocorrelated, a rigorous hypothesis test is not possible

** Anti-logarithm of the theoretical value resulting from the regression.

***Excluding Construction

For total industry, manufacturing as well as sectors I and II, this fall has brought the level of profitability in 1981 to less than half the 1960 level. This movement has not, however, been uniform.

For total industry and manufacturing, the evolution of the rate of profit has been characterized by the following phases (see fig. 3 and 4):

- from the beginning of the period until the early Seventies, no definite trend but wide fluctuations[14]. The first cyclical drop,

[14]The regression of log p (rate of profit) on time from 1960 to 1971 shows a very slight decline (less than one percent per year) which, however, is not statistically significant (in the same way, the r^2 values are extremely low: 0.09 and 0.08 respectively).

from 1960 to 1963, which is probably the extension of a trend which began in the Fifties, reduced the level by almost 30%;

- in the Seventies, a strong declining trend. From 1970 to 1975, this movement was particularly rapid, bringing the 1975 profitability to a little more than the half of the 1969 peak. The second half of the Seventies experienced a complete cycle, with the recovery ending in 1979 for total industry.

Fig. 3: The rate of profit and its components (indices 1960 = 100)

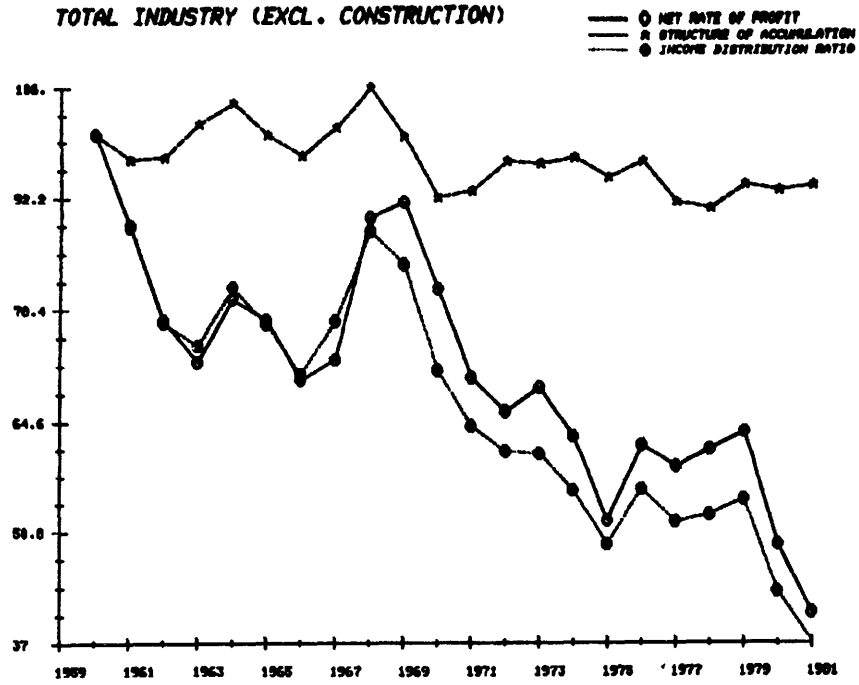
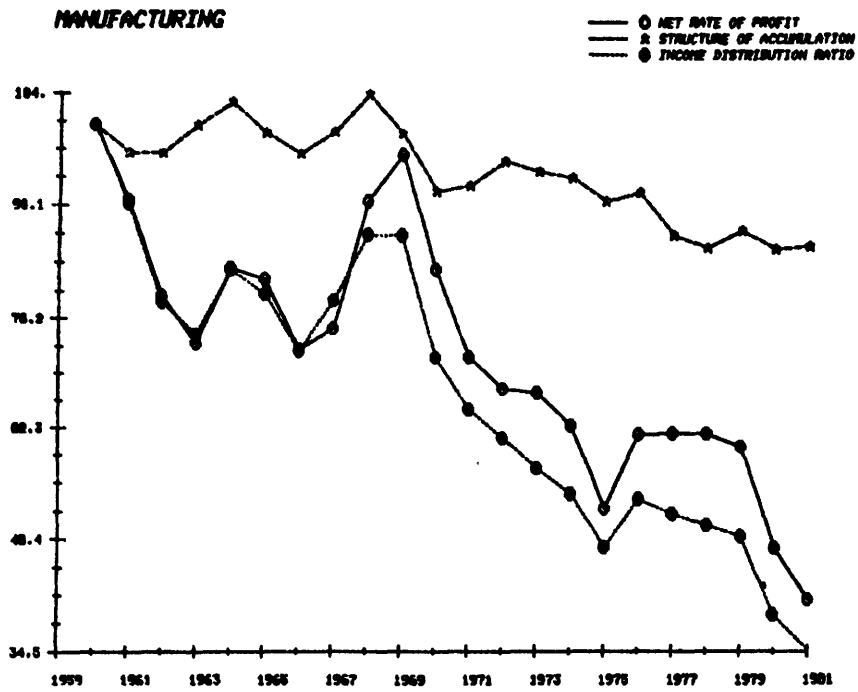
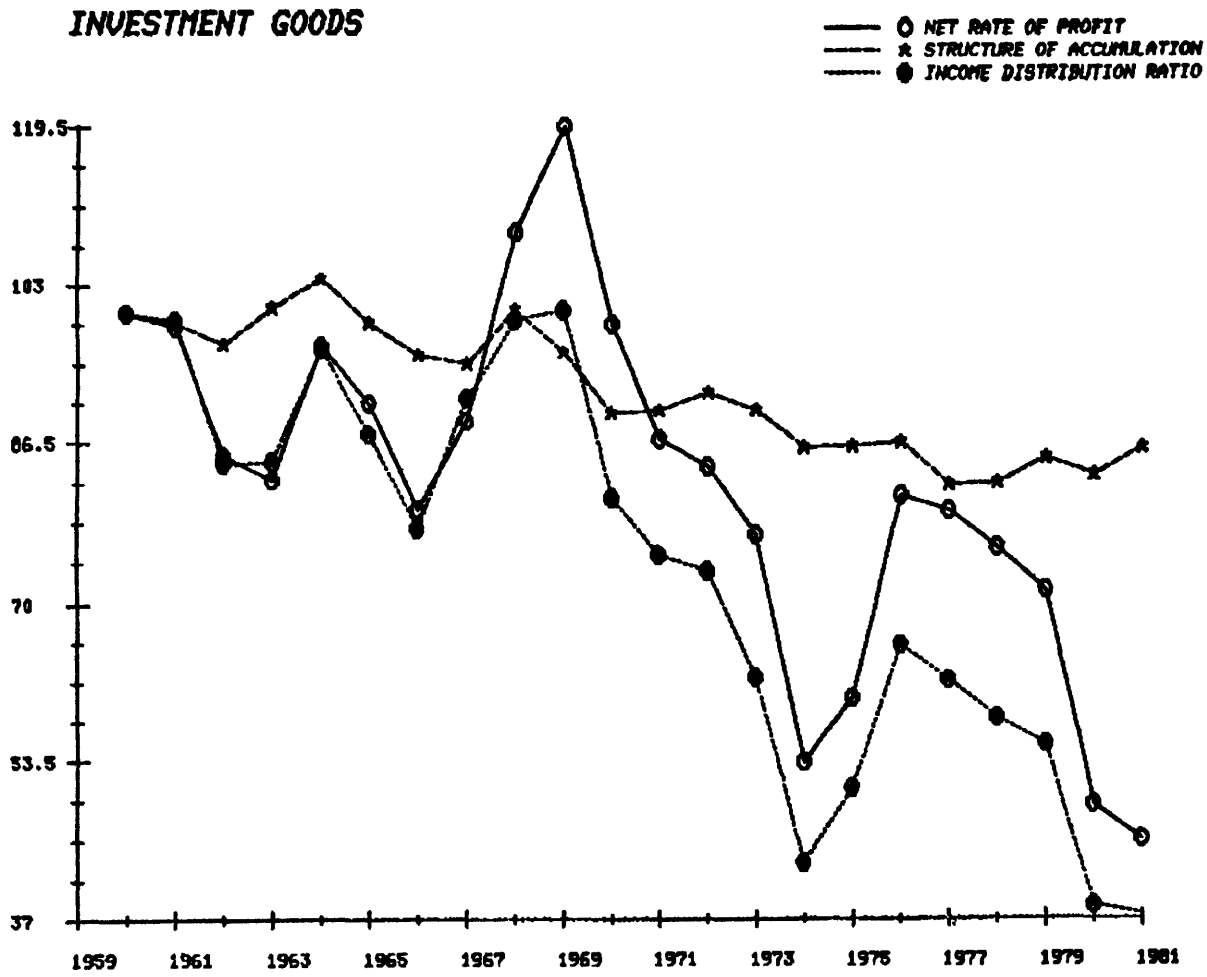


Fig.4: The rate of profit and its components (indices 1960 = 100)



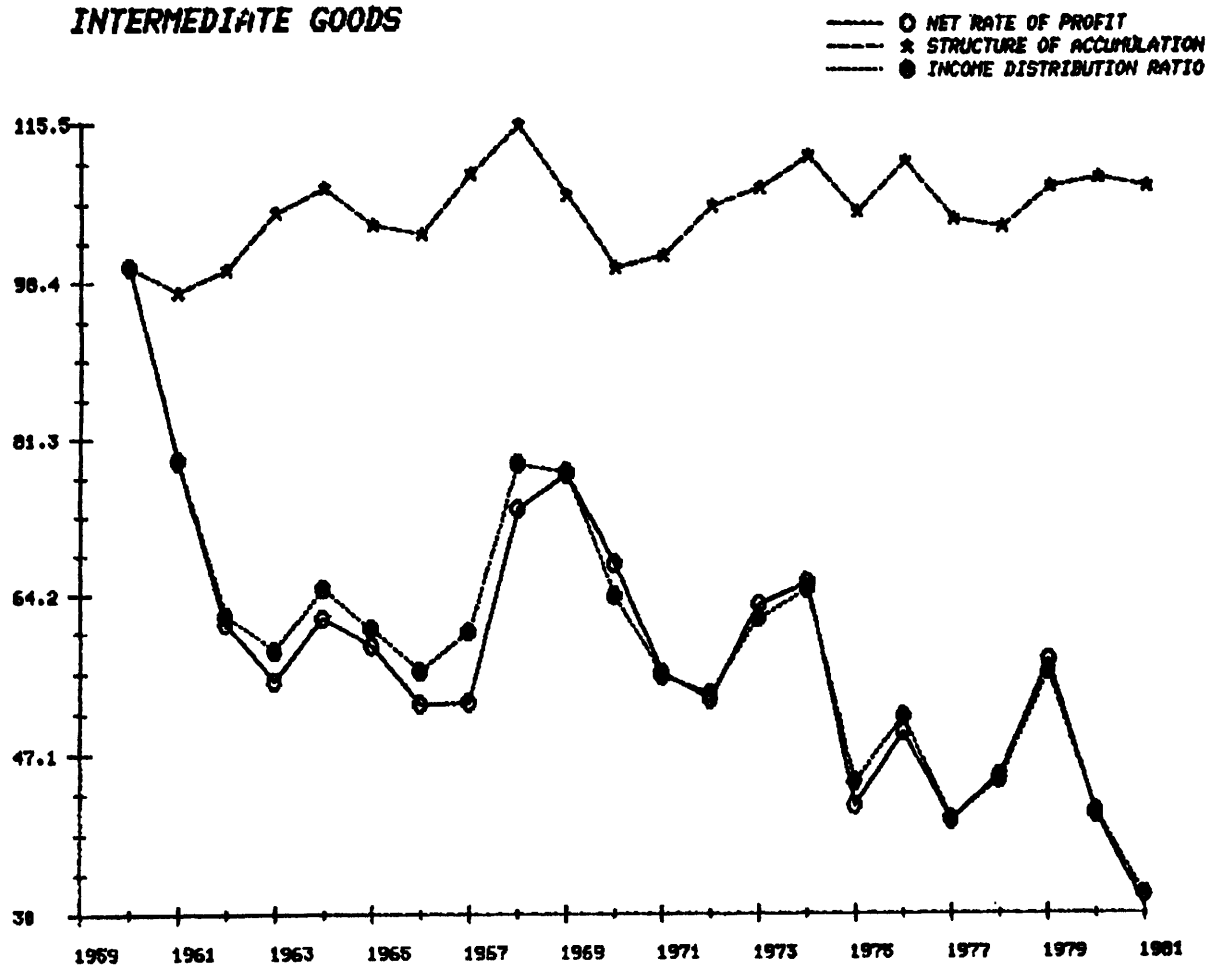
The investment goods sector presents two peculiarities which differentiate it from the general evolution: the 1960-63 decline was much less pronounced whilst the 1967-69 and 1975-76 cyclical expansions were much larger (fig. 5).

