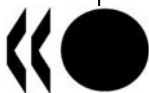


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Working Party on National Accounts

THE DISTRIBUTION OF VALUE-ADDED IN FRANCE, 1949-2007

**To be held on 14-16 October 2008
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Beginning at 9:00 a.m. on the first day**

This document has been prepared by Pierre-Alain Pionnier, INSEE and will be presented under item 11 of the draft agenda

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THE DISTRIBUTION OF VALUE-ADDED IN FRANCE, 1949-2007

Publication by INSEE of very long time series of national accounts makes it possible to have a look on the distribution of value-added and its evolution in France for nearly sixty years. Several studies on this subject have already been performed in the past but generally in base 80 and on a shorter period of time.

Apart from updating the conclusions, this present study allows to determine to which extent conceptual and methodological innovations introduced by successive bases may have an impact on the distribution of value-added. It also clarifies the hypotheses made to compare the preceding bases and to publish data in a unique base. The main assumptions concern the definition and the repartition of taxes and subsidies, the separation of non-financial corporations, sole proprietorships and hospitals prior to 1970, and the creation of a series of financial intermediation services indirectly measured (FISIM) prior to 1999. These national accounting issues related to the breakdown of value-added between sectors are treated in the first part of this study.

A second part is devoted to the economic interpretation of the evolution of the distribution of value-added within non-financial corporations. Several explanations have been proposed since the end of the 1970s in order to explain the evolution of the distribution of value-added in France and the differences with Anglo-Saxon countries. Economic fluctuations as well as evolution of input prices or the appearance of a biased technical progress and institutions on the labour market may have an influence on the breakdown of value-added but all these explanations are only partial. It appears that the evolution of the breakdown of value-added must always be analyzed in link with the evolution of the capital labour ratio and that the proposed explanations must take into account the delay of adjustment of the inputs.

I. National accounting issues related to the distribution of value-added

This study mainly concerns the distribution of value-added (VA) in non-financial corporations (NFC) except sole proprietorships. This sector represents nearly 55% of value added in France in 2007 (nearly 45% in 1949).

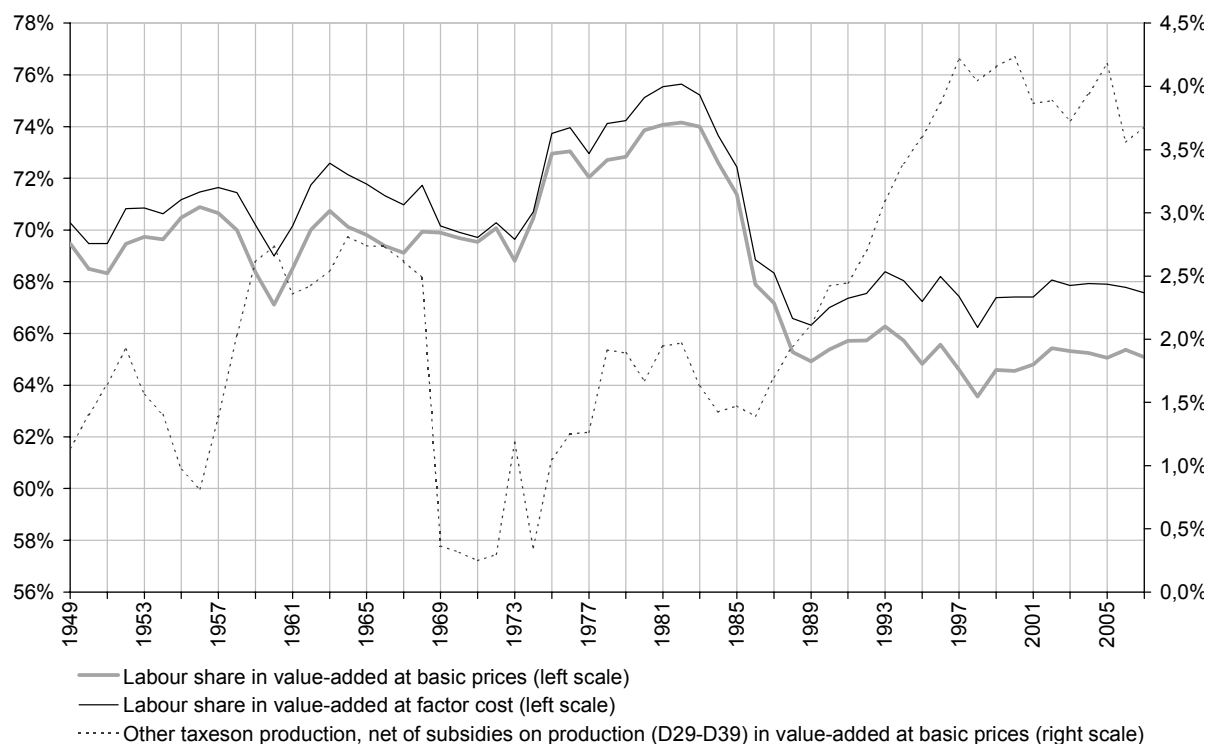
1 Stylized facts for non-financial corporations in base 2000

In accordance to a well established stylized fact for all industrialized countries, the breakdown of VA is relatively stable on the long term. Nevertheless, in the last sixty years, the share of the compensation of employees in VA has been characterized by relatively large variations around a long term mean of 2/3. These are in fact three components of value-added which jointly fluctuated : compensation of employees, taxes net of subsidies on production (D29-D39) and what is usually called capital share (besides the remuneration of capital in the current year, this component of value-added is also used to pay taxes on benefits and to make investments).

Graph 1 illustrates the evolution of the share of the compensation of employees and of taxes net of subsidies on production. The share of capital is the complementary to one of these two components. A more synthetic way to represent this breakdown is to compute VA not at basic prices (price system used in base 2000) but at factor cost. VA at factor cost can be computed from VA at basic prices by subtracting

taxes net of subsidies on production. The share of the compensation of employees in VA at factor cost is the exact complementary to one of the capital share.

Graph 1 : Distribution of value-added for non-financial corporations in base 2000



After having been characterized by a relative stability until the mid-1970s, the breakdown of VA became distorted in favour of the compensation of employees after the two first oil-shocks. An adverse distortion took place during the 1980s : the labour share returned to its level prior to the first oil-shock and continued to fall until 1989. It is globally stable since then, but at a lower level than what prevailed before 1974.

Several authors have already come to the conclusion that the evolution of the breakdown of VA during the 1980s more than offset the initial distortion of the 1970s (Blanchard 1997, Artus and Cohen 1998). Nevertheless, it is not admitted by all French studies made on this subject (Prigent 1999), which is mainly due to the way of pricing VA (basic prices, producer prices or factor cost).

2 The choice of non-financial corporations to study the breakdown of value-added : National accounting arguments

The choice of describing the breakdown of VA solely for non-financial corporations (S11) can first of all be explained by the particular and conventional breakdown for financial corporations (S12), general government (S13), non-profit institutions serving households (S15) and households excepting sole proprietorships (S14B). Moreover, one wants to take into account that a growing part of the French workforce is wage-earning since the middle of the 20th century¹.

¹ This question is treated in the next paragraph.

The distribution of value-added for financial corporations (S12)

This sector includes financial institutions as well as insurance corporations. The particular way to compute their value-added is an argument to exclude them from the field under study.

The computation of value-added for banks is partly conventional because it only includes invoiced fees and mark-ups on deposit management and credit granting (financial intermediation services indirectly measured - FISIM) and not their other financial activities (capital gains and losses on assets, mark-ups realized thanks to derivative financial instruments...) which are treated in the financial account. Yet such financial activities are a growing part of bank activities since the end of the 1980s and they allow the compensation of employees to increase rapidly. So, the upward trend in the share of the compensation of employees in the value-added of financial institutions is partly due to the narrow basis on which value-added is computed.

Concerning insurance corporations, the main issue is the measurement of value-added. Indeed, national accounts try to distinguish in the premiums received between a part covering the reimbursement of disasters and a part remunerating the insurance service, the only one which contributes to value-added. This difficult distinction is responsible for the fact that value-added is computed with more uncertainty for insurance corporations than for non-financial corporations.

The distribution of value-added for general government (S13) and non-profit institutions serving households (S15)

Non-market services provided by general government are often delivered freely or at a price which is not in line with production costs. Due to the lack of market prices, this non-market output, which represents 90% of general government output, is conventionally measured by the sum of production costs. All the branches of non-profit institutions serving households are equally considered as non-market branches and their output is measured by the sum of their production costs.

More precisely, the output (P1) of these branches is equal to the sum of their intermediate consumption (P2), the compensation of their employees (D1) and their consumption of fixed capital (K1) : $P1 = P2 + D1 + K1$.

The labour share for such non-market branches can be computed as :

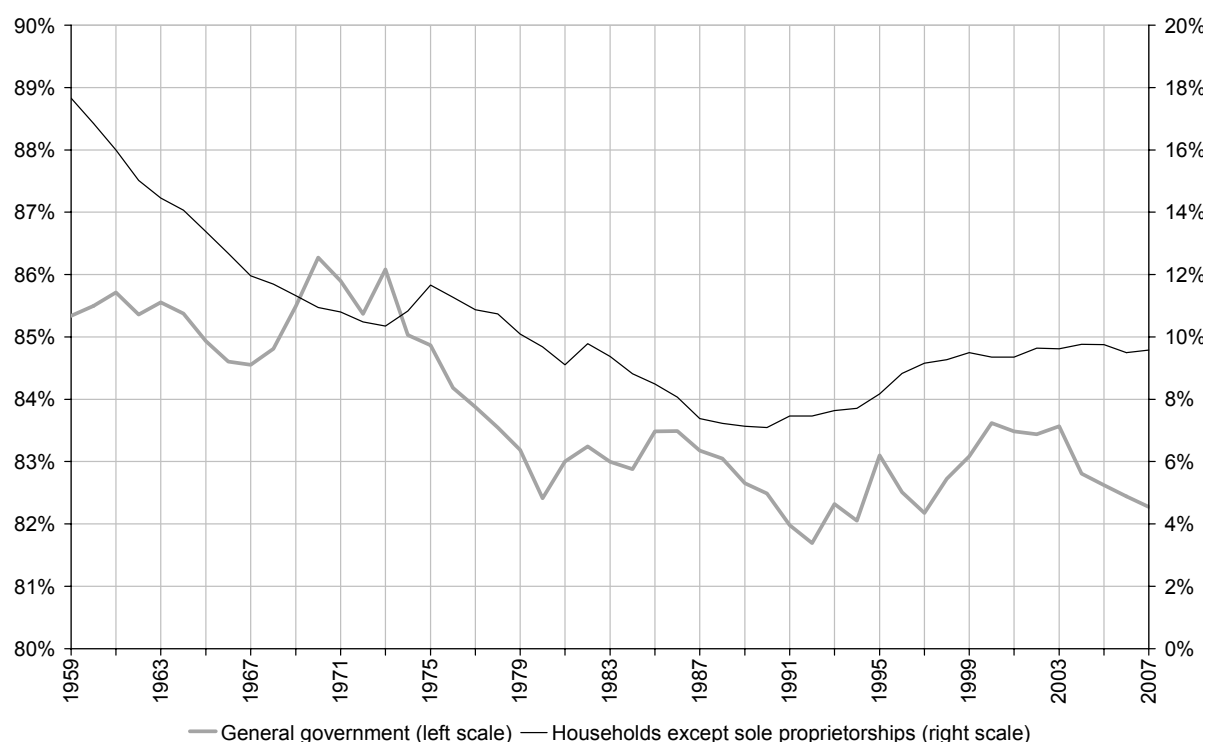
$$\frac{D1}{VA} = \frac{D1}{P1 - P2} = \frac{D1}{D1 + K1} = \frac{1}{1 + \frac{K1}{D1}}$$

This share remains relatively stable in time and is clearly higher than the one observed in non-financial corporations but this is due to accounting conventions rather than to economic criteria.

The distribution of value-added for households except sole proprietorships (S14B)

In national accounts, the output of households except sole proprietorships is mainly an output for own final use. First of all, it corresponds to housing services "produced" by households who hold an accommodation and to farm produces. Besides, households who employ domestic staff have an imputation of the corresponding household services. Intermediate consumption by households only corresponds to the upkeep of the houses and wages only correspond to the compensation of domestic staff. Altogether, the breakdown of value-added for households excepting sole proprietorships is characterized by a very low labour share (*cf.* graph 2).

Graph 2 : The distribution of value-added for general government and households except sole proprietorships



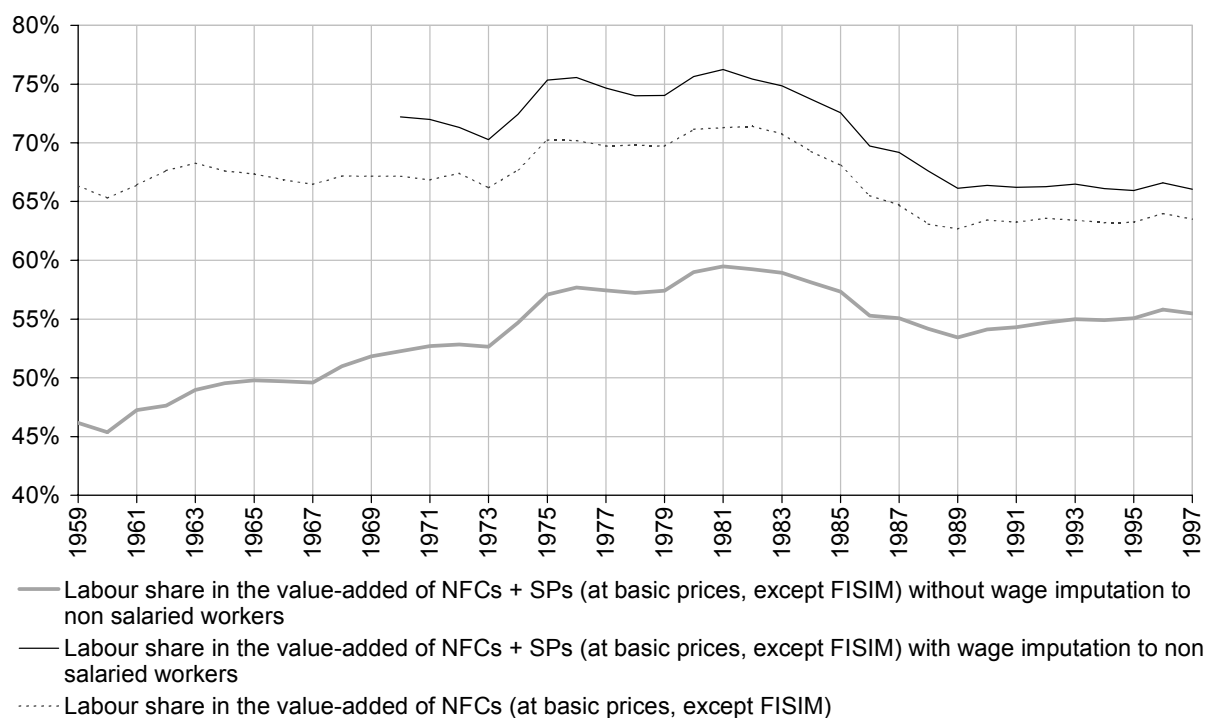
3 *Two alternative methods to neutralize the growing proportion of wage earners*

Several authors have already noticed that the growing proportion of wage earners and the progressive disappearing of sole proprietorships induced an upward trend in the share of value-added devoted to the compensation of employees. This upward trend corresponds to a transformation of the structure of the economy and not to a change in the relative remuneration of labour and capital. That's why it should be neutralized.

In order to do this, the method used in this paper consists in analyzing the breakdown of value-added only for non-financial corporations, except sole proprietorships. An alternative method used in the literature consists in dealing with all non-financial corporations (including sole proprietorships) and in dividing the mixed income of sole proprietorships in two components : wages and operating surplus. This is generally done by attributing to sole proprietorships the mean wage observed in non-financial corporations except sole proprietorships (*cf.* Cette and Mahfouz 1996, Prigent 1999, Timbeau 2002).

Graph 3 illustrates the evolution of the breakdown of value-added for all non-financial corporations (including sole proprietorships) in base 80, with and without sharing out of the mixed income of sole proprietorships in accordance with the method described previously. Over the period 1970-1997, the breakdown of value-added obtained with this method is comparable to the breakdown obtained for non-financial corporations, except sole proprietorships.

Graph 3 : Effect of the growing proportion of wage earners on the breakdown of value-added for non-financial corporations including sole proprietorships (base 80)

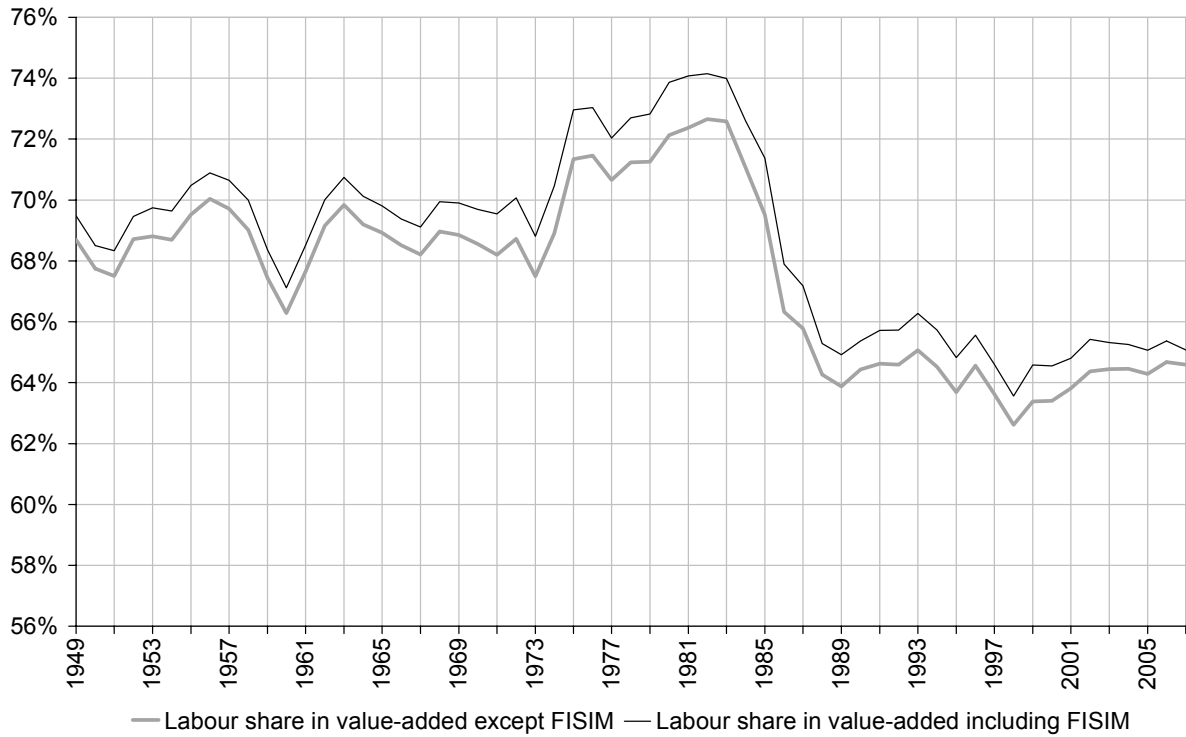


We now study to which extent the breakdown of value-added in base 2000 is different of the one obtained with the preceding bases. The difference is mainly due to the allocation of financial intermediation services indirectly measured (FISIM) and to the valuation of value-added.

4 Financial intermediation services indirectly measured (FISIM)

Before base 2000, the output of FISIM had for only counterpart the intermediate consumption by the national economy. In base 2000, this output is distributed between the different sectors which make use of it. So, a part of the output of FISIM was allocated to NFCs in form of intermediate consumption, which led to lower their value-added. All things remaining equal, the allocation of FISIM led to an increase of the labour share in value-added. This increase represents about one point of value-added over the all period (*cf.* graph 4).

Graph 4 : Impact of the sharing-out of FISIM on the breakdown of value-added (at basic prices) of non-financial corporations in base 2000



Box 1 : From base 70 to base 2000 : Conceptual innovations and available data

In base years, GDP and the different aggregates of national accounts are estimated in level. It requires the mobilization of all available data (administrative data, survey data...) and the set up of very heavy investigation means. It is at these occasions that the most important conceptual and methodological innovations are introduced. Between two base years, national accounts are computed in variation from representative but not exhaustive statistical sources.

For this study on the distribution of value-added, data in four different bases have been used.

1. Base 70

Concepts and nomenclatures used for this base are presented in INSEE (1976). The base year is 1971 but the reference year for accounts at constant prices is 1970. This is why this base is indifferently called "base 70" or "base 71". All available data in base 70 don't have the same status :

- years 1972 to 1982 are definitive accounts, 1983 is a semi-definitive 1 account, 1984 is a semi-definitive 2 account, 1985 is a provisional account ;
- years 1959 to 1969 come from a first backcast (*cf.* Beudaert, Lori and Sérurier 1978) ;
- years 1949 to 1958 come from a second backcast, less detailed and never published by INSEE.