Figure 5: The rate of profit and its components (indices: 1960 = 100)



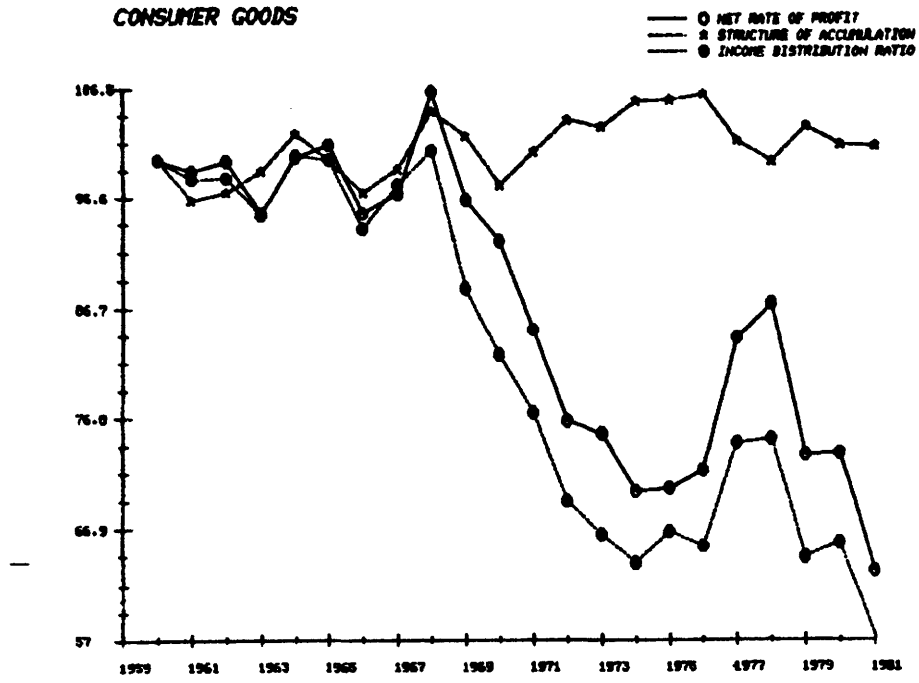
The intermediate goods sector, after a sharp fall from 1960 to 1963 (when the rate of profit dropped from 18.3% to 10%), displayed a less steep downward trend, with sensible cyclical fluctations around it (fig. 6). For 1962-1980, the exponential trend of the rate of profit is actually - 2.35 per annum, instead of -2.91 for the whole period.

Figure 6: The rate of profit and its components (indices 1960 = 100)



The consumer goods sector departs from the general dynamics in the sense that there were two periods (1960-67 and 1972-80) in which the trend was stationary, and these were separated by a considerable fall from 1969 to 1972 (fig. 7).

Figure 7: The rate of profit and its components (indices 1960 = 100)



The downward trend also emerges from other studies which use a different methodology (Schmidt 1980; Barou and others 1979), although its extent is very strongly influenced by the method of estimating fixed capital. This is why the fall in profitability is far less obvious when the D.I.W.(Deutsches Institut für Wirtschaftsforschung) data are used (Barou and others 1979, p. 46), than when the R.W.I (Rheinisch-Westfälisches Institut für Wirtschaftsforschung) data are (Schmidt 1980, p. 222; see also Görzig 1981, p. 329, for a comparison between the results derived from the use of data from the two institutes). However, the profitability of capital advanced of total manufacturing, which I have calculated from the Statistiches Bundesamt's stock of fixed capital, displays a fall analogous to that shown in Table 2.

3. The burden of depreciation, which is certainly a fixed constraint for companies, has had a considerable influence on the long term rate of profit, because of the slow growth of the mass of nominal profits. To this we should add the growing replacement cost of capital goods, which however had only a minor effect if compared with the first factor. This aspect is made clear by comparing gross and net profitability (table 3).

Table 3: Comparison of profit rates*,**

	Profit rates on capital advanced				Gross profit rate on fixed capital	
	net		gross			
	unadjusted	adjusted	unadjusted	adjusted		
	% change	index 1981	% change	index 1981	% change	index 1981	% change	index 1981	% change	index 1981
Investment goods***	-2.65	45.4	-3.11	40.6	-1.42	65.3	-1.59	63.4	-1.14	65.0
Intermediate goods	-2.91	30.9	-3.17	28.0	-1.43	54.0	-1.48	53.0	-1.25	55.4
Consumer goods	-2.00	63.2	-2.01	62.7	-1.14	77.0	-0.88	82.1	-1.42	72.2
Manufacturing	-2.97	40.8	-3.35	35.4	-1.62	60.1	-1.62	59.4	-1.44	60.6
Total industry***	-2.73	40.7	-2.95	36.5	-1.46	60.6	-1.41	60.5	-1.33	61.2

* the rate of change is that of the exponential trend 1960-81 multiplied by 100.
The Student's t are in general high (around -5).

** The index for 1981 is established taking 1960 as the base year. Note that the indices relative to the different profit rates or sectors are not comparable. In fact, for the same rate of change (i.e. the same slope of the regression line), the index at the end of the period shows different values according to the level of the rate of profit in the base year. Suppose, for example, that the share of depreciation in value added is stable; if the profitability declines the index of the net rate of profit in the final year will be lower than the index of the gross rate of profit.

***Excluding construction

We see that the fall attributable to this factor has been considerable - for total industry, the 1981 index for net unadjusted rate of profit was a third below the index for the gross rate of profit.

One can also see that the weight of depreciation on profitability could be felt most in the intermediate goods sector[15] - as this is the most capitalized sector in the economy[16] - and least in the consumer goods sector[17].

The correction introduced to take into account the wages of the self-employed, however, has not significantly changed the results which are obtained by including them in the profits. Indeed, the employees' share of total employment - which was already very high in 1960 (97 % in sectors I and II) - has barely changed in sectors I and II and, in sector III, it has only gone up by 7.2 % over the 22 years under consideration. Contrary to what has happened with the net profit rates, gross adjusted profitability is sector III has fallen less than unadjusted profitability. This point is explained by the fact that, in the Seventies, the self-employed's share of wages with respect to net profits rose more than in the case of gross profits. This is due to the growing weight of depreciation, which amounted to 23.3 % of gross profits in this sector in 1960, and 37.2 % in 1981.

Note that throughout the period none of the five profitability indicators displays negative yields.

IV. THE STRUCTURE OF ACCUMULATION AND ITS COMPONENTS

1. The indicator of the structure of accumulation did not exert an important influence on the movement of profitability. In fact, in Sector I, total manufacturing and total industry, it fell (see table 4 and fig. 3, 4 and 5). It was only in sectors II and III that it showed an upward trend (table 4 and fig. 6 and 7); this increase was, however, very moderate and, as we shall see below (table 7), it was not the main determinant of the fall in profitability.

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[15]The ratio of the two profitability indices was 57.2 in 1981.

[16]In 1981, the fixed capital at constant 1976 prices per employee was 86,394 DM in sector II, and 30,442 DM and 35,913 DM in sectors I and III.

[17]In this sector, the ratio of the two rate of profit indices was 82.1 in 1981.

Table 4: The indicator of the structure of accumulation and its components
(average annual % rates of change of the exponential trend 1960-1981)[a]

		Formula VI				Formula VII	
	sa	QT/PDT	$\frac{PKCA}{PVA}$	$\frac{W}{VA}$ [b]	r	$\frac{QT}{WRL}$	$\frac{PKCA}{CP}$
Investment goods[c]	-1.04	-0.77	-0.09*	0.76	0.58	-1.87	0.25
Intermediate goods	0.31	-0.21*	0.66	0.59	0.45	-0.26*	0.13
Consumer goods	0.23	-0.28	0.31	0.70	0.91	-1.03	0.35
Manufacturing	-0.84	-0.76	0.43	0.88	0.36	-1.40	0.19
Total industry[c]	-0.43	-0.41	0.33	0.77	0.42	-1.03	0.19

[a] parameters b of the function $x = ae^{bt}$, or: $\log x = \log a + bt$ where x is each of the above variables, and t is time (1, 2,...,22). The Student t values are in general very high (well above 5), but as the residuals are autocorrelated, it is not possible to carry out a rigorous hypothesis test. The cases when Student t is less than 2 are indicated by an asterisk.

[b] To obtain the rate of change of the indicator of the structure of accumulation by adding those of its components, it is necessary to perform a simple operation to derive the term $\frac{(W/r)}{VA}-1$ of formula VI.

To do this, the r figures should be deducted from those of the wage share, and the sign changed.

[c] Excluding construction.

2. Taking the first way of splitting the indicator of the structure of accumulation (formula VI), we can see that the net effect of technological change exerted a slight downward pressure on the indicator, and thus a favourable influence on the rate of profit. In fact, in all the main sectors the ratio of the capital intensity of production (QT) to labour productivity (PDT)[18] showed a long term decline or stability (table 4). Capital accumulation has thus been quite efficient, the increase in capital per worker having been often associated with a higher growth in productivity.

[18] The ratio between these two variables gives a result which is near to the capital coefficient (capital/output ratio at constant prices), the inverse of the capital productivity:

$$\frac{QT}{PDT} = \frac{KCAV}{L} \cdot \frac{L}{VAV} = \frac{KCAV}{VAV}$$

The difference with respect to the capital coefficient (KV/VAV, where KV is the stock of fixed capital at constant prices) and the capital productivity (VAV/KV) is that the term KCAV also includes a part of the circulating capital: KCAV = (K + IC/r):PKCA

It is nevertheless noticeable that this result is just the opposite to what is usually put forward for the German economy. In effect, several authors lay stress on the loss of efficiency of capital which should have already begun at the start of the Sixties (Keizer 1979; Cellier 1980). They show in this regard a decreasing productivity of gross capital, which should have contributed to a depression of the rate of profit and consequently to accelerate the appearance of the crisis. If one uses the gross capital stock estimated by the German Statistical Office (SBA) or the DIW, one has a decrease in productivity. On the other hand, if one takes the gross capital stock of RWI, as is the case in this paper, one arrives at a productivity of capital which is fairly stationary[19]. However, if we follow the conventional definition of efficiency as the marginal return of investment, then in this case also we would conclude that productive performance had been poor. This is because, as the marginal product falls faster than the average, the efficiency of investment also falls, and this development would appear when using the RWI data.

Table 5: Productivity of fixed capital: a comparison using net and gross capital stock
(average annual % rates of change of the exponential trend 1960-1981)[a]

	VAV/KV	VAV/GKV
Investment goods[b]	0.86	-0.16*
Intermediate goods	0.52	-0.10**
Consumer goods	0.13*	-0.97
Manufacturing	1.01	-0.05**
Total industry[b]	0.60	-0.17*

VAV = gross value added at constant prices
KV = stock of net fixed capital at constant prices
GKV = stock of gross fixed capital at constant prices
VAV/KV differs from QT/PDT because QT includes the "stock" of intermediate consumption. However, the trend is very near (see column QT/PDT in table 4).

[a] The trend has been estimated as in table 4.
The cases where Student t is less than two are indicated by an asterisk, and by two asterisks when t is less than one.

[b] Excluding construction.

[19] See table 5 where, with the exception of sector III, the parameters relating to the trend of productivity of gross capital do not differ statistically from zero.

Gross capital stock, which is estimated on the assumption that the efficiency of plant and machinery remains constant during the whole of its (conventional) life, is normally used in the productivity analyses. Net capital, on the other hand, constitutes a more financial perspective and is normally calculated in assuming that each year 1/nth of past investment (n being the length of conventional life) is recovered as (linear) depreciation allowances.