2. Base 80

Base 80 is conceptually very near from base 70 (*cf.* INSEE 1987). Again, all available data don't have the same status :

- years 1977 to 1982 are base years ;
- years 1983 to 1992 are definitive accounts, 1993 is a semi-definitive 1 account, years 1994 to 1996 are semi-definitive 2 accounts, 1997 is a provisional account ;
- years 1970 to 1976 come from a first backcast (*cf.* Kleinpeter et Muller 1989) ;
- years 1959 to 1969 come from a second backcast, less detailed and never published by INSEE.

3. Base 95

The transition to base 95 from 1998 on induced several accounting innovations that are still in force in base 2000 :

- introduction of new activity and product nomenclatures ;
- integration of overseas departments (DOM) to the national economic territory ;
- transition to the concepts and nomenclatures of SNA 93 - SEA 95, in particular : valuation of the output at basic prices, inclusion of intangible goods (software) and certain military goods into GFCF, distinction between three types of income (primary, disposable, adjusted disposable), distinction between individual and collective consumption expenditures, introduction of transport margins.

4. Base 2000

From a conceptual point of view, base 2000 is not very different from base 95. The main differences are an allocation of FISIM and a new treatment of social services. Nevertheless, an important change occurred in the conciliation methodology of national accounts. Priority is now given to firm statistics, that is to the income approach, although a heavier weight was given to the goods and services aspects in the preceding bases. This led to important revisions of trade margins and of the intermediary inputs table.

5 *The valuation of value-added*

In bases 70 and 80, output - and therefore value-added - were valued at producer prices. Since base 95, output and value-added are valued at basic prices. The relation between output at producer prices (P1PP) and output at basic prices (P1) is given by the following equation : $P1PP = P1 + D214 - D31$, where D214 corresponds to taxes on products, except VAT and import taxes, and D31 to subsidies on products.

When output is valued at basic prices, taxes on products, excepts VAT and import taxes, are treated as if they were directly paid by customers, instead of being part of the price charged by producers. Conversely, subsidies on products are treated as if they were directly received by customers, not by producers. Basic prices reflect the amount perceived by producers.

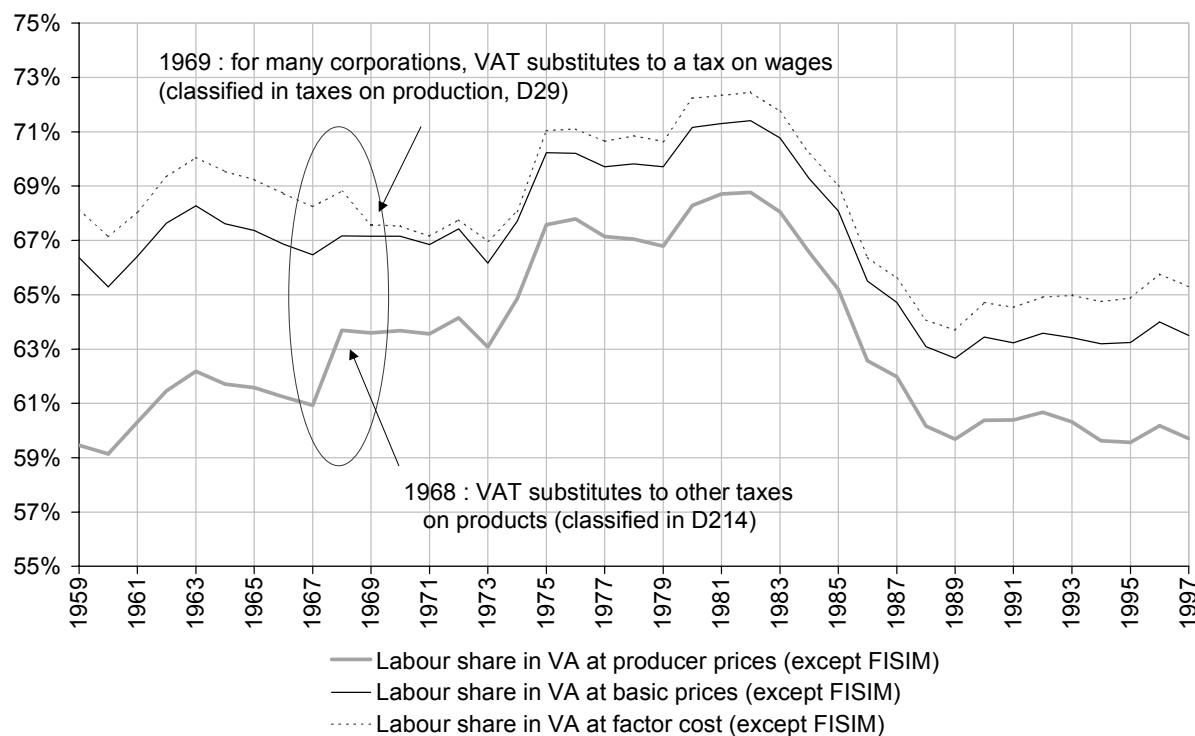
On condition that taxes and subsidies are reclassified following the new nomenclature, data in bases 70 and 80 allow to compute value-added at basic prices and value-added at producer prices for NFCs because these taxes and subsidies are distributed by institutional sector. It is not the case any more in base 2000 : only the global amount of taxes on products (except VAT and import taxes) and subsidies on products is computed. Therefore, it is not possible to compute value-added at producer prices for NFCs in base 2000.

The transition from one valuation to another is not neutral for the distribution of value-added in bases 70 and 80, especially for a year like 1968 where an important fiscal reform concerning taxes on products was enforced. Indeed, VAT was extended in 1968 and it substituted to other taxes on products² (*cf.* annex 1 and graph 5).

As explained previously, the computation of value-added at factor cost allows to neutralize important variations in taxes and subsidies, not only in taxes on products, except VAT and import taxes, and subsidies on products, but also in other taxes on production (D29) and in subsidies on production (D39). From this point of view, the year 1969 is particularly interesting because VAT (classified in D211 and never included in VA) substitutes to a tax on wages (classified in D29) for many firms (*cf.* annex 1 and graph 5).

² Contrary to other taxes on products, VAT is never included in VA, may it valued at basic prices or at producer prices. Taxes on products except VAT and taxes on imports (D214) to which VAT substitutes in 1968 are included in VA at producer prices but not in VA at basic prices.

Graph 5 : Impact of the valuation of the value-added of NFC on its distribution (data in base 80)

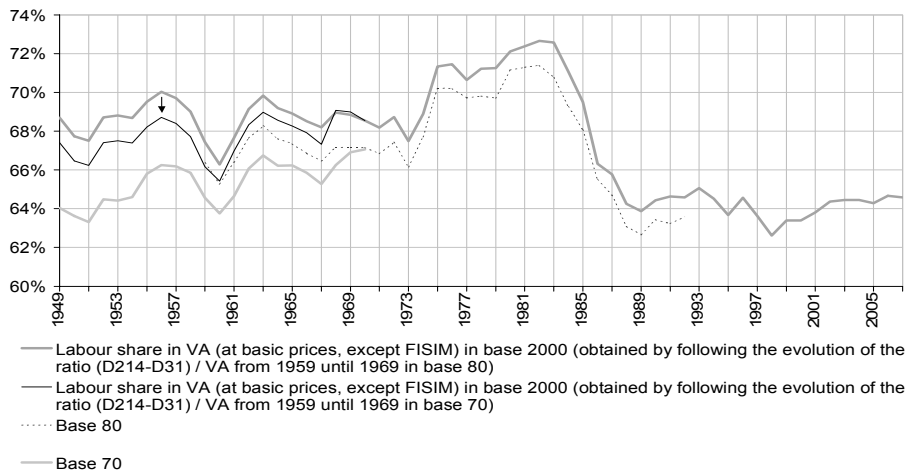


Even though certain studies made with data in base 80 conclude that the actual distribution of value-added is comparable to the one that prevailed before the first oil-shock (*cf.* Prigent 1999), this conclusion seems to be partly due to the valuation of VA. The main difference in the distribution of VA appears in 1968, following the fiscal reform. In 1968 wage earners obtained a substantial increase of their wage after the events of may ("Grenelle agreements"). Nevertheless, after the effects of the fiscal reform have been neutralized, the distribution of value-added doesn't seem to have been really modified in 1968. With a valuation of VA at basic prices, data in base 2000 allow to conclude that the distribution of VA is significantly lower since the beginning of the 1990s than what prevailed before the first oil-shock.

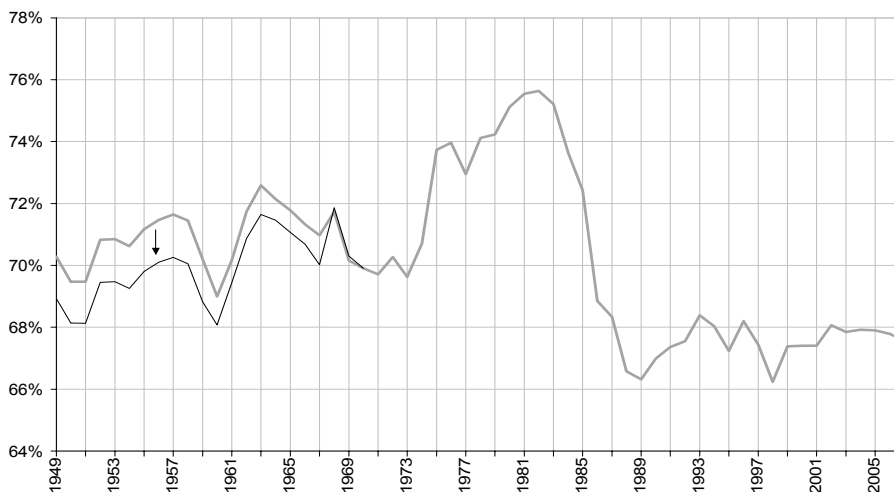
Uncertainty on the distribution of value-added for NFC due to divergences between bases 70 and 80 from 1959 until 1969

Even though data in base 80 were used as a reference for the backcast of base 2000 until 1959, the evolution of the distribution of value-added can also be studied with data in base 70, available from 1949. A divergence which remains unexplained for the time being appears between the two bases in 1968. It concerns the evolution of taxes on products, except VAT and import taxes. This uncertainty, cumulated with the one concerning subsidies on products, represents 1.5 point of VA at basic prices (except FISIM) in 1968 (*cf.* annex 1). The gap between bases 70 and 80 concerning taxes on products, except VAT and import taxes, and subsidies on products mainly explains the difference in the distribution of value-added from 1959 to 1969 these two bases. Graph 6 illustrates what the distribution in base 2000 would have looked like if the backcast of these taxes and subsidies had followed the profile of base 70 instead of the profile of base 80 from 1959 until 1969. After this modification, the conclusion that labour share is lower since the beginning of the 1990s than before the first oil-shock must be put into perspective but it remains valid, even if value-added is computed at factor cost (*cf.* graph 7).

Graph 6 : Distribution of value-added at basic prices : divergences between bases 70 and 80 from 1959 until 1969



Graph 7 : Distribution of value-added at factor cost : error margin in base 2000 due to taxes on products (except VAT and import taxes) and subsidies on products



6 Breakdown of the compensation of employees between gross wages and employers' social contributions

The breakdown of the compensation of employees between gross wages and employers' social contributions produces two interesting stylized facts (*cf.* graph 8) :

- Before 1973, considering the stability of the total labour share (D1) in value-added, the increase in employers' social contributions seems to have an impact only on gross wages.
- However, from 1973 to 1983, the large increase in the labour share appears to be related to employers' social contributions whose weight in VA increases continuously although the weight of gross wages remains nearly stable.

So, the issue of substitutability between gross wages and employers' social contributions, that may be considered as a delayed income covering different risks such as unemployment, illness and old age, cannot be studied as if it was a phenomenon that remained constant.

Graph 8 : Share of gross wages and of employers' social contributions in value-added in base 2000

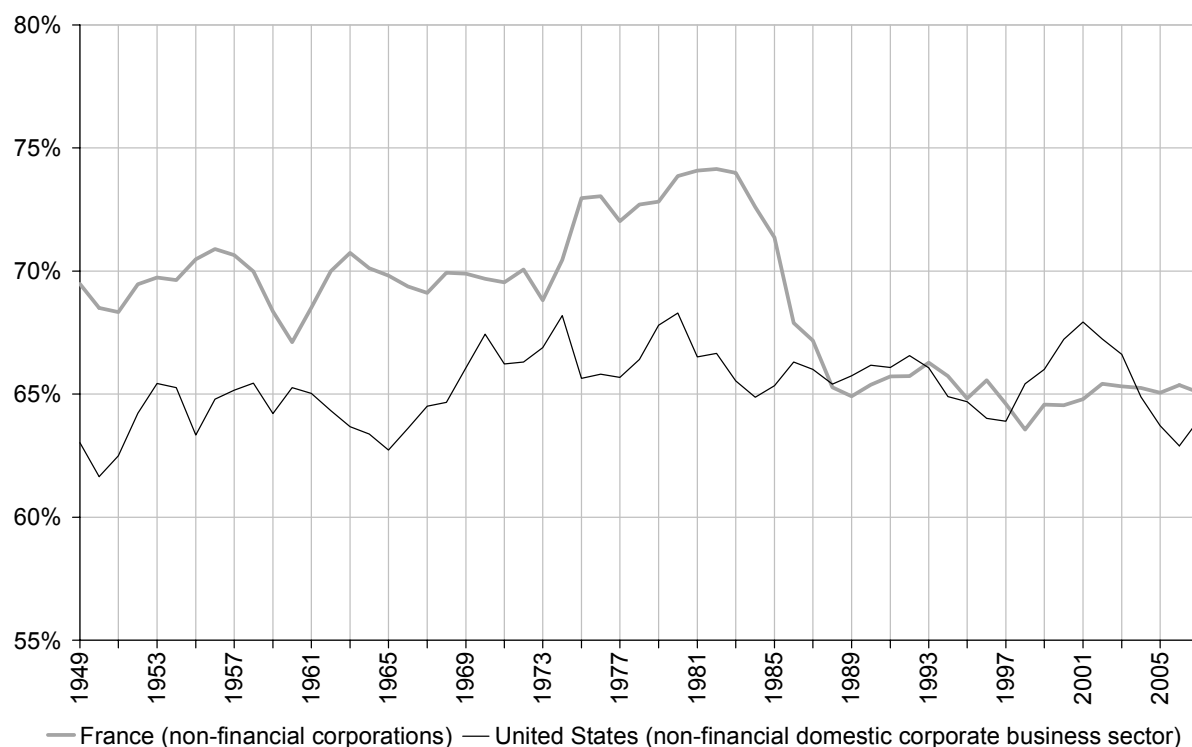


II. Economic interpretation of the distribution of value-added in non-financial corporations

The fact that the compensation of employees represents a relatively stable share of value-added in the private sector is considered as a well established stylized fact in macroeconomics. Nevertheless, this proposition better reflects the situation in Anglo-Saxon countries than in continental European countries, as several authors already noticed (*cf.* Blanchard 1997, Cotis and Rignols 1998). Since the middle of the 20th century, the distribution of value-added is in fact less stable in France than in the United States. The labour share was higher in France in the 1950s and 1960s but was characterized by more important and durable

distortions in the 1970s and 1980s. Since the beginning of the 1990s, it is lower than what prevailed in the 1950s and 1960s.

Graph 9 : Distribution of value-added for non-financial corporations in France and in the United States

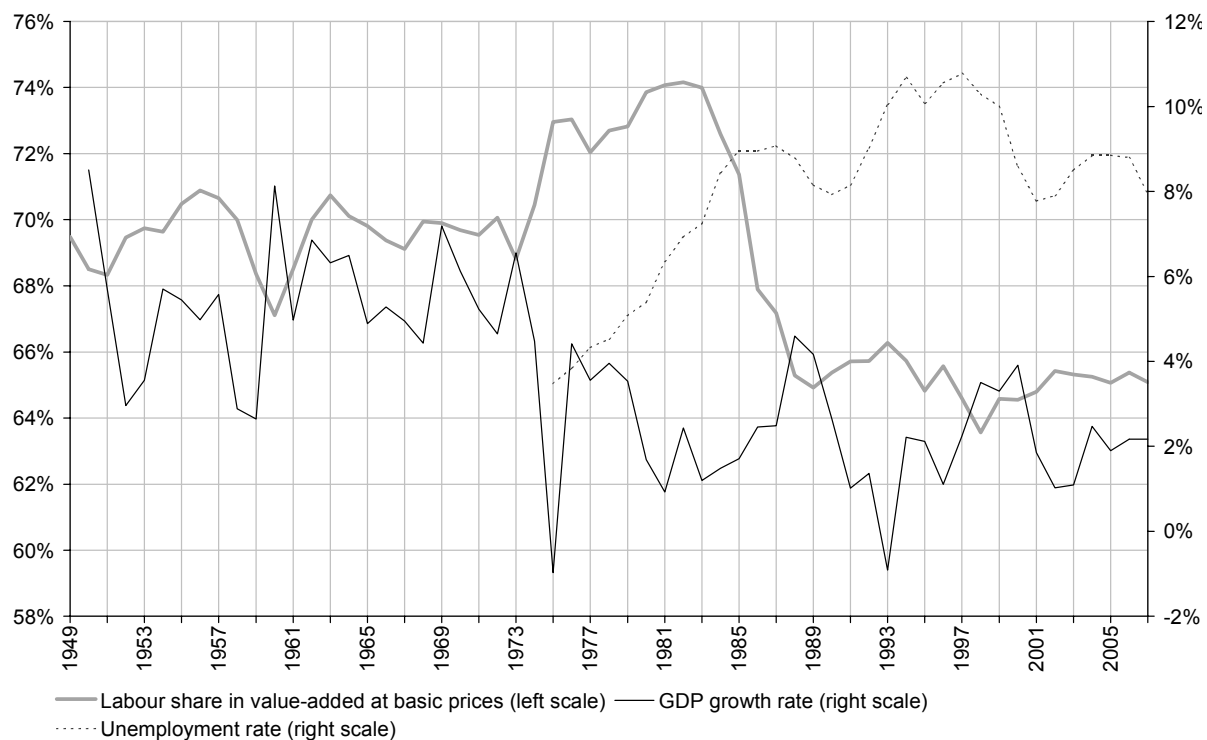


In order to try to explain these stylized facts, it seems useful to remember what the theoretical determinants of the distribution of value-added are.

1 Influence of the business cycle

In the short term, there is a possible effect of the business cycle on the distribution of value-added. In case of a downturn or of an upturn in the business cycle, employment adjusts slowly to the production cycle, which leads to a negative instantaneous correlation between the rate of increase of GDP and the labour share in value-added (*cf.* graph 10 and table 1). During the following quarters, employment adjusts to the business cycle and reduces the initial effect on the distribution of value-added. Moreover, employment fluctuations may influence the distribution of value-added through different channels. For instance, a durably bad economic situation can lead to an increase in unemployment and to a slowing down of the increase in wages by this way. This effect lowers the labour share in value-added. This argument has been often used to explain why the distribution of value-added in the 1990s was less favourable to workers than before the first oil-shock (*cf.* Malinvaud 1998 where this explanation is considered as the "most convincing").

Graph 10 : Influence of the business cycle on the distribution of value-added



Results presented in table 1 show a maximal correlation between the evolution of the GDP growth rate and the *contemporaneous* evolution of the labour share in value-added. This correlation is equal to -0.45 over the entire period (1951-2007) and to -0.34 over the periods before (1951-1973) and after (1976-2007) the first oil-shock. Concerning unemployment, the correlation with the evolution of the labour share is higher in evolution than in level and is maximal after one or two years.

Table 1 : Empirical correlation between the evolution of the labour share, GDP growth rate and unemployment, in level and in evolution³

	Instantaneous correlation with the evolution of the labour share	Correlation with the evolution of the labour share after one year	Correlation with the evolution of the labour share after two years	Correlation with the evolution of the labour share after three years
Evolution of GDP growth rate (1951-2007)	- 0,45	- 0,06	0,26	- 0,06
Evolution of GDP growth rate (1951-1973)	- 0,34	0,20	0,27	0,03
Evolution of GDP growth rate (1976-2007)	- 0,34	- 0,22	0,20	- 0,04
Unemployment rate (1976-2007)	- 0,22	- 0,21	- 0,18	0,01
Evolution of the unemployment rate (1976-2007)	0,06	- 0,34	- 0,36	- 0,18

2 The effect of factor prices

The (relative) stability of the distribution of value-added is an empirical observation rather than the result of a real macroeconomic theory. On the contrary, it is the necessity to reproduce this stylized fact that generally leads the economist to use a Cobb-Douglas production function for the modeling of economic growth in the long term. Indeed, this production function is characterized by a unitary elasticity of substitution between capital and labour. This hypothesis implies that the distribution of value-added remains unchanged when an input price increases. In fact, this global stability hides contradictory economic mechanisms (*cf. infra*).

Two main limits affect this reasoning : it is based on the hypotheses of a unitary elasticity of substitution between capital and labour and it neglects every temporal aspect. Either the economist is only interested in the long term, or he considers that all the mechanisms engaged by the variation of input prices are simultaneous, so that their effects on the distribution of value-added neutralize each other at every moment.