The differing growth of productivity obtained in using one or the other aggregate is a result, in the case of Germany, of gross capital in volume increasing more quickly than net capital, which is interpreted as a sign of ageing of capital[20]. In effect, if we suppose that new net capital incorporates the most advanced techniques, an increase in the ratio of net to gross capital stock would reflect an improvement in the quality of capital. The inverse should be true if, as appeared in Germany, the ratio in question diminishes[21]. However, if a different hypothesis is adopted for the efficiency of investments, the conclusions that can be drawn from the development of this ratio are not so clear. Effectively, it could be accepted that all investment, including replacements, contribute to the growth of productivity, old machinery being replaced by goods of a higher quality. Under these circumstances, the ratio of net to gross capital stock would not therefore be a good indicator for the quality of capital. In any case, the fact of giving equal consideration to the productivity of net capital contributes to a better understanding of the development of the German economy. In effect, even accepting that there might have been effectively a decrease in the efficiency of capital (a fall in the productivity of gross capital), the productivity of net capital shows us that, from the financial point of view, this situation has been completely redressed.

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[20]For a discussion and comparison with other EEC countries, see Todd (1984), p. 49-55. The considerations below are, moreover, extracted from his study.

[21]For the whole of industry, this ratio passed from 0.61 in 1960 to 0.514 in 1981 (stock of capital of RWI).

3. The capital intensity of production (QT) has advanced more in sector II, where the index (base 1960) reached 248.1 in 1981. This sector already had the highest capital intensity at the start, and has therefore reinforced this feature (table 6).

The growth in the capital intensity has followed a quite similar course in sectors I and III, as well as in total manufacturing, with an average increase of 3.26 %, 3.38 % and 3.48 % per year respectively (table 6); this brought the 1981 level to about the double of 1960. While showing clear cyclical fluctuations, drops in the capital intensity were rare. They occurred in 1969 in sector I, in 1977 and 1978 in sector III and in 1978 in total manufacturing.

Table 6: The capital intensity of production (QT) and labour productivity (PDT)

	Capital intensity of production				Productivity of labour			
	% trend increase[a]		absolute values[b]		% trend increase[a]		absolute values[b]	
	60-81	60-73	1960	1981	60-81	60-73	1960	1981
Investment goods[c]	3.26	3.14	22,957	46,151	4.02	4.27	20,988	47,016
Intermediate goods	4.45	4.67	43,219	107,219	4.66	5.51	23,384	55,472
Consumer goods	3.38	3.60	24,667	48,186	3.66	3.96	18,528	38,978
Manufacturing	3.48	3.80	26,142	53,375	4.24	4.73	19,916	45,609
Total industry[b]	3.83	3.89	31,567	69,325	4.24	4.73	21,179	48,172

[a] Estimated as in tables 2 to 5.
Student t less than two are indicated by a asterisk.
[b] QT and PDT are in DM, at 1976 prices
[c] Excluding Construction.

Labour productivity displayed quite different growth rates from one sector to another, the biggest increase having occurred in the intermediate goods sector (4.66 % per annum, over the whole period). As we have seen, this result was achieved by means of a more sustained capital accumulation, which overall was not as productive as in Sector I or for total manufacturing. In fact, in these sectors, the ratio

QT/PDT declined at the average rate of 0.8 % per year (table 4), while in sector II there were large short term fluctuations but the ratio stayed stationary over the whole period (see table 4, where the slight decrease - 0.2 % per annum - is not statistically different from zero). Sector III, with a productivity growth of 3.66 % per year and a QT yearly increase of 3.38 %, gave similar results in terms of poor productive performance (see, on table 4, the ratio QT/PDT, which is just above the value of sector II).

Productivity declined or slowed down markedly in phase with the troughs of the cycle, especially in 1975 and 1980-81. In the first half of the Seventies we notice a clear break in trend. For total industry, for instance, the 1960-73 growth was 4.7 % per year, whilst for 1974-1981 it decreased to 3.1 %. For sector II, this gap widened, the trend increases being 5.5 % per year from 1960 to 1973 and 3.1 % for 1974-81.

4. The relative prices of capital advanced with respect to the prices of value added generally pushed up the indicator of the structure of accumulation. It is only in sector I that the reverse occurred, but the weight of this factor was very slight (and statistically not different from zero: see table 4). In sector III, the relative price movement balanced the influence of the net effect of technical change (term QT/PDT), while in sector II it largely outweighed it. For total industry and manufacturing, the relative price exerted a quite important upward pressure on the sa indicator.

The influence of relative prices on the indicator of the structure of accumulation becomes much less sensible if we consider the prices of capital advanced with respect to consumer prices (the second way of splitting sa; see table 3).

Changes in income distribution correct for the effects of the factors analysed above. Since this element also exerted a major effect on profitability, it is considered in greater detail below, together with the rate of turnover of circulating capital.

(5)

V. INCOME DISTRIBUTION AND WAGES PER EMPLOYEE

1. Over the full period, the wage share in (gross) value added advanced more in sector III and total manufacturing (0.70 % and 0.88 % per annum respectively; see table 4) and less in sector II (0.59 % per year). For total industry, it increased by 21 %, passing from 59.4 % in 1960 to 72.5 % in 1981.

In all sectors, there have been four stages in the growth of the wage share: i) no or very little progress until 1969, with three-four years cycles; ii) a strong increase from 1970 to 1974-75, clearly breaking the past trend; iii) cyclical movements with no or slight increase until 1979; iv) another increase in 1980 and 1981, bringing the wage share to the peak for the period.

The picture changes considerably if we consider the share of the stock of circulating capital for wages in value added, i.e. by taking into account the rate of turnover of circulating capital (W:r)/VA. As the relative weight of circulating capital declined (r increased), the rising trend of the wage share was correspondingly reduced. This effect can be seen by subtracting, in table 4, the coefficient relative to r from the increase in the wage share: for sector I and II, the share of the stock of variable capital increases very little over the 1960-1981 period, and in sector III it even declines. The influence of this variable on the indicator of the structure of accumulation was not irrelevant for total industry and manufacturing, even if its weight was severely reduced compared to that of the wage share (see table 4).

2. The income distribution ratio, another way of expressing the share of wages in value added[22], shows the same cyclical profile, with the movements reversed, of course. The above considerations therefore apply "mutatis mutandis". The only substantial difference is that, as can be clearly seen from formula VIII, the fluctuations in the income distribution ratio are wider than those in the wage share.

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[22] The relationship between these two income distribution indicators is as follows: $\frac{W}{VA} = \frac{1}{1+(S/W)}$ (VIII)

Starting from an initial position favorable to the employers[23], the income distribution ratio has dropped to little more than a third in 1981 (except in sector III, where the 1981 level is 57 % of the 1960 one). It is worth noting the very large decline at the beginning of the period in sector II, which determined a similar evolution in total industry.

A comparison with the profitability trend over the full period (table 7) clearly highlights the dominant influence of the income distribution ratio on it.

Table 7 - The profitability trend and its components: a summary of contribution variables[a]
(average annual % changes of the exponential trend 1960-1981)

	p	S/W	1+sa	r
Investment goods	-2.65	-4.11	-0.89	0.58
Intermediate goods	-2.91	-3.06	0.29	0.45
Consumer goods	-2.00	-2.69	0.21	0.91
Manufacturing	-2.97	-4.09	-0.76	0.36
Total industry	-2.73	-3.54	-0.39	0.42

p = unadjusted net rate of profit of capital advanced
S/W = income distribution ratio
sa = indicator of the structure of accumulation
r = rate of turnover of circulating capital

[a] Starting from the logarithmic form of formula II, the exponential trend is obtained by regression of the function $x = ae^{bt}$, where x is each of the four variables concerned (p; S/W; 1/(1+sa); r) and t is the time. The estimated parameters b, which show the average annual rate of change of the long term trend, allow us to appreciate the weight of each component on the fall in profitability. With a superscript point to indicate the rate of change, we have:

$$\dot{p} = \dot{S/W} + \left(\frac{\dot{1}}{1+sa}\right) + \dot{r}$$

The student t values are usually high, and always more than two.

[23] In 1960, German industry had a higher income distribution ratio than that of other European countries. For all manufacturing, the gross rate was 65.1 in Germany, 56 in France and 48.4 in the UK; it is only in Italy that it was higher (72.9).

3. The nominal and real wages per employee have shown an evolution similar to that of the wage share: a slow progress until 1967; a far faster growth from 1968 to 1975, followed by a slowing down over the last six years[24] (table 8). Over the whole period, the growth has been relatively uniform from one sector to another, with per capital real wages increasing by 4.5 % and 4.2 % a year in the intermediate goods and consumer goods sectors, and by 4.9 % in the investment goods sector.

Table 8 - Wages per employee
(average annual % growth - compound rates[a])

	Real wages[b]				Nominal wages			
	1960-81	60-67	67-75	75-81	1960-81	60-67	67-75	75-81
Investment goods	4.9	4.7	6.3	3.2	8.9	7.5	11.1	7.6
Intermediate goods	4.5	4.4	5.8	3.0	8.5	7.2	10.6	7.4
Consumer goods	4.2	4.7	5.2	2.4	8.2	7.5	10.0	6.7
Manufacturing	4.7	4.7	5.9	3.1	8.7	7.5	10.7	7.4
Total industry	4.6	4.6	5.9	3.1	8.7	7.4	10.8	7.4

[a] Contrary to what was usually done, in this table the growth rates do not refer to the exponential trend, because the twenty-two year evolution has been split into relatively short periods. However, for 1960-81, the rates of growth of the exponential trend are very near, or sometimes identical, to those shown in the table.

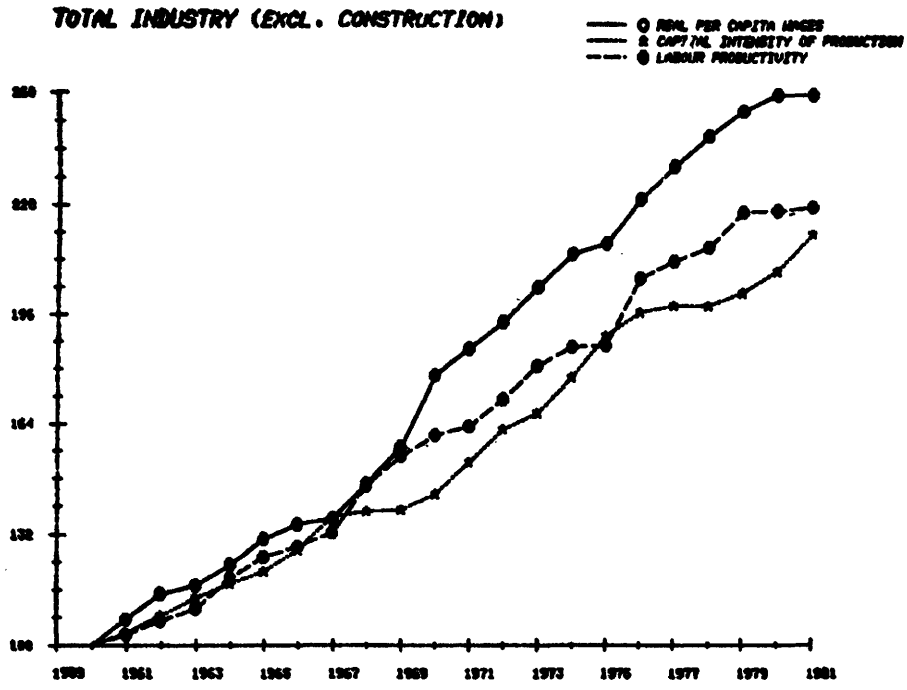
[b] Deflated by the cost of living index for a worker's family with an average income (SBA 1982, p. 182).

This therefore did not change the structure of wages. Sector II has always had high wages (8 to 12 % above industry as a whole); sector I, starting with per capita wage near the average of industry, ended with a level 6 % higher, while sector III stayed substantially below the average (from -16.4 % in 1960 to -23.1 % in 1981).

[24] In 1981, the real wage per employee actually diminished.

The index of real per capita wages (base year 1960) stayed constantly above the index of the capital intensity of production, with the gap widening over time. In sector I, where the difference was bigger, it reached 35 % in 1981; for total industry 18 % (see fig. 8).

Figure 8. : Real wages, productivity and capital intensity of production (indices 1960 = 100)



In sector II, however, this gap was small; from 1960 to 1966, real wages grew at the same pace as the capital intensity, and in 1967 and 1968 the index of the latter was even higher than the former; in 1981, real wages per employee reached the index level 253 and the capital intensity of production 248.1.

But what is more interesting is that the comparison with the index of labour productivity (1960 = 100) gives the same results, although the difference (increasing over time) was less substantial:

21.3 % in 1981 for sector I and 14.1 % for total industry (see fig. 8)[25]. As in the previous case, sector II departs from the general evolution in the sense that, even if the real wage index stayed above the index of productivity (except in 1968 and 1969), the gap was quite small (6.6 % in 1981).

We thus observe in the long run a rising strength of labour and substantial changes in income distribution, which have taken place above all through bargaining - Germany has in no way experienced strikes comparable to those of its partner countries, especially UK, France and Italy.

[25]It should nevertheless be emphasized that the gap with respect to labour productivity is larger than the true one, because the crude definition of productivity used here (volume of production per employee) does not take into account the reduction of the working week over the twenty two years.

Part 2

VI PRODUCTION CYCLES AND PROFITABILITY CYCLES

1. The identification of profitability cycles did not raise any major problems of method, because the movements reflected by the data are wide enough to pinpoint troughs and peaks without further elaboration.

The volume of output (value added at market prices) declined or slowed down markedly on occasion during the period, so that production cycles can also be identified simply by examining the graph of absolute values. However, for the purpose of studying the correlation between production and the rate of profit, deviations from the long-term trend of production had to be measured, and this involved a regression to establish the trend line.

In the three cases, the most suitable function for the calculations was a spline regression: sector II, where the trend changed in 1973; total manufacturing and total industry, where the break point was in 1971. A linear function (no break point) was used for the investment goods sector, and a polynominal of the second degree was preferable statistically for sector III.

2. The rate of profit has generated four cycles in sectors I and III and in total manufacturing (see table 9 and figure 9). What characterises these sectors is the fact that they have "jumped" a cycle at the beginning of the Seventies, following the fall in the income distribution ratio mentioned above. In the intermediate goods sector and in the whole of industry the number of cycles has been greater mainly because, in sector II, there was also a complete cycle in the first half of the Seventies (1972-75, see table 9). The significant recovery in 1973 in this sector produced an interruption in the fall of profitability from 1970 to 1972 in total industry: in this case also, we can discern a cycle 1972-75, whose peak is nevertheless very small compared to that of sector II.

Table 9 : Profitability and production cycles

	Profitability (a)					Production (c)		
			Troughs	Peaks				
	Cycles		%(b)	%	year	Cycles		Peaks
Investment goods (d)	I	..-1963	15.2	18.4	1960	I	..-1963	1961
	II	1963-66	14.6	17.7	1964	II	1963-67	1965
	III	1966-74	9.8	21.9	1969	III	1967-72	1970
						IV	1972-75	1973
	IV	1974-81	8.3	14.9	1976	V	1975-78	1976
						VI	1978-81	1979
Intermediate goods	I	..-1963	10.0	18.3	1960	I	..-1963	1960
	II	1963-67	9.6	11.3	1964	II	1963-67	1964-65
	III	1967-72	9.7	14.2	1969	III	1967-71	1970
	IV	1972-75	7.6	12.0	1974	IV	1971-75	1973
	V	1975-77	7.3	9.1	1976	V	1975-81	1979
	VI	1977-81	5.6	10.4	1979			
Consumer goods	I	..-1963	23.3	24.5	1962	I	(1961)-63	1962
	II	1963-66	23.3	24.8	1965	II	1963-67	1965
	III	1966-74	17.2	26.0	1968	III	1967-75	1972
	IV	1974-81	15.5	21.3	1978	IV	1975-81	1979-80

(a) net rate of profit on capital advanced

(b) rate of profit at the end of the cycle

(c) value added at market prices (constant 1976 prices)

(d) excluding construction

Table 9 : Profitability and production cycles

	Profitability (a)					Production (c)		
			Troughs	Peaks				
	Cycles		%(b)	%	year	Cycles		Peaks
Manufacturing	I	..-1963	16.6	22.7	1960	I	..-1963	1960
	II	1963-66	16.4	18.7	1964	II	1963-67	1965
	III	1966-75	11.8	21.9	1969	III	1967-71	1970
						IV	1971-75	1973
	IV	1975-81	9.3	14.0	1976-1978	V	1975-81	1979
						(a)	1975-78	1977
						(b)	1978-81	1979
Total industry(d)	I	..-1963	14.2	19.7	1960	I	..-1963	1960
	II	1963-66	13.8	15.7	1964	II	1963-67	1965
	III	1966-72	13.0	18.1	1969	III	1967-71	1970
	IV	1972-75	10.3	13.6	1973	IV	1971-75	1973
	V	1975-81	8.0	12.5	1979	V	1975-81	1979
						(a)	1975-78	1977
						(b)	1978-81	1979

(a) net rate of profit on capital advanced

(b) rate of profit at the end of the cyle

(c) value added at market prices (constant 1976 prices)

(d) excluding construction

Fig. 9 : Rate of profit and production cycles

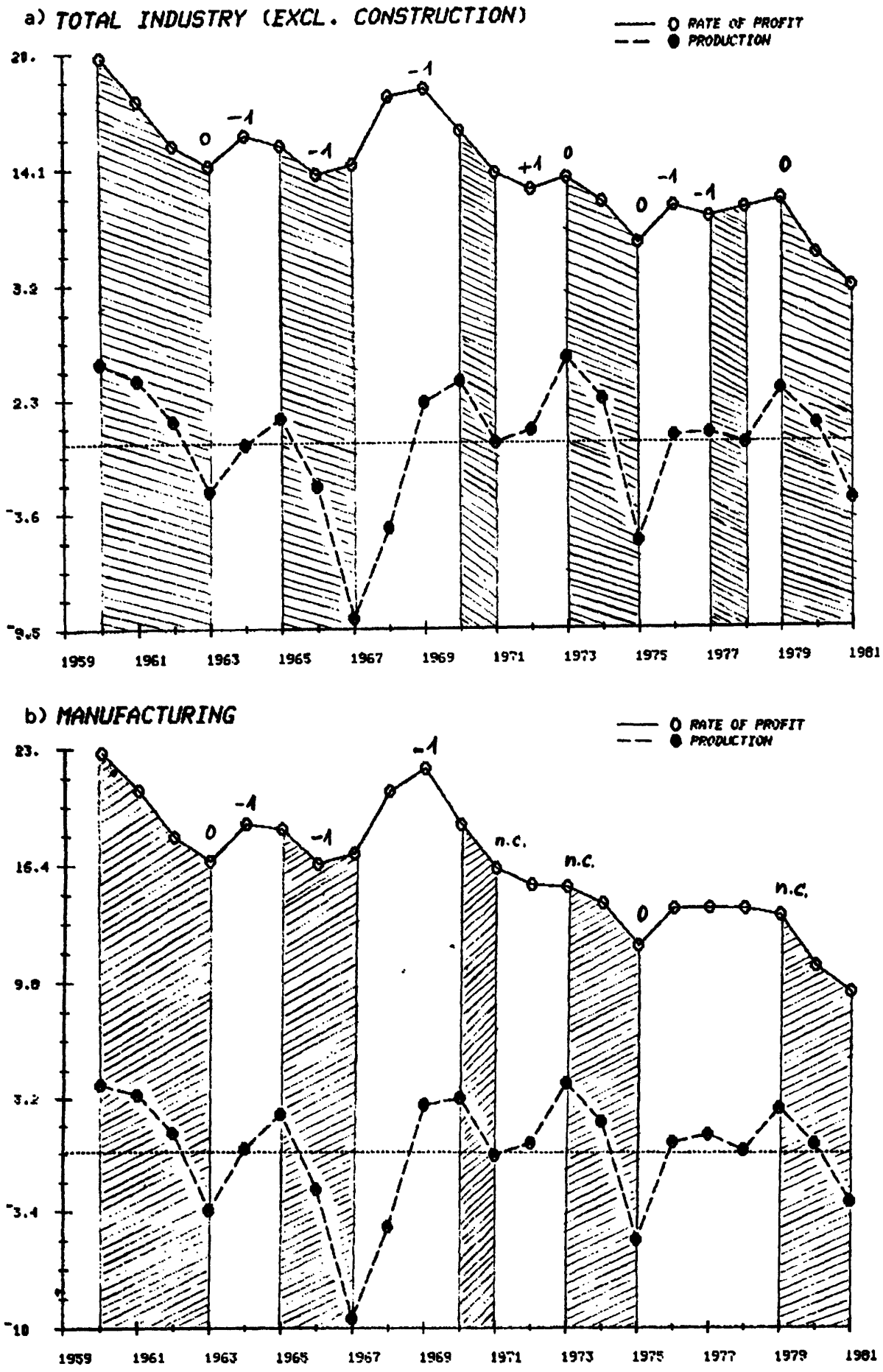
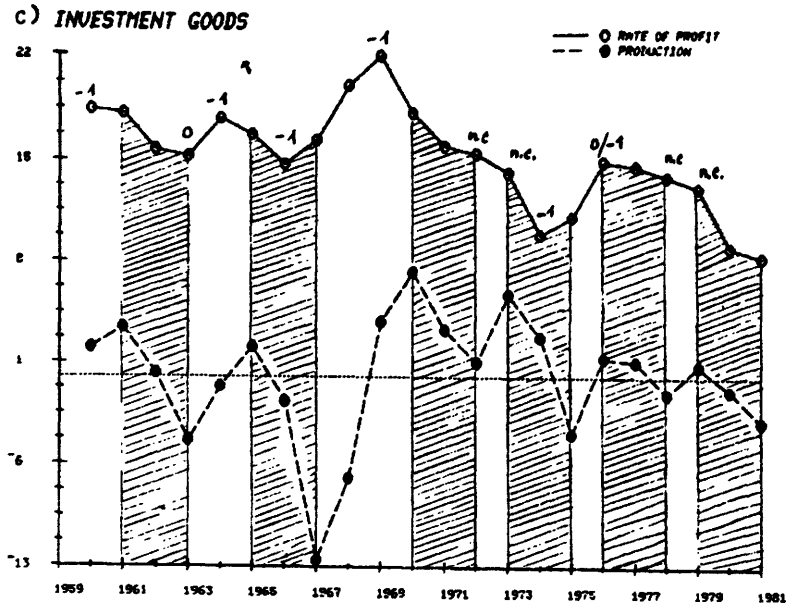
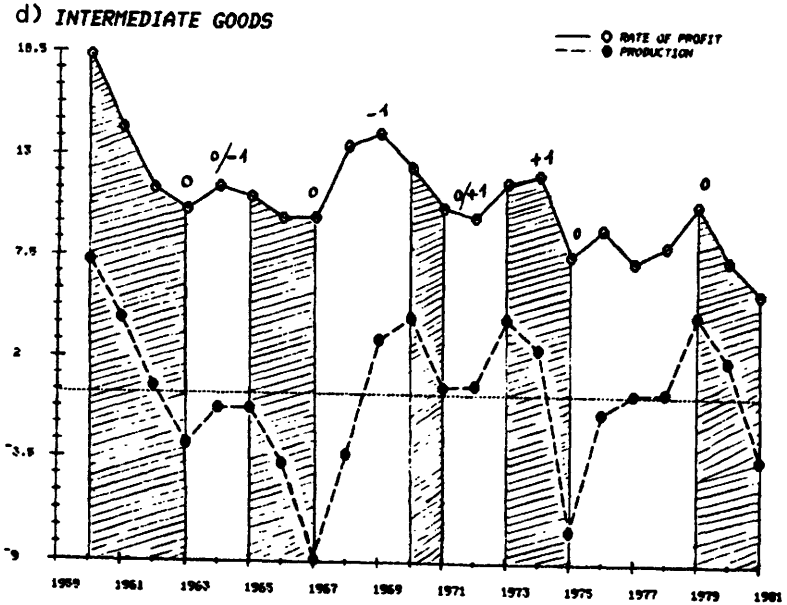
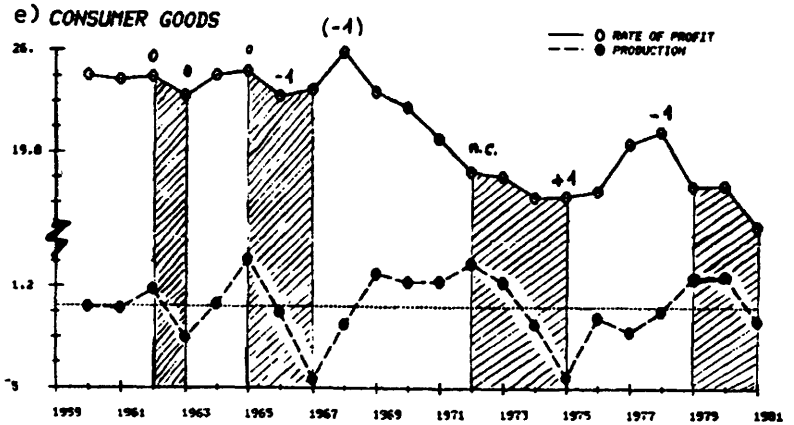


Fig. 9 (cont)


c) INVESTMENT GOODS
RATE OF PROFIT
PRODUCTION
22
18
8
1
-6
-13
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981


d) INTERMEDIATE GOODS
RATE OF PROFIT
PRODUCTION
18.5
13
7.5
2
-3.5
-9
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981


e) CONSUMER GOODS
RATE OF PROFIT
PRODUCTION
26.
19.8
1.2
-9
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981

In Sectors I and III, the first two cycles have been quite short; the successive cycles (1966-74 and 1974-81), however, have shown very wide gaps between peaks and troughs (see fig. 9). One particular characteristic in total manufacturing is that, in the cycle 1975-81, profitability remained at maximum levels for three years (1976 to 1978).