The use of a CES (constant elasticity of substitution) production function allows to choose an elasticity of substitution between capital and labour which is different from one. In order to formalize the influence of input prices on the distribution of value-added, we use a framework in which the quantity of goods produced by firms and their demand for labour result from their profit maximization. Considering that the equilibrium on the goods market is defined by supply, we implicitly choose a medium / long term horizon (i.e. beyond the short term horizon which is characterized by demand fluctuations and effects

³ We look at the correlation with the *evolution* of the GDP growth rate because there's a time-lag between the business cycle and the productivity cycle only in case of a modification in the rate of growth. Concerning unemployment, its level as its evolution may influence the growth rate of wages and, by this way, the distribution of value-added.

The unemployment rate series published by INSEE isn't available prior to 1975.

related to the productivity cycle). Moreover, we consider that input prices are determined exogenously. For the cost of capital, this corresponds to the traditional small open economy hypotheses. For the cost of labour, we make the assumption that supply perfectly adjusts to demand, whatever the wage level fixed exogenously. This determination of employment by the demand side seems to be reasonable in an economy where the unemployment rate is high.

In this framework, the reaction of the labour share in value-added to an evolution of input prices can be written (*cf.* annex 3 for a detailed proof) :

$$\frac{\partial \ln S_L}{\partial \ln W} = \underbrace{\underbrace{\underbrace{1}_{\text{Direct effect on wages}} - \underbrace{(1-S) \cdot \sigma + 1 \cdot \frac{\nu}{1-\nu} \cdot S}_{\substack{\eta_W^L : \text{Reaction of employment} \\ \text{Reaction of the total wage bill}}} - \underbrace{\frac{1}{\nu} \cdot \frac{\nu}{1-\nu} \cdot S}_{\substack{\eta_W^Y : \text{Volume effect} \\ \text{Reaction of VA at current prices}}}}_{(*)} \quad (*)$$

$$\Leftrightarrow \frac{\partial \ln S_L}{\partial \ln W} = (1-S)(1-\sigma) = (1-\nu \cdot S_L)(1-\sigma)$$

$$\frac{\partial \ln S_L}{\partial \ln R} = \eta_R^L - (1 + \eta_Y^P) \cdot \eta_R^Y = -(1-\nu \cdot S_L)(1-\sigma) = -\frac{\partial \ln S_L}{\partial \ln w}$$

where S_L corresponds to the labour share in value-added, S to the labour share in total production costs, W to the cost of labour, R to the cost of capital, σ to the elasticity of substitution between capital and labour, η_W^L (η_R^L) to the unconditional elasticity of employment to the cost of labour (of capital), η_W^Y (η_R^Y) to the elasticity of value-added (at constant prices) to the cost of labour (of capital), η_Y^P to the price elasticity of the demand for goods and ν to an indicator of competition on the goods market defined by the equation : $\nu \equiv \frac{1}{1 + \eta_Y^P}$.

The first equation (*) shows that the labour share in value-added reacts to several contradictory effects in case of an increase in the labour cost :

- a direct and immediate effect (through wages) which increases the total wage amount ;
- a substitution effect, more slowly to appear, which is unfavourable to employment and to the total wage amount : it is all the more so effective as the elasticity of substitution between capital and labour is high and as the labour share in the total production cost (S) is low⁴ ;
- two volume effects, equally more slowly to appear and which neutralize each other : the first one at the numerator, unfavourable to employment and to the total wage amount, the second one at the denominator which corresponds to a fall in value-added and, consequently, to a rise of the labour share in value-added ;

⁴ A low labour share in the total labour cost corresponds to a weak utilization of this input. Therefore, substitution in favour of capital to reach a given production level in case of a wage increase is very high when it is measured in proportion of the initial labour volume used.

- a valorization effect : sell prices of corporations all the more reflect the input price increase as competition is weak on the goods market ; this effect leads to a decrease of the labour share in value-added.

In case of a low substitutability between capital and labour, an increase in the labour cost leads, in the short term and in the long term, to an increase in the labour share, whereas an increase in the cost of capital leads to an exactly opposite phenomenon.

These theoretical conclusions have often been used to explain why the distribution of value-added became distorted in France in the 1970s and 1980s. Indeed, it seems today well established that the wage increases of the second half of the 1970s and of the first half of the 1980s have been granted in function of the growth rate of productivity that prevailed before the first oil-shock (*cf.* Malinvaud 1986, Artus and Cohen 1998)⁵. Therefore, the slowdown of total factor productivity that occurred at this date led to an increase of the labour cost in efficiency units and to a rise of the labour share in value-added (we suppose that the elasticity of substitution between capital and labour is inferior to one). The more moderate rate of wage increase after the first half of the 1980s, combined with the increase in real interest rates and in the cost of capital, would then have led to a fall in the labour share. This influence of the cost of capital has been emphasized by several authors (*cf.* Fitoussi and Phelps 1986, Cotis and Rignols 1998, Prigent 1999).

3 *Considering the influence of time to explain the impact of input prices*

Even if an influence of input prices on the distribution of value-added is possible, some effects are visible only in the medium / long term. It's at this horizon that substitution and volume effects may have an impact. As noticed by Malinvaud (1998), "in each corporation, the [substitution] phenomenon is related to the replacement of equipments spread on numerous years and it allows at the occasion a renewal of products and production methods" ; "after 10 to 20 years, a substitution effect shall occur".

Likewise, Caballero and Hammour (1998) insist on the fact that the reaction of an economy to a given shock depends on the time horizon which is considered. In the short term, the elasticity of substitution between capital and labor is very low and the labour input may fully benefit from substantial wage increases (direct effect on the total wage amount and the distribution of value-added, *cf.* annex 3). In the long term, when the substitution effect becomes effective, the labour share in value-added mechanically decreases in comparison to the level reached in the short term. If, in the same time, there is a fall in the labour cost and/or a rise in the cost of capital, this mechanical decrease is emphasized. Nevertheless, one shall observe an inflexion in the distribution of value-added even in the absence of this subsequent evolution of input prices.

Therefore, the decrease of the labour share in the 1980s may be analyzed as a substitution of capital to labour, itself consequence of the too dynamic wage increase in the 1970⁶. The decrease of the labour cost in efficiency units to its level of before the first oil-shock would have emphasized this phenomenon (*cf.* graphs 11 and 12). Nevertheless, if one accepts this logic of substitution between inputs, the rise in real interest rates during the 1980s and the first half of the 1990s should have led, with a delay from the middle of the 1990s on, to an increase in the labour share due to the substitution of labour to capital. Yet, if an inflexion occurred from 1990 until 1993, it is probably attributable to the bad economic situation at that

⁵ In general, this explanation neglects the fact that the sustained increase in the labour share from 1973 until 1983 is largely due to employers' social contributions : their weight in the compensation of employees continuously grew while the weight of gross wages remained stable (*cf.* graph 6). This suggests several questions on the modeling of wage bargaining.

⁶ This hypotheses of a delayed substitution effect is also mentioned by Artus and Cohen (1998).

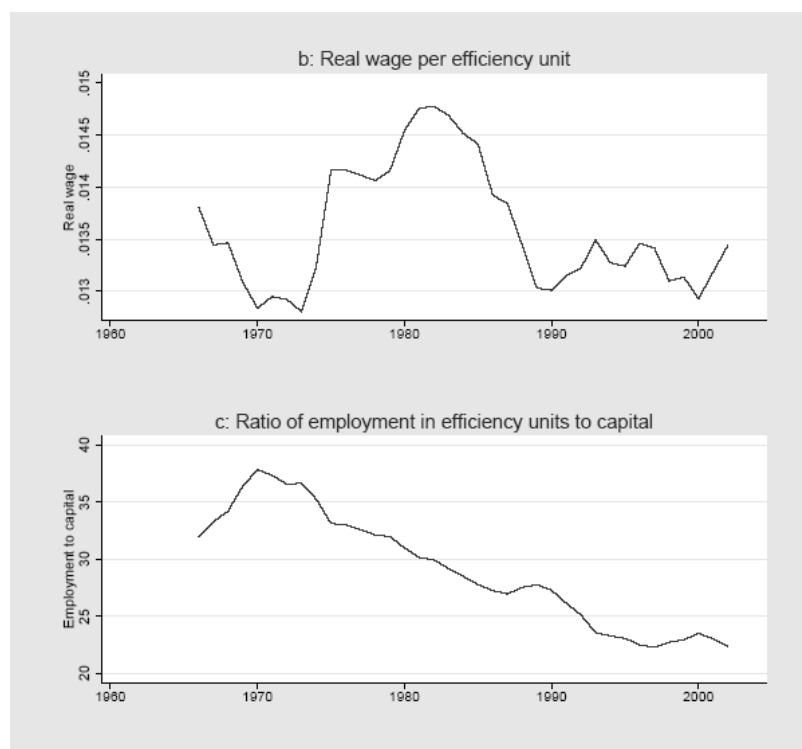
time and the labour share remains stable since the middle of the 1990s. Anyway, the distribution of value added has not recovered the level that prevailed prior to the first oil-shock (cf. graph 2 and box 2).

4 *Analysis of the effective substitution between capital and labour*

As already noticed by Blanchard (1997 and 2005), the hypotheses of an influence of input prices on the distribution of value-added is problematic when it is compared to the effective evolution of capital and labour force. Indeed, the real labour cost in efficiency units returned at the beginning of the 1990s to its level of the beginning of the 1970s and remained stable thereafter. Likewise, real interest rates are not very different since the end of the 1990s from those which prevailed at the beginning of the 1970s. Despite all of this, considering Blanchard's computations, the ratio of labour in efficiency units to capital continuously decreased during the 1970s and 1980s before to stabilize at the beginning of the 1990s.

With data published by the INSEE for NFCs over the period 1978-2007⁷, one can derive similar conclusions as Blanchard for the private sector over the period 1965-2001.

**Graph 11 : Real wage per efficiency unit and ratio of employment in efficiency units to capital
(Source : Blanchard 2005)**



⁷ In base 2000, capital series are not backcasted before 1978.

Graph 12 : Real labour cost in efficiency units for NFCs and 10-year real interest rates (source : INSEE)⁸



⁸ A preliminary computation of multifactor productivity has been made for NFCs using for their value-added the same deflator than for the value-added of the whole economy. These productivity gains have been attributed to labour (hypotheses of Harrod-neutral technical progress) under the assumption that the value-added of NFCs followed, in the long term, a Cobb-Douglas production function of the type $K^\alpha L^{1-\alpha}$ with $\alpha = 1/3$.

**Graph 13 : Ratio of employment in efficiency units to capital for NFCs
(base : 1978 = 1)⁹**



This direct analysis of the ratio of employment in efficiency units to capital allows to better estimate the importance of the substitution effect between inputs, independently of other effects that influence the distribution of value-added.

The continuous decrease of this ratio despite the large increase of real interest rates (and also probably of the cost of capital) during the 1980s is really problematic. The relative evolution of the labour cost cannot really be an explanation to the small increase in the ratio of employment in efficiency units to the capital stock since the mid-1990s : its fall during the 1980s should have reinforced the simultaneous effect of the increase in interest rates and it is far more stable than real interest rates since the beginning of the 1990s.