3. Before analysing production cycles, it would be useful to situate them in a general context by making a brief allusion to the discussion on "long waves". In effect, data relating to GDP or industrial production since 1950 display two fundamental elements which give substance to the hypothesis of long waves[26]. On the one hand, we see a pronounced slowdown in growth (see table 10 and fig. 10). On the other, figure 11 shows clearly that, since 1950, industrial production appears as an S-shaped curve, typical of long waves. If the two major phases of this movement are broken down into recovery and prosperity for the long upswing, and recession and depression for stagnation, then probably the roots of recovery lie in the pre-war period. This is upheld by Glismann, Rodemer and Wolter (1978 and 1980), for whom the long upswing would have arisen around 1933-35

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[26]At the moment, this is only a hypothesis (nevertheless plausible and very interesting) because the theory of long waves has not yet been proven conclusively by statistics. On the one hand, the statistical series show quite a regular alternation of 25 to 30 year periods of sustained growth, followed by stagnations of similar length (Van Duijn 1983, part III pp.147ss). On the other hand, there is some doubt about the existence of long waves of production if one applies the spectral analysis to the figures for USA, UK, France and Germanmy (Van Ewijk 1982). This author was able to detect long waves for prices only.
The use of the spectral analysis for the study of long waves does, however, give rise to several problems since: a) in covering a maximum of only four long waves, the series are not long enough; b) they do not meet the demands of a stationary series, and the elimination of the trend can affect the identification peaks; c) this method implies a regularity of cycles which does not actually happen and which, moreover, is not indispensible to confirm the occurrence of long waves. See Van Duijn (1983, pp. 169-172) which concludes that the "spectral analysis cannot prove or disprove the existence of long waves" (p. 172).

Table 10 - Industrial production (a) and GDP at constant prices (average annual % growth - compound rates)

	1950 /55	1955 /60	1960 /65	1965 /70	1970 /76	1976 /81	1950 /60	1960 /70	1970 /81
Investment goods			7.6	6.6	3.3	2.5		7.1	2.9
Intermediate goods			4.9	6.0	2.2	1.3		5.4	1.8
Consumer goods			4.9	2.2	0.8	0.0		3.5	0.5
Industrial production(b)	12.7	7.4	5.7	4.5	1.9	1.4	10.0	5.1	1.7
GDP	9.4	6.5	5.0	4.2	2.7	2.4	8.0	4.6	2.6

(a) gross value added at market prices. The series 1960-1981 is at 1976 prices; the data before 1960 have been calculated on the basis of the growth rates of the series at 1962 prices
(b) including construction

and the start of stagnation in 1960[27]. According to Van Duijn (1983), however, the reovery of the Thirties belonged more to a business cycle Juglar, the real start of the long upswing being traceable towards the end of the Forties. The change of phase would have taken place in 1973 (Van Duijn 1983, chap. IX, in particular pp. 153 and 156). If one accepts this dating, the slowdown in growth which appeared in the sixties (table 10) would thus reflect the phase of prosperity of the long upwsing.

In any case, what is important to point out here is the break which took place in the Seventies. It has been much less strong in Sector I (table 10), which has benefitted from the German leadership on the world market for equipments goods.

[27]These authors concentrate on the deviations of net national product from trend. In striving for coherence, the pre-war statistics relate only to the present territory of Federal Germany. The series have been smoothed by moving averages of three and nine years. One should note that the growth rates of investment and investment rates have the same cyclical configuration as the net national product (Glismann et al., 1968, p. 16).

Fig. 10 : Growth rates of value added at constant prices
Total industry (including Construction)

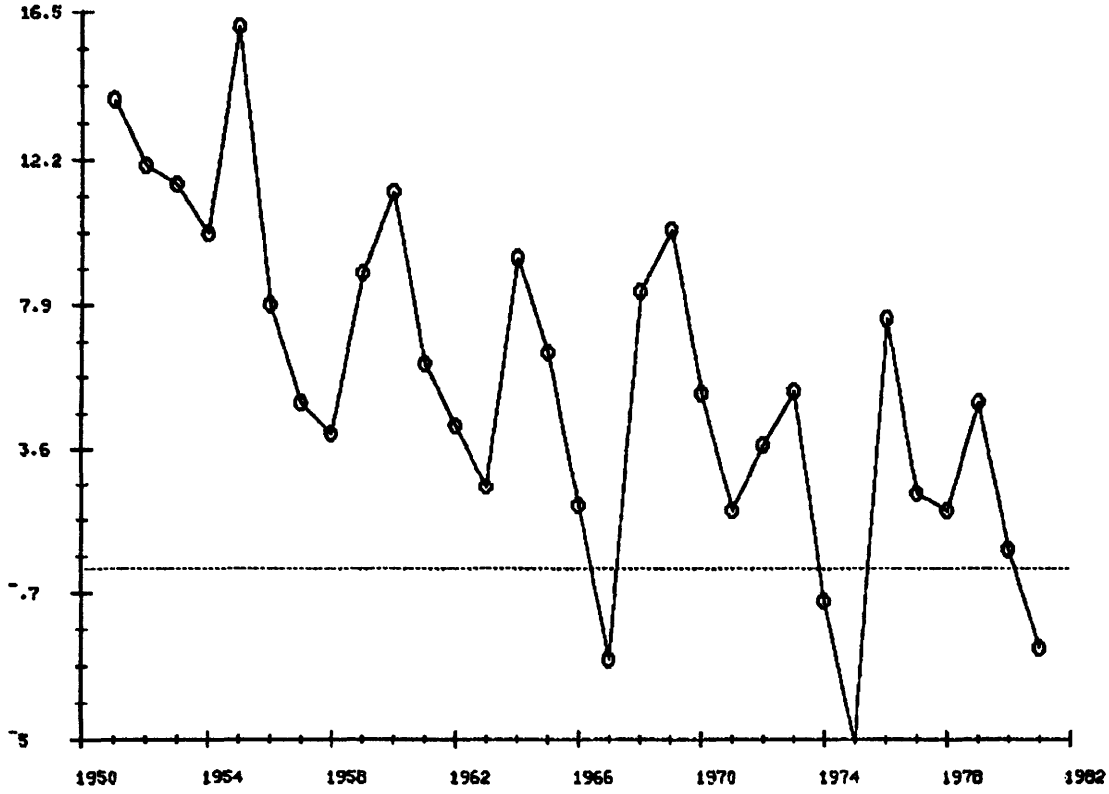
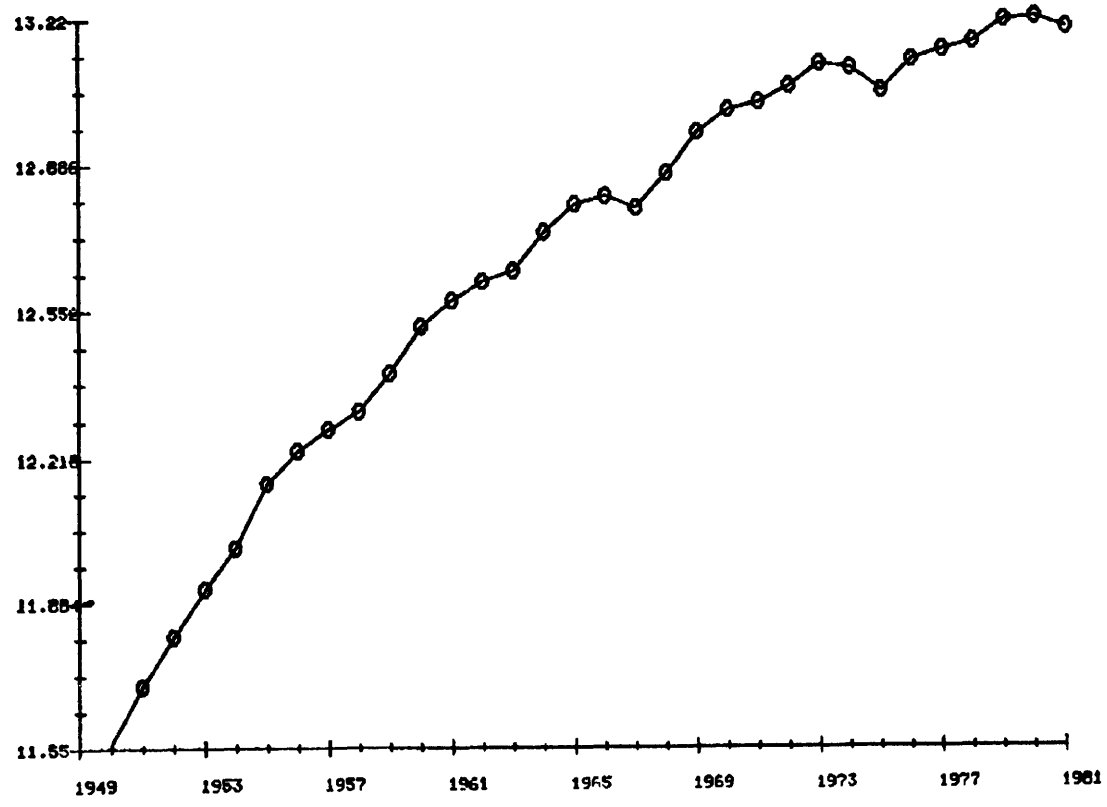


Fig. 11 : Value added at constant prices (logarithms)
Total industry (including Construction)



4. Grafted onto these basic trends are five business cycles: (1958)-63; 1963-67; 1967-71; 1971-75 and 1975-81. In the investment goods sector, there was a supplementary cycle in the Seventies (1975-78), whilst in Sector III there are only four cycles in the whole of the period. It is worth noting that the slow-down in 1978 for the whole of industry and manufacturing effected a division of the last cycle into two phases: 1975-78 and 1978-81.

By comparing profitability cycles with production cycles, we can now try to establish which of the two models, "demand/investment" or "profits/investment, provides the better interpretation of the dynamics of Germany industry. More precisely:

(i) if peaks and troughs in the rate of profit anticipate peaks and troughs in the volume of output by at least one period, the "profits/investment" model would seem to offer a more appropriate description of events;

(ii) if the production cycle anticipates the profitability cycle, the "demand/investment" model would be preferred;

(iii) if the cycles coincide, no definite conclusion can be drawn from annual data. In fact, synchronized cycles would support the case for the "demand/investment" model, but full confirmation requires a study of data for shorter periods (e.g. quarterly data), because the apparent synchronization of cycles observed using annual data may mask considerable time lags supporting the alternative model.

5. The comparison shows the existence of a good connection between profit cycles and production cycles, with the exception of sector III. However, the data does not enable us to establish clearly whether, for the whole of the period, the "profits/investments" model or the "demand/investments" model applies. In effect, table 11 shows that in three cases (total industry, manufacturing and investment goods) the regessions linking production to profitability (unlagged) give results statistically better than those of the regressions with a time lag. It is only for the Investment goods sector that the regression provides good evidence for the "profits/investment hypothesis (see

Table 11 - Profitability and production cycles*
(regressions: whole period)

	one year's lag: $\Delta DTO_t = a+b\Delta RP_{t-1}+cD$						no lag: $\Delta DTO_t = a+b\Delta RP_t+cD$					
			dummy variables						dummy variables			
	a	b	c	year	r^2	DW	a	b	c	year	r^2	DW
Investment goods	1.307	1.686 (5.77)	-8.67 (-3.1)	1967	0.708	2.12	1.382	1.070 (3.11)	-14.01 (-3.86)	1967	0.511	1.70
			-8.08 (-2.61)	1977					-9.39 (-2.61)	1975		
Intermediate goods	0.147	0.959 (3.03)	-10.37 (-3.32)	1975	0.501	2.04	0.422	1.539 (5.43)			0.588	1.60
			10.33 (3.03)	1976								
Manufacturing	0.020	1.259 (3.01)	8.52 (2.45)	1976	0.354	1.82	1.143	1.589 (5.28)	-9.41 (-3.74)	1967	0.634	1.88
Total industry	0.236	1.270 (3.11)	-6.02 (-2.07)	1975	0.472	2.09	0.978	1.635 (4.82)	-8.52 (-3.39)	1967	0.588	1.97
			7.81 (2.62)	1976								

ΔDTO_t = first differences in deviations from the trend of output in volume at time t
ΔRP_{t-1} = first differences in the rate of profit at time t-1
D = dummy variable = 1 for the year shown, 0 in other years
Figures in brackets are Student t statistics

*The results for the consumer goods sector are omitted because no significant coefficients were found

table 11)[28]. For the consumer goods sector, however, there appears to be no correlation either in regressions with time lags or without lags. The fact that, for this sector, the rates of profit and production seem to fluctuate independently is further confirmed by fig. 9.

On the other hand, for the other sectors as well as for total industry and manufacturing, fig. 9 shows that in the sixties there is some evidence for the "profits/investment" model. In effect, if in all the sectors the first trough of profitability (1963) coincides with that of production, the second (1966) anticipates it by a year; this lag also appears for the peaks of profitability of 1964 and 1969.

We now turn to a consideration of the type of accumulation that underlies these cyclical movements, and of the development of the capital intensity of production dealt with in part one.

VII CAPITAL ACCUMULATION AND EMPLOYMENT

1. The relation between the accumulation of capital and employment is summarized by the theoretical notions of extensive capital accumulation (capital widening) and intensive capital accumulation (capital deepening). With extensive accumulation, the productive base is broadened with no change in techniques. Capital intensity and labour productivity remain constant, while employment expands to match the increase in capacity. With intensive accumulation, on the other hand, investment occurs in capital goods that increases the productivity of

[28] In the regression (with time lag) relating to this sector, it has been necessary to introduce a dummy variable for 1967, although the trough of rate of profit anticipates that of production as forecast by the "profits/investment" model. That is because the calculation of the trend of production resulted in exaggerating the deviation of 1967 which introduced an anomaly in the regression with the rate of profit.

labour; the short-term effects of such investment may be detrimental to employment, since less labour is required to produce the same output[29]. Intensive accumulation is usually accompanied by an increase in the capital intensity of production, since the installation of the new equipment means that each employee will be working with a larger volume of fixed and circulating capital.

In practice, of course, accumulation is never purely extensive or intensive because, for continuous growth, both types of investment must be accompanied by an expansion of the labour force, as undertakings enlarge their productive base while adopting new, more productive techniques. It is thus important to identify the dominant feature.

For this purpose, the rate of growth of net fixed capital stock at constant prices has been broken down into: (i) the rate of growth of capital stock per employee, and (ii) the change in employment, by using a similar procedure to that followed in section V[30]. This shows the extent to which capital accumulation has increased the capital intensity of production (measured, for the sake of simplicity, as the fixed capital stock per employee) and how it has affected employment.

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[29] It is usually argued that the adverse effect on employment is short-lived, since the labour shed by the branch adopting the new technique will be absorbed by the investment goods sector, which is facing growing demand. This argument only holds while expansion is gathering momentum, however; in periods of slowdown or stagnation, the adverse effect is probably predominant.

[30] The starting point was thus the identity: $KV = (KV/L) \cdot L$
where KV = net fixed capital (volume)
L = employees
which has been transformed in growth rates (lower case symbols) by estimating the long-run exponential trend: $kv = (kv/l) + 1$
Net capital (KV) was used rather than gross capital (GKV) because the broadening of the productive base (i.e. net investment) is properly reflected only in the former: $\Delta KV = GFCF - D$
where GFCF = gross fixed capital formation
D = depreciation
Changes in gross capital, on the other hand, include the differences between retirements (RT) and depreciation, and this cannot be regarded as additional capacity:
$\Delta GKV = GFCF - RT$

Fig. 12 gives a graphic interpretation of this aspect of the question. It compares the index of net accumulation (capital at constant prices) with the index of capital intensity, the difference between the two corresponding to the change in employment. A positive difference (the index of accumulation is higher than the index of capital intensity) means an increase in employment; a negative difference means a decrease.

2. Figure 12 and Table 12 emphasise three fundamental elements: i) during the whole period, the accumulation has been generally intensive[31]; ii) the investment goods sector varies from the others, capital accumulation having been extensive; iii) the rhythm of accumulation showed a break in 1973.

In the intermediate goods sector and that of consumer goods, the accumulation has become more intensive from the second half of the Sixties, with a growing gap appearing between the index of capital per employee and fixed capital stock in volume (fig. 12). Consequently, from 1966 to 1981, the number of employees dropped by 14.5 % in sector II and 25 % in sector III. In the latter, the fall in employment has become particularly significant since 1973, a year which marked the end of growth in capital whilst capital per employee continued to rise noticeably for another two years (fig. 12,e). Having been confronted for more than a decade by unfavourable prospects in demand, industry in this sector thus contracts its production base and, in replacing machinery, opts for capital intensive techniques, thereby reducing employment.

The investment goods sector has experienced a different dynamic, largely due to its external exposure. In effect, Germany has benefitted for a very long time from a favourable international specialisation in this sector, which has allowed it to sustain revaluations.

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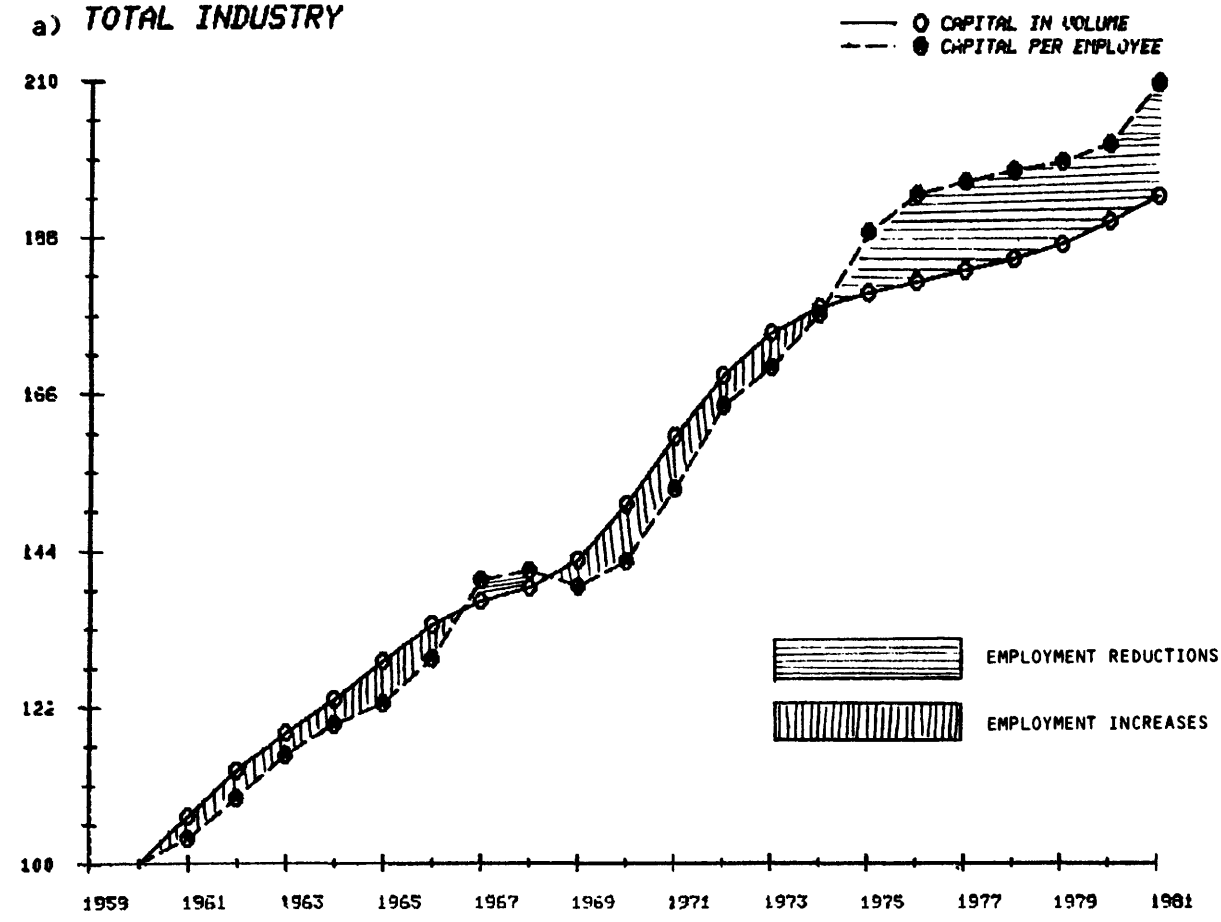
[31]Figures in the last column of Table 12 indicate the nature of accumulation. A ratio of over 100 denotes intensive accumulation; the higher the figure, the more intensive the accumulation.