Even if we admit that the substitution effect may be slow to occur, this problem linked to the evolution of the capital-labour ratio appears, at the latest, in the mid-1990s. This makes uncertain all analyses leading on the substitution between inputs that could be worked out to explain subsequent evolutions. Moreover, a potentially important phenomenon explaining the distribution of value-added may be left aside.

There are three types of explanations for this evolution of the capital-labour ratio since the mid-1990s :

- Real interest rates are not a good measure of the cost of capital.
- Due to a very long adjustment delay, the evolution of the cost of capital could have reversed before having produced its effects.

⁹ The capital considered corresponds to the volume of fixed assets (AN 11) for NFCs : this series is available from 1978 on in the balance sheets published by the INSEE.

- Exogenous phenomena could have contributed to the evolution of the capital-labour ratio. Considering their potential importance, they should be taken into account to explain the distribution of value-added.
 - i. Blanchard (1997) mentions a biased technical progress in favour of capital.
 - ii. As it is unlikely that continental European countries could have benefited from a specific technical progress in favour of capital that Anglo-Saxon countries wouldn't have known, institutional differences have often been proposed to make this explanation more convincing. For instance, one can suppose that not all countries have the same elasticity of substitution between capital and labour.
 - iii. Moreover, specific rigidities on the labour market, as the existence of a higher minimum wage in France than in other countries, could make the adjustment of wages more difficult and lead to more substitution in favour of capital.

An econometric dynamic model taking into account long term relationships (as in Cotis and Rignols 1998 and in Prigent 1999) but also adjustment delays and short term influences and leaning on an accurate measure of the cost of capital may help to quantify the exact influence of input prices, business cycle and exogenous factors (biased technical progress, institutions...) on the capital-labour ratio and the distribution of value-added. Thanks to such a model and to long time series published by INSEE, it could be, for instance, interesting to reexamine the influence of real interest rates on the distribution of value-added. This issue was largely discussed at a time when very high real interest rates coincided with a very low labour share in value-added. It seems to be less discussed now, even though the large decrease in interest rates has not been followed by a noticeable evolution in the distribution of value-added.

Bibliography :

- Artus P., Cohen D. (1998) : Le partage de la valeur ajoutée : faits et problématique, *Rapport du Conseil d'analyse économique N°2*
- Bentolila S., Saint Paul G. (2003) : Explaining movements in the labor share, *Contributions to macroeconomics, Vol. 3, N°1*
- Beudaert M., Lori L., Sérurier M. (1978) : Rétropolation des comptes nationaux dans le nouveau système de comptabilité nationale française, Séries 1959-1970, *Collections de l'Insee, série C, N°67-68*
- Blanchard O., Summers L. (1984) : Perspectives on high world interest rates, *Brookings papers on economic activity, Vol. 1984, N°2*
- Blanchard O. (1997) : The medium run, *Brookings papers on economic activity, Vol. 1997, N°2*
- Blanchard O. (2005) : European unemployment : the evolution of facts and ideas, *MIT Department of economics Working paper N°05-24*
- Bournay J., Pionnier P.-A. (2007) : L'économie française : ruptures et continuités de 1959 à 2006, *Insee Première N°1136*
- Bourquard V., Carnot N., Deruennes A., Pamies-Sumner S. (2005) : Une maquette de prévision à court terme pour la France, *Document de travail de la DGTPE*
- Bouvier G., Pilarski C. (2008) : Soixante ans d'économie française : des mutations structurelles profondes, *Insee Première N°1201*
- Caballero R., Hammour M. (1997) : Jobless growth, appropriability, factor substitution and unemployment, *NBER Working paper N°6221*
- Cette G., Mahfouz S. (1996) : Le partage primaire du revenu : un constat descriptif sur longue période, *Économie et Statistique N°296-297*
- Cotis J.-P., Rignols E. (1998) : Le partage de la valeur ajoutée : quelques enseignements tirés du "paradoxe franco-américain", *Revue de l'OFCE N°65*
- Fitoussi J.-P., Phelps E. (1986) : Causes of the 1980s Slump in Europe, *Brookings papers on economic activity, Vol. 1986, N°2*
- INSEE (1969) : Rapport sur les comptes de la Nation 1968, *Collections de l'Insee, série C, N°2*
- INSEE (1970) : Rapport sur les comptes de la Nation 1969, *Collections de l'Insee, série C, N°8*
- INSEE (1975) : Rapport sur les comptes de la Nation 1974, *Collections de l'Insee, série C, N°33-34*
- INSEE (1976) : Système élargi de comptabilité nationale, *Collections de l'Insee, série C, N°44-45*
- INSEE (1979) : Les comptes de la santé : méthodes et série 1950-1977, *Collections de l'Insee, série C, N°74*
- INSEE (1987) : Système élargi de comptabilité nationale - Base 80, *Collections de l'Insee, série C, N°140-141*
- Kleinpeter M.-A. et Muller P. (1989) : La réropolation 70-76 des comptes nationaux en base 80, *INSEE, Note de base 80 N°25*
- Malinvaud E. (1986) : The rise of unemployment in France, *Economica, Vol. 53, N°210*

- Malinvaud E. (1998) : Les cotisations sociales à la charge des employeurs : analyse économique, *Rapport du Conseil d'analyse économique N°9*
- Prigent C. (1999) : La part des salaires dans la valeur ajoutée en France : une approche macroéconomique, *Économie et Statistique N°323*
- Timbeau X. (2002) : Le partage de la valeur ajoutée en France, *Revue de l'OFCE N°80*

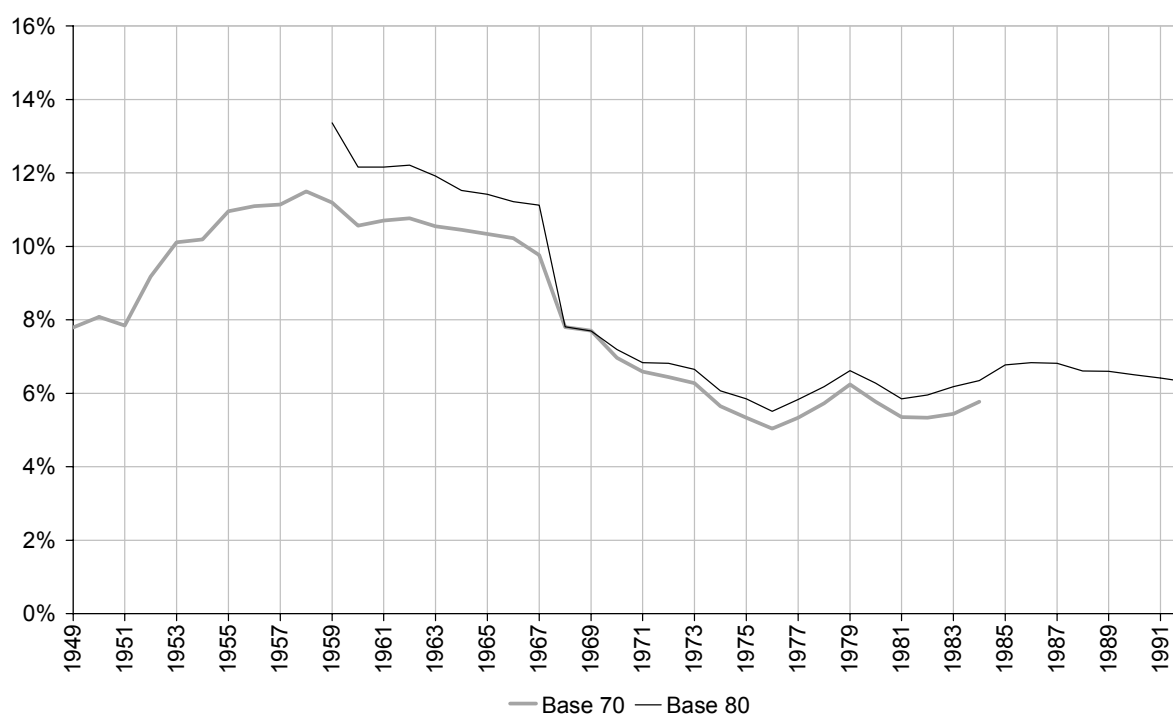
Annex 1: Reconstitution of long time series of taxes and subsidies in the nomenclature of base 2000

Taxes and subsidies are classified following the same nomenclature in bases 70 and 80. However, this nomenclature has been deeply modified with the introduction of base 95.

1 Backcast of taxes on products, except VAT and import taxes (D214)

- Base 80 : An aggregate called "impôts spécifiques sur les produits" (R221) is a good indicator for the global amount of taxes on products, except VAT and import taxes (D214) perceived by general government.
- Base 70 : The same indicator (R221) is used to backcast taxes on products, except VAT and import taxes (D214)¹⁰. Nevertheless, only the aggregates R22 and R222 exist in base 70 before 1959. A partition between "autres impôts sur les produits" (R221) and "impôts divers liés à la production" (R223) has been made by fixing the weight of each institutional sector in the aggregate R22-R222 at his 1959 value.

Graph 14 : Share of taxes on products, except VAT and import taxes (D214) in the value-added (basic prices, except FISIM) of non-financial corporations ¹¹



¹⁰ In base 70, contrary to base 80, this indicator is called "autres impôts sur les produits", exactly like D214 in base 2000.

¹¹ Non-financial corporations do not include sole proprietorships and hospitals. The method for separating non-financial corporations, sole proprietorships and hospitals in bases 70 and 80 is explained in annex 2. In base 2000, contrary to bases 70 and 80, taxes on products, except VAT and taxes on imports (D214), are not broken down between institutional sectors.

One can notice a break in 1968 : it is related to the disappearance of several taxes on products that were replaced by VAT. It's not easy to precisely measure the size of this break because many reclassifications of taxes occurred since then. This could partly explain the discrepancy between bases 70 and 80 for taxes of the type R221. Indeed the nomenclature used for taxes in 1968 is not the same that is used in bases 70 and 80 (it dates back to base 62), itself different from the one used in base 2000. Another explication to the discrepancy between bases 70 and 80 could be the treatment of the time-lag in the recording of taxes due to the strikes of may 1968.