Fig. 12 *CAPITAL ACCUMULATION AND EMPLOYMENT (1960=100)*

a) *TOTAL INDUSTRY*



b) *MANUFACTURING*

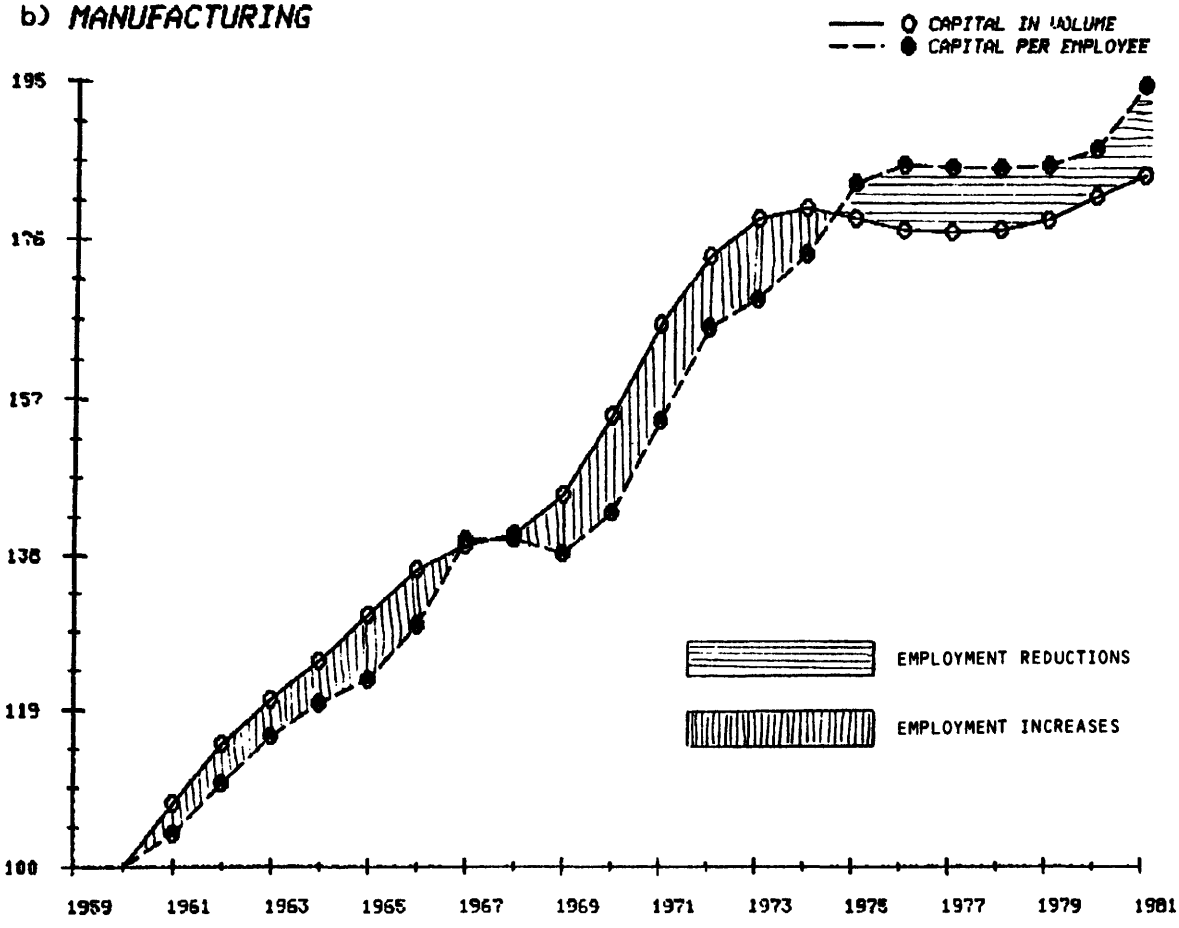
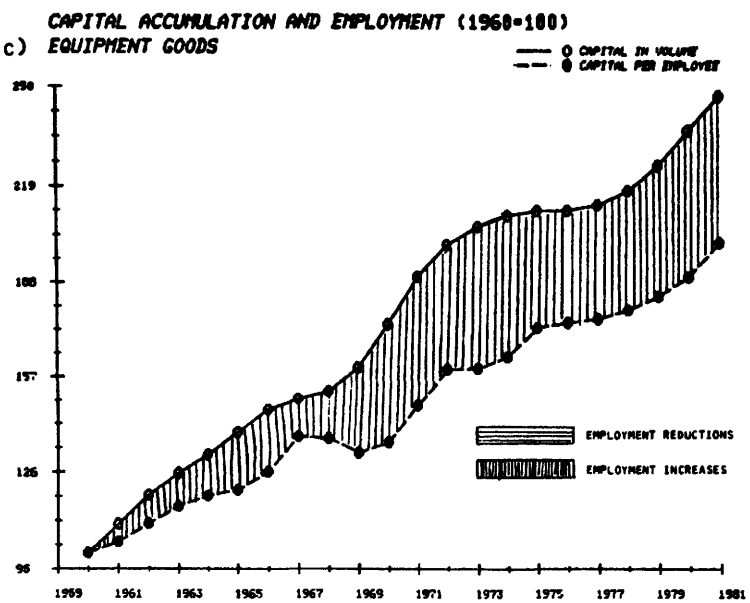
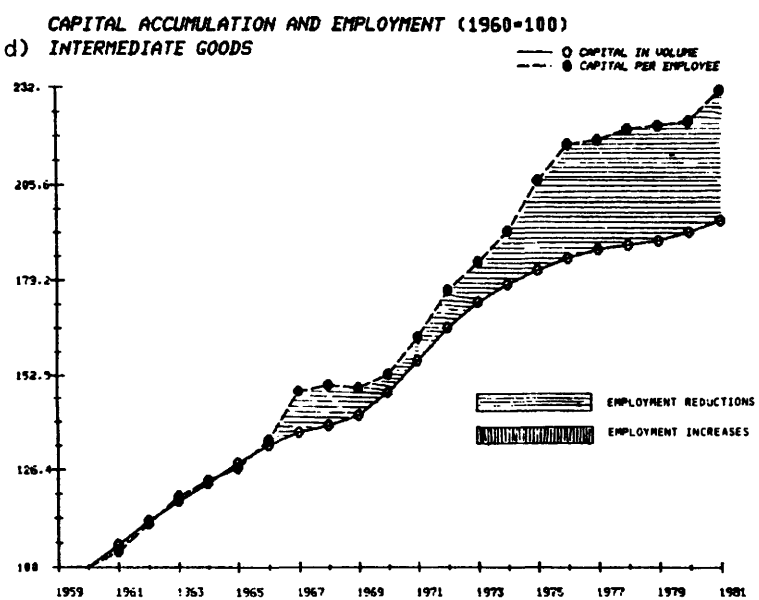


Fig. 12 (cont)


CAPITAL ACCUMULATION AND EMPLOYMENT (1960=100)
c) EQUIPMENT GOODS
CAPITAL IN VOLUME
CAPITAL PER EMPLOYEE
EMPLOYMENT REDUCTIONS
EMPLOYMENT INCREASES
1959 1961 1963 1965 1967 1969 1971 1973 1975 1977 1979 1981


CAPITAL ACCUMULATION AND EMPLOYMENT (1960=100)
d) INTERMEDIATE GOODS
CAPITAL IN VOLUME
CAPITAL PER EMPLOYEE
EMPLOYMENT REDUCTIONS
EMPLOYMENT INCREASES
1959 1961 1963 1965 1967 1969 1971 1973 1975 1977 1979 1981

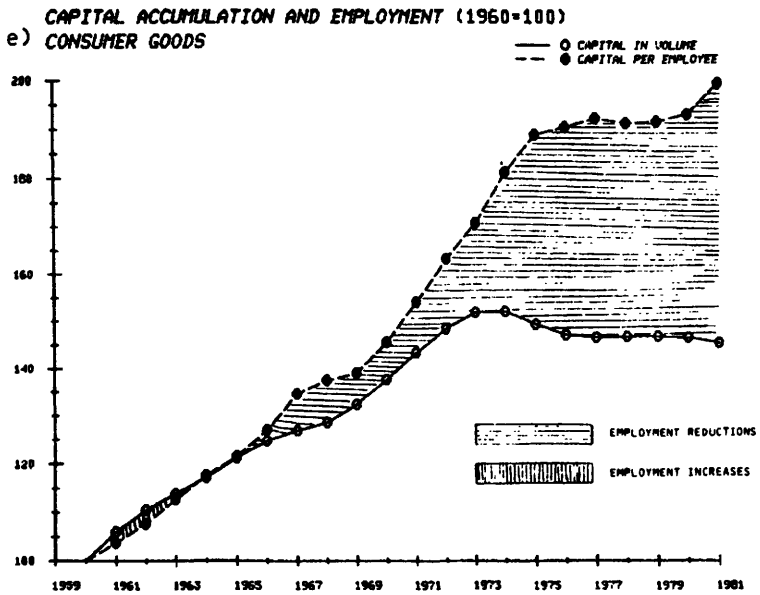

CAPITAL ACCUMULATION AND EMPLOYMENT (1960=100)
e) CONSUMER GOODS
CAPITAL IN VOLUME
CAPITAL PER EMPLOYEE
EMPLOYMENT REDUCTIONS
EMPLOYMENT INCREASES
1959 1961 1963 1965 1967 1969 1971 1973 1975 1977 1979 1981

Table 12 : Capital accumulation and employment
(annual average rate of change of the exponential trend(a)

	Period	KV	KVL	L	(KVL/KV)%
Investment (b) goods	1960-81	4.04	3.16	0.88	78.2
	1960-73	5.23	3.42	1.80	65.4
	1960-70	4.98	3.23	1.75	64.9
	1971-81	2.14	2.60	-0.46	121.5
Intermediate goods	1960-81	3.23	4.14	-0.91	128.2
	1960-73	3.87	4.49	-0.62	116.0
	1960-70	3.74	4.52	-0.78	120.9
	1971-81	1.92	3.22	-1.30	167.7
Consumer goods	1960-81	1.80	3.53	-1.74	196.1
	1960-73	2.99	4.00	-1.01	133.8
	1960-70	2.93	3.83	-0.90	130.7
	1971-81	-0.16**	2.22	-2.38	i.a.
Manufacturing	1960-81	2.81	3.23	-0.42	114.9
	1960-73	4.15	3.87	0.27*	93.3
	1960-70	3.98	3.74	0.24**	94.0
	1971-81	0.58	1.85	-1.27	319.0
Total industry(b)	1960-81	3.12	3.63	-0.51	116.3
	1960-73	3.96	3.88	0.08**	98.0
	1960-70	3.81	3.80	0.01**	99.7
	1971-81	1.59	2.85	-1.26	179.2

KV = net fixed capital stock at constant prices

KVL = net fixed capital stock per employee at constant prices

L = employees

i.a.= "intensive" accumulation

(a) Parameters b(.100) of the function:
$x = a \cdot e^{bt}$, or: $\log x = \log a + bt$

* t statistics less than two
** t statistics less than one
In all the other cases, t values are very high

(b) Excluding Construction

For this reason, in the Sixties the production in Sector I has proceeded much faster than in others, and has been less affected by the crises of the Seventies (see Table 10). Capital accumulation followed a similar course, the capital stock index (1960 = 100) in volume in 1981 being at 247 in Sector I, against 195.5 and 145.3 in sectors II and III. On the other hand, the growth of capital per employee in Sector I has not only been lower than that of capital stock in volume, but also has been lower than those of other sectos (see column KVL in Table 12). Thus, over the whole period, a little more than three quarters of the growth of capital stock in sector I served to increase capital intensity of production and about one quarter employment. The extensive character of accumulation has been more marked in the period 1960-73 (during which time employment increased 1.8 % per year). Conversely, in the second half of the Seventies, also in Sector I the accumulation became more intensive.

For total manufacturing and the whole of industry, the accumulation has been extensive up to 1974 (except in 1967 and 1968) and became intensive since then (see fig. 12 a) and b).

VIII CONCLUSIONS

1. Over the period 1960-81, the rate of profit in German industry displayed a falling trend. This movement proceeded by stages and was heavily influenced by the fall in the first half of the Seventies.

The indicator of the structure of accumulation did not exert an important influence on the decline in profitability since it increased very moderately or in some cases even decreased. This result is essentially due to four factors, two stemming from technology (capital intensity of production and labour productivity) and the others from income distribution and relative price movements. Technological change exerted a slight downward pressure on the indicator

of the structure of accumulation (and hence a positive effect on profitability), because the increase of capital intensity of production has often been associated with a larger growth of productivity. This net effect of technology has been amplified by the shift in wage share which, on average, increased by about 26 % over the twenty-two years considered. Nevertheless, the decline in the relative weight of circulating capital (increase of the rate of turnover) substantially reduced the influence of the rising trend in the wage share. On the other hand, the relative price of capital advanced generally pushed up the indicator of the structure of accumulation.

This study shows a long run rising strength of labour, somewhat surprising for a country in which there is a deeply rooted collaboration between the Unions, the employers' organisations and the policy makers (the German "social consensus"). In fact, over the full period, the real wage per employee increased more than labour productivity, with the gap widening over time. The income distribution ratio closely followed the fluctuations in profitability. In particular, a fall is observed at the beginning of the Sixties and another, very strong, in the first half of the Seventies. The recovery which has appeared since 1976 has to be linked to the weakening of the labour movement resulting from mass unemployment, which again reached its Fifties level.

2. The comparison of the profitability cycles with production cycles shows a good correlation between the two, except in the consumer goods sector. However, the data does not support the case of the "profits/investments" models vs. "demand/investments", since troughs and peaks in profitability had not been systematically lagged with respect to the corresponding points of production, but rather tended to coincide. It is only in the investment goods sector that the "profits/investment" model is best verified, profitability having been a leading indicator for production cycles.

3. The type of accumulation that underlies these cyclical movements is generally "intensive", the growth of the volume of fixed capital having served to increase the capital intensity of production at the expense of employment. The investment goods sector, the most dynamic of the German industry because of its exports orientation, constitutes a remarkable exception: over the whole period, the capital accumulation was "extensive", and this feature has been more accentuated until 1973. In the second half of the Seventies, however, even in this sector capital accumulation became "intensive".

The consumer goods sector provides the most extreme case of "intensive" accumulation, because the capital intensity of production continued to grow after 1973, while the productive base was shrinking. It resulted in a severe cut in employment.

A policy to encourage investment to reduce unemployment should thus be selective, and make investment grants dependent on the attainment of job targets.

Appendix I

Sources and Methods

1. The data employed come from national accouting, base 1976 (SBA 1982 A and 1983), and are integrated with other compatible sources.

Since the German Statistical Office (Statistiches Bundesamt, hereinafter SBA) does not publish the disaggregated net stock of capital, for this aggregate and for the current replacement cost depreciations, the RWI's estimation was used.[32] The DIW's data on capital (Seidel and Scheiger 1979) proved to be of no use to this work, because they only concern gross capital.

SBA has recently revised its national accounts series from 1960, to register in a different way the value added tax (VAT), which was introduced in 1968. This produced a break in the series for value added and intermediate consumption since, from 1960 to 1967, the data include VAT on a "gross" basis while, from 1968 onward, VAT is on a "net" basis. However, for 1968, SBA published two figures for the above variables: one with VAT on a "gross" basis and another with VAT on a "net" basis. Following a suggestion from statistics officials at SBA and RWI, the complete series were derived by multiplying the figures 1960 to 1967 inclusive by the following ratio:
X_{1968} gross VAT / X_{1968} net VAT
(where X is respectively value added and intermediate consumption).

It is interesting to note that a previous version of this paper (Doc II/275/82 of May 1982), using the unrevised data (SBA 1979 and 1981), gave practically the same results as the present ones.

2. The disaggregated value added at factor cost for the 33 branches of manufacturing industries is only published for 1970 onwards. For the period prior to this, disaggregated figures for value

[32]The method used was the perpetual inventory method. For details, see Schmidt (1979).

added at market prices, and net indirect taxes for all manufacturing, energy and construction are the only figures available. The problem of disaggregating the net indirect taxes for the manufacturing branches for 1960-69 then arose. The SBA's (1972) and the DIW's input-output tables (Stäglin et al. 1973) could not be used to this effect, because the classification of branches varied too much from that presently used (Spyro) (SBA 1977).

There were three possible alternative estimation procedures, which consisted in retropolating: a) the structure of net indirect taxes in 1970 in relation to their total; b) the percentage of taxes in 1970 with respect to production; c) this percentage in relation to value added. The first two methods have been ruled out: the first because it does not take into account changes which have taken place in the weight of the branches between 1960 and 1969. The second - which in theory would have been the best one, because VAT was introduced in 1968 - was not satisfactory because it have incoherent results for some branches. The sum total for manufacturing sector taxes calculated using the third method has sometimes been different from the corresponding figure in the national accounts. The estimated data for the manufacturing branches has then been adjusted in proportion to the difference between the two totals.

In any case, it should be pointed out that the estimation of net indirect taxes is only of minor importance for calculating profitability. During the whole of the period under consideration - hence for 1970-1981 also, when it was unnecessary to estimate indirect taxes - the profitability of capital advanced in sectors I and II had an identical movement both when profits are at maket prices and at factor costs. It is only in sector III that some differences occur for a few years, although these differences are extremely slight and do not alter the long term trend or the cycles.

3. As regards stocks and work in progress, there was, in particular, the problem of breaking down the data for all manufacturing published in the national accounts. This problem was solved by calculating the branches' changes in stocks back to 1960, using the stocks and work in progress of one reference year (1978) (SBA 1981 B, p. 28-32).

The disaggregation for 1978 was obtained by applying to the manufacturing total in the national accounts for each category of stocks (raw materials and fuel, finished goods and work in progress) the structure found in the yearly survey on investments of firms with at least 20 employees[33].

The changes in stocks between 1960 and 1980 were estimated using Bertrand and Fauqueur's method (1978). Since there is a correspondence between flows and stocks, the changes (at current prices) in the latter at time t can be calculated according to the changes in intermediate consumptions and in wages:

$$\Delta ST = ST_m \cdot \frac{\Delta IC}{IC_{av}} + ST_g \frac{\Delta W + \Delta IC}{W_{av} + IC_{av}} \qquad 34$$

where ST_m = stocks of raw materials and fuel (year average)

ST_g = stocks of finished goods and work in progress(year average)

$ST = ST_m + ST_g$

$\Delta ST = \Delta ST_m + \Delta ST_g$

IC = annual intermediate consumption

IC_{av} = average intermediate consumption = $IC - (\Delta IC/2)$

$\Delta IC = IC_t - IC_{t-1}$

W = annual wages and salaries

W_{av} = average wages and salaries = $W - (\Delta W/2)$

$\Delta W = W_t - W_{t-1}$

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[33]The sum total of stocks held by the manufacturing industries in the sample at the end of 1978 was only 6.7 % below the analogous total in the national accounts. It follows from this that the possible error made by extrapolating the structure of the sample is negligible.

[34]In order to have a stricter estimate of ST, intermediate consumption would have to be divided into: a) expenditure on raw materials and fuel; b) purchases of other goods and services (other materials, commercial services, communications and transport, credit services, etc.), and use only the first category. This was not done because there are no yearly input-output tables. When using all the intermediate consumption, the hypothesis was put forward that the rate of change in costs in a) and b) is the same. The ensuing error is only minimal, since the second category of expenditure represents a fairly small share of the total.

These changes enabled one to obtain a disaggregated set of the stocks and work in progress at current prices at the beginning and end of each year. This set revealed a bias with respect to the corresponding figures in the national accounts for total manufacturing. The difference was minimal for stocks of finished goods and work in progress; for raw materials, the bias, which was very slight at the beginning of the calculation, so accumulated that in 1960 the difference between the national accounts' total and the calculated figures was 23 %. The bias was corrected by applying to the national accounts' total the structure of the estimated series for each branch.

The same process was used for the energy industries. The 1978 level was estimated, in the absence of a better alternative, by applying to the production of national accounts the same rate of turnover of stocks as in the sample of corporation surveyed by the SBA (SBA 1981 C, p. 26 and 68).

For the construction industry, however, it was not possible to obtain a reliable measure of stocks, and consequently this sector was left out of the calculation of profitability.

4. Failing anything better, the intermediate consumptions have been deflated by using the implicit prices of each branch's value-added, because the SBA does not publish the data in volume for individual manufacturing branches. The only avaialble figure concerns total manufacturing since 1970. When comparing the index of implicit prices of intermediate consumption which results from this with the value-added prices, one sees differences for several years which reached a maximum of seven points (in 1979 the two indices coincide). However, this discrepancy has a negligible impact on QT because the "stock" of intermediate consumption (IC/r) varies, according to sectors, between 25 % (total industry) and 40 % (sector I) of fixed capital.

5. The 34 industrial sectors (construction excluded) in the national accounts were regrouped into three large sectors, according to the main destination of their products.

The investment goods sector (sector I) covers the following sectors (the Sypro classification numbers are given in brackets):

1) agricultural and industrial machines (32); 2) office and data-processing machines (50); 3) vehicles (33); 4) shipbuilding (34); 5) aeronautics (35); 6) electrical goods (36); 7) precision and optical instruments (37).

The intermediate goods sector (sector II) includes:

1) energy industries (10) and mining and quarrying (21); 2) chemistry, including radioactive materials (40; 24); 3) oil refining (22); 4) plastic products (58); 5) rubber (59); 6) non-metallic minerals (25); 7) fine ceramics (51); 8) glass (52); 9) ferrous metals (27); 10) non-ferrous metals (28); 11) foundry products (29); 12) extruded and drawn metal, cold-rolled products (30); 13) structural metal products (31); 14) iron, sheet metal and metal products (38); 15) wood pulp, paper, board (55); 16) paper products (56).

The consumer goods sector (sector III) includes:

1) musical instruments, toys, etc. (39); 2) timber (53); 3) wooden products (54); 4) printing and publishing (57); 5) leathers and skins (61); 6) leather goods (62); 7) textiles (63); 8) clothing (64); 9) food products (68); 10) drinks (6871-79); 11) tobacco (69).

Total manufacturing includes all branches of industry except for energy and construction. It thus differs from the similar grouping of German statistics (verarbeitendes gewerbe) because of the exclusion of oil refining, which is an energy branch. This has been done in order to have the same grouping as in the European system of accounts (ESA).

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ANNEX II

Rate of profit and its components

	INVESTMENT GOODS, EXCL. CONSTRUCTION				*INTERMEDIATE GOODS*				*CONSUMER GOODS*			
YEARS	*P*	*S/W*	*SA*	*R*	*P*	*S/W*	*SA*	*R*	*P*	*S/W*	*SA*	*R*
1960	18.4	33.8	6.4	4.0	18.3	54.8	16.3	5.8	24.5	55.5	13.1	6.2
1961	18.1	33.5	6.4	4.0	14.4	43.3	15.8	5.6	24.2	54.5	12.6	6.0
1962	15.6	28.5	6.2	4.0	11.1	33.9	16.2	5.7	24.5	54.6	12.7	6.1
1963	15.2	28.6	6.5	4.0	10.0	31.8	17.2	5.8	23.3	52.7	12.9	6.2
1964	17.7	32.6	6.6	4.2	11.3	35.5	17.6	5.9	24.6	55.7	13.4	6.3
1965	16.6	29.5	6.4	4.1	10.7	33.1	17.0	5.8	24.8	55.5	13.1	6.3
1966	14.6	26.3	6.1	4.0	9.6	30.6	16.8	5.6	23.3	52.0	12.7	6.1
1967	16.3	30.8	6.1	3.7	9.6	32.9	17.9	5.5	23.7	54.2	13.0	6.1
1968	19.9	33.6	6.4	4.4	13.5	43.0	18.7	6.2	26.0	56.0	13.6	6.8
1969	21.9	33.9	6.2	4.6	14.2	42.5	17.5	6.2	23.6	49.1	13.3	6.9
1970	18.1	27.3	5.7	4.5	12.4	35.1	16.2	6.1	22.7	45.8	12.8	6.8
1971	15.9	25.3	5.8	4.3	10.2	30.4	16.4	5.9	20.7	42.8	13.1	6.9
1972	15.4	24.8	5.9	4.3	9.7	29.3	17.3	6.1	18.7	38.5	13.5	7.1
1973	14.1	21.0	5.8	4.6	11.6	33.7	17.6	6.4	18.5	36.8	13.4	7.2
1974	9.8	14.5	5.5	4.4	12.0	35.5	18.2	6.5	17.2	35.4	13.8	7.2
1975	11.0	17.1	5.5	4.2	7.6	24.2	17.2	5.7	17.3	37.0	13.8	6.9
1976	14.9	22.2	5.6	4.4	9.1	28.0	18.1	6.2	17.7	36.3	13.8	7.2
1977	14.6	21.0	5.3	4.4	7.3	22.0	17.1	6.0	20.6	41.4	13.3	7.1
1978	13.9	19.6	5.3	4.5	8.2	24.3	16.9	6.1	21.3	41.6	13.0	7.2
1979	13.1	18.7	5.5	4.5	10.4	30.6	17.7	6.4	18.0	35.7	13.5	7.3
1980	9.0	13.0	5.3	4.4	7.4	22.4	17.8	6.2	18.0	36.4	13.2	7.0
1981	8.3	12.7	5.5	4.3	5.6	17.6	17.7	6.0	15.5	31.9	13.2	6.9

P = NET RATE OF PROFIT ON CAPITAL ADVANCED
S/W = (NET) INCOME DISTRIBUTION RATIO
SA = INDICATOR OF THE STRUCTURE OF ACCUMULATION
R = RATE OF TURNOVER OF CIRCULATING CAPITAL

	MANUFACTURING				TOTAL INDUSTRY, EXCL. CONSTRUCTION			
YEARS	P	S/W	SA	R	P	S/W	SA	R
1960	22.7	48.7	9.9	5.1	19.7	48.7	12.1	5.3
1961	20.6	43.9	9.5	4.9	17.5	43.1	11.7	5.2
1962	18.0	38.1	9.5	5.0	15.2	37.4	11.7	5.2
1963	16.6	36.1	9.9	5.0	14.2	36.0	12.3	5.2
1964	18.7	40.0	10.1	5.2	15.7	39.5	12.6	5.4
1965	18.4	38.6	9.8	5.1	15.2	37.3	12.1	5.3
1966	16.4	35.0	9.5	4.9	13.8	34.3	11.8	5.1
1967	17.0	38.2	9.8	4.8	14.3	37.4	12.2	5.0
1968	20.6	42.0	10.2	5.5	17.7	42.9	12.8	5.7
1969	21.9	42.0	9.7	5.6	18.1	40.9	12.0	5.8
1970	18.7	34.6	9.0	5.4	16.0	34.5	11.1	5.6
1971	16.2	31.4	9.1	5.2	13.8	31.2	11.2	5.4
1972	15.3	29.6	9.4	5.4	13.0	29.6	11.7	5.6
1973	15.1	27.7	9.3	5.6	13.6	29.5	11.6	5.8
1974	14.2	26.2	9.2	5.5	12.4	27.2	11.7	5.8
1975	11.8	23.0	8.9	5.1	10.3	23.9	11.4	5.3
1976	13.9	25.9	9.0	5.4	12.2	27.3	11.7	5.6
1977	14.0	25.0	8.5	5.3	11.6	25.3	11.1	5.5
1978	14.0	24.3	8.4	5.4	12.1	25.7	11.0	5.6
1979	13.6	23.6	8.6	5.5	12.5	26.7	11.3	5.8
1980	10.7	18.9	8.3	5.3	9.7	21.1	11.3	5.6
1981	9.3	16.9	8.4	5.1	8.0	18.2	11.3	5.5

P = NET RATE OF PROFIT ON CAPITAL ADVANCED
S/W = (NET) INCOME DISTRIBUTION RATIO
SA = INDICATOR OF THE STRUCTURE OF ACCUMULATION
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