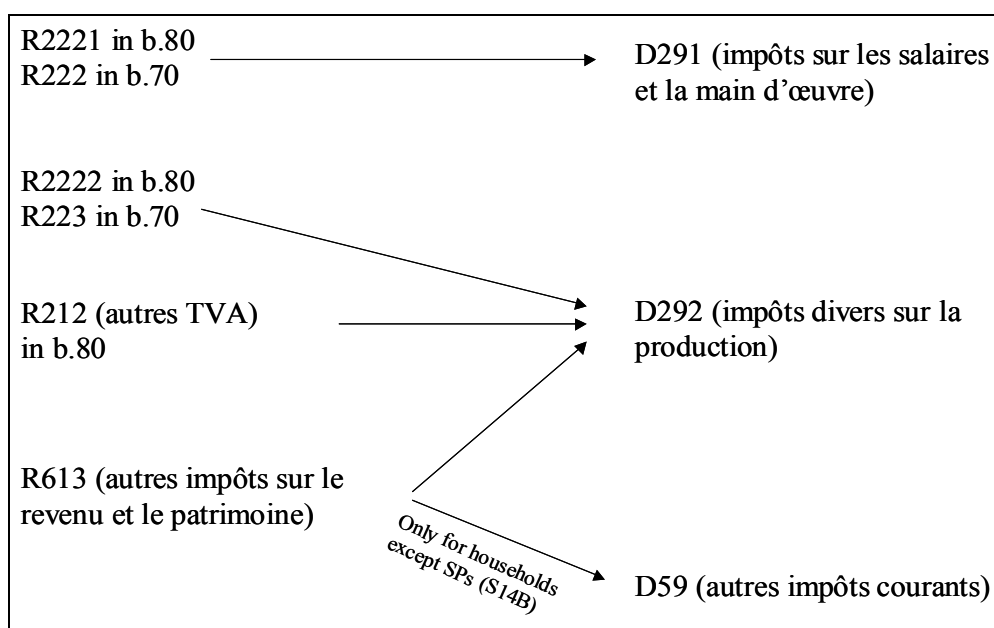
In the end, the size of the series break for taxes of the type R221 paid by non-financial corporations is comprised between 2.0 and 3.3 points of value-added (at basic prices and excepting FISIM). A discrepancy of the same size appears in the distribution of VA at producer prices (including taxes on products, except VAT and import taxes) and at basic prices (excluding them).

2 Backcast of other taxes on production (D29) and of other current taxes (D59)

The main difficulty consisted in dividing so-called "autres impôts sur le revenu et le patrimoine" (R613) between "impôts divers sur la production" (D292, i.e. : other taxes on production classified in D29, except taxes on wages classified in D291) and other current taxes (D59). Nevertheless, this reclassification was only necessary for households except sole proprietorships (S14B) and is not detailed here.

- Base 80 : "Impôts divers liés à la production" (R2222) are reclassified in D292 in the new nomenclature and "impôts à la charge des employeurs sur les salaires et la main d'œuvre" (R2221) are reclassified in D291.
- Base 70 : "Impôts divers liés à la production" (R223), obtained previously, are reclassified in D292 in the new nomenclature and "impôts à la charge des employeurs sur les salaires et la main d'œuvre" (R222) are reclassified in D291 (*cf.* scheme 1).

Scheme 1 : Necessary reclassifications to obtain other taxes on production (D29) and other current taxes (D59) in bases 70 and 80



Graph 15 : Share of other taxes on production (D29) in the value-added (at basic prices, except FISIM) of non-financial corporations



One can observe a break in 1969, a year where VAT replaced a tax on wages (classified in D291) for many corporations (*cf.* INSEE 1970).

3 Backcast of subsidies on production (D39)

- Base 80 : Subsidies on production (D39) in base 2000 only correspond to one part of subsidies on production (R31) in base 80. The rest of R31 is now classified in subsidies on products (D31).

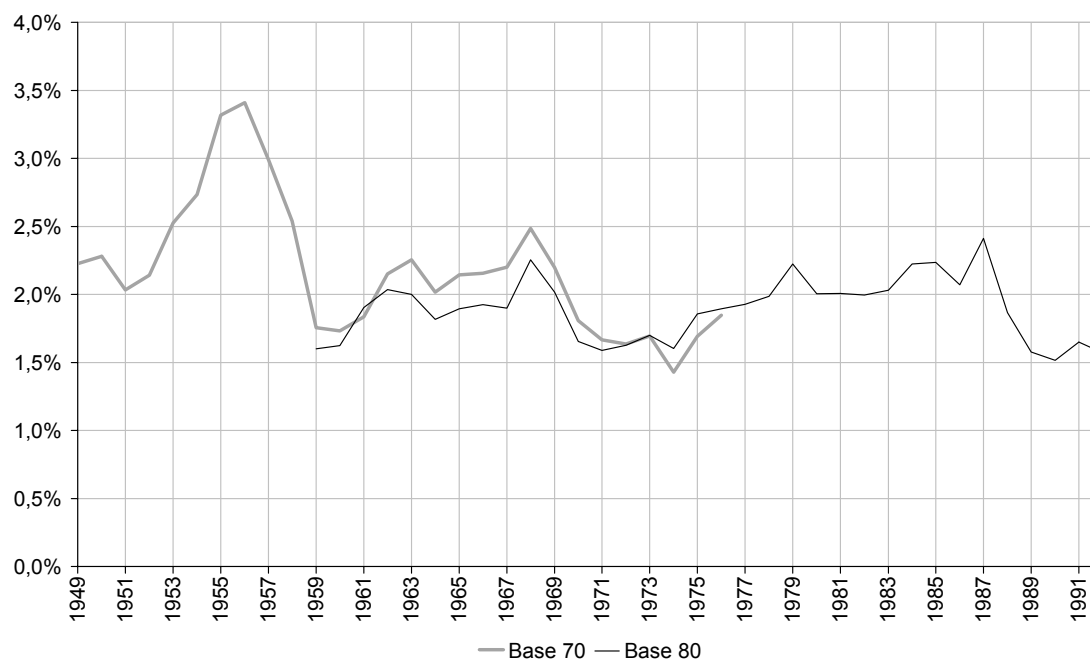
A reclassification had to be done at a very detailed level of the nomenclature (*cf.* scheme 2). Thus, so-called "autres subventions d'exploitation" (R3129) in base 80 had to be divided into subsidies on production (D39) and subsidies on products (D31) in base 2000. A sharing coefficient of 0.5 was chosen because it allowed to reproduce the evolution of subsidies on production (D39) in base 2000 on the period 1977-1997.

The transition from one nomenclature to another had to be adapted before 1977 because data in base 80 are not available with sufficient detail from 1959 until 1976. So we used a fixed proportion of the global amount of subsidies on production (R31) in base 80 and the distribution between sectors was made component per component for the aggregate D39.

4 *Backcast of subsidies on products (D31)*

Subsidies on products (D31) were obtained by difference between the aggregate called subsidies on production in the preceding bases (R30 in base 70, R31 in base 80) and subsidies on production in a strict meaning in base 2000 (D39).

Graph 17 : Share of subsidies on products (D31) in the value-added (at basic prices, except FISIM) of non-financial corporations¹²



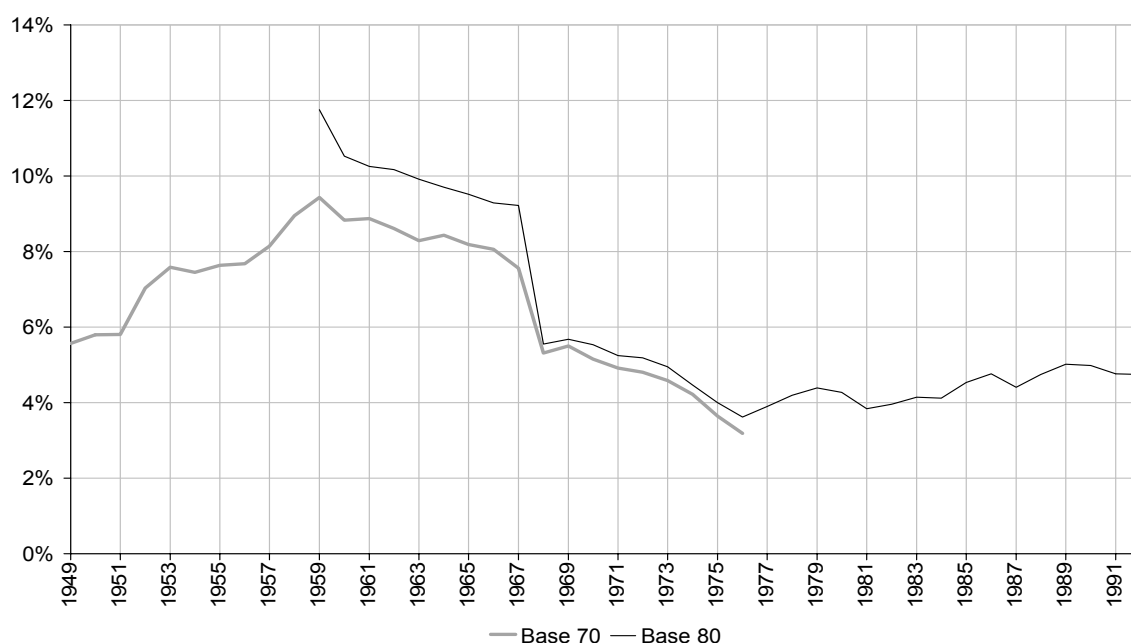
5 *Conclusion*

In the end, the influence of taxes and subsidies on the distribution of value-added can be studied by distinguishing two groups among them :

- Taxes on products, except VAT and import taxes, net of subsidies on products (D214-D31) that allow to compute production at producer prices from production at basic prices ;
- other taxes on production, net of subsidies on production (D29-D39) that allow to compute gross operating surplus from value-added.

¹² In base 2000, subsidies on products are not distributed between sectors.

Graph 18 : Share of taxes on products, except VAT and import taxes, net of subsidies on products (D214-D31) in the value-added (at basic prices, except FISIM) of non-financial corporations ¹³



Graph 19 : Share of other taxes on production net of subsidies on production (D29-D39) in the value-added (at basic prices, except FISIM) of non-financial corporations



¹³ In base 2000, taxes on products, except VAT and taxes on imports, and subsidies on products are not distributed between sectors. As described previously for taxes on products except VAT and taxes on imports, there is a series break in 1968. Its size is 2.2 points of VA (at basic prices, except FISIM) in base 70 and 3.7 points of VA in base 80.

Annex 2 : Distinction between non-financial corporations, sole proprietorships and hospitals before 1970

Sole proprietorships (SPs) and non-financial corporations (NFCs) were not distinguished before 1970 for the computation of production and intermediate consumption : distinct accounts only existed for value-added and distributive transactions below this aggregate. Before 1956, distinct accounts for NFCs and SPs only existed for gross operating surplus and distributive transactions below this aggregate.

There's an additional problem on the period 1949-1959 where backcasted data in base 70 are used as a starting point for the backcast in base 2000. Indeed, hospitals and NFCs were not distinguished in base 70.

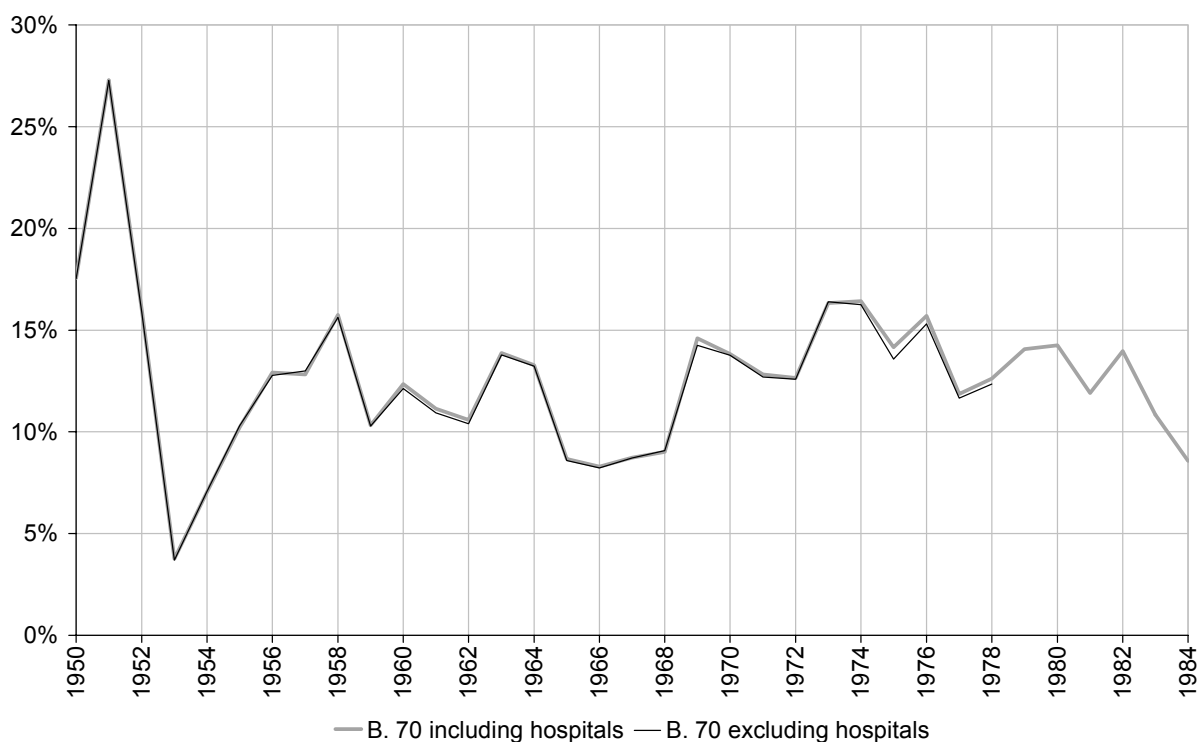
In order to use available data before 1970 for the backcast in base 2000, it was necessary to distinguish between non-financial corporations, sole proprietorships and hospitals.

1 Distinction between hospitals on the one hand, SPs and NFCs on the other hand

The only available information on hospitals in base 70 is about the production of hospital services : it was published in INSEE (1979) for the period 1950-1977. In the absence of information concerning the value-added of hospitals, we estimated an econometric relationship between the evolution of intermediate consumption and the evolution of output for the aggregate NFCs+hospitals and in applying this relationship to the production of hospital services. In order to compute the compensation of employees, we used the same distribution of value-added than for general government (except hospitals).

In the end, the evolution of value-added for NFCs in base 70 depends very little on the inclusion or the exclusion of hospitals in the aggregate (*cf.* graph 20).

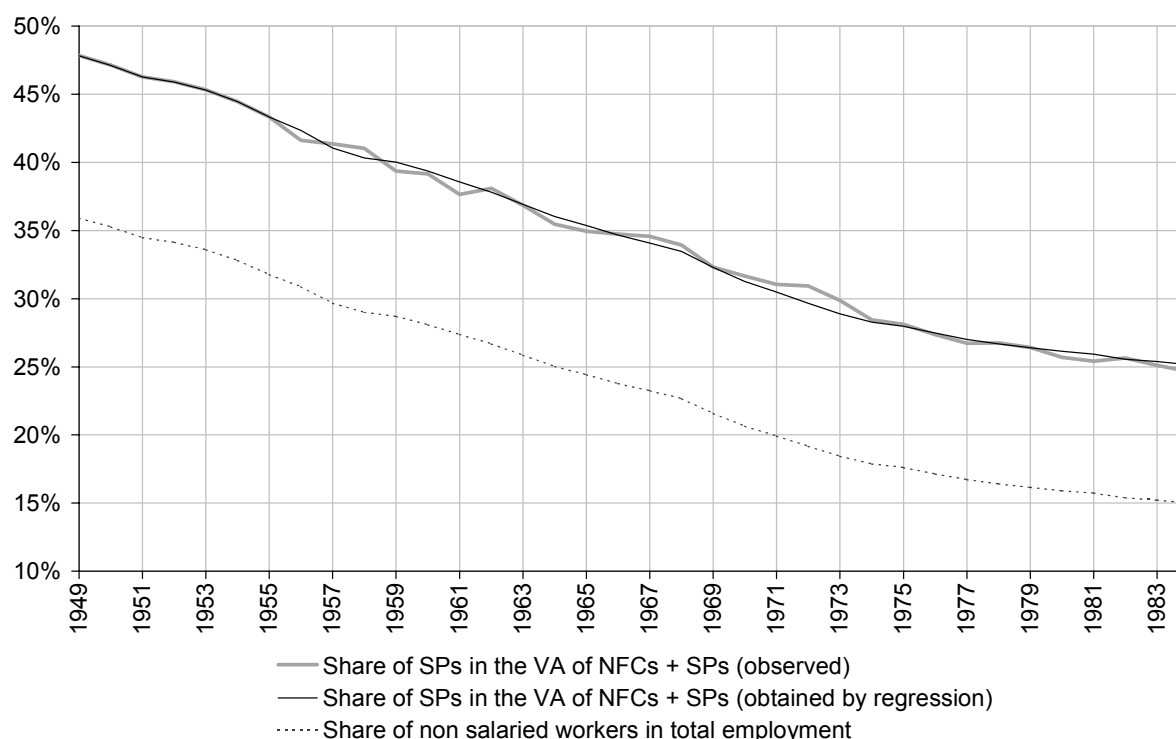
Graph 20 : Evolution of value-added (at basic prices, except FISIM) for NFCs



2 Distinction between NFCs and SPs

The distribution of value-added between NFCs and SPs before 1956 was obtained by means of an econometric relationship between the share of SPs in the value-added of SPs and NFCs and the share of non-salaried workers in total employment. Doing this, we implicitly assume that the productivity of non-salaried workers is comparable to the productivity of salaried workers and that the number of wage-earners working for sole proprietorships remains constant.

Graph 21 : Share of SPs in the value-added of SPs + NFCs and share of non-salaried workers in total employment



The same method couldn't be applied to distribute the compensation of employees between NFCs and SPs before 1956. Indeed, the amount of wages distributed by SPs depends not only on the number of SPs and on the number of wage-earners in each of them but also on the distribution of value-added for these wage-earners. In order to do as few direct hypotheses as possible on the distribution of value-added for SPs, taxes and subsidies have been distributed at a detailed level and the compensation of employees has been obtained as a difference between gross operating surplus or mixed income (for which NFCs and SPs are distinguished until 1949 in base 70) and value-added net of taxes and subsidies.

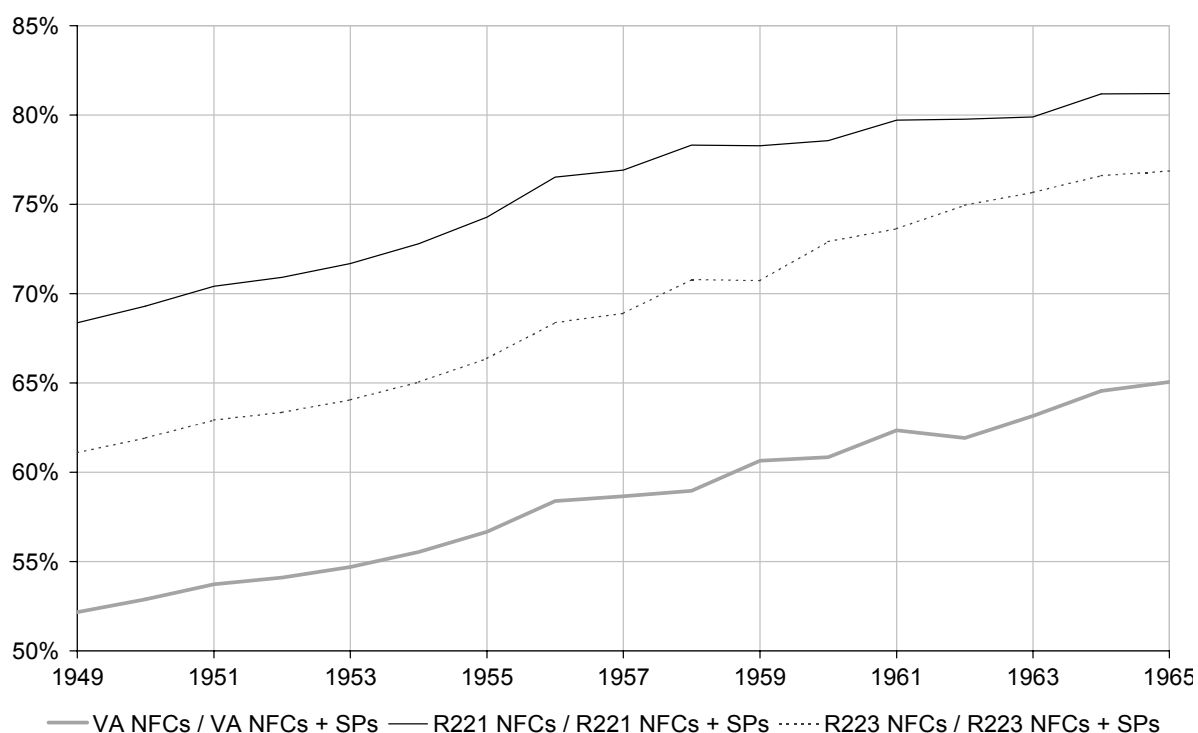
Distribution of taxes between NFCs and SPs :

- Taxes on products, except VAT and import taxes (D214) : The indicator in base 70 (R221 - "impôts spécifiques sur les produits") has been distributed like value-added between NFCs and SPs.
- Other taxes on production (D29) : Three different indicators in base 70 have been used (*cf.* annex 1).

Backcasting taxes on wages (D291) required to distribute the indicator R222 between NFCs and SPs. Given the nature of these taxes, the compensation of employees was first computed including them (D1+D291). Then D291 has been distributed between NFCs and SPs like the aggregate D1+D291. In order to do this, we considered the compensation of employees as the appropriate tax base and we assumed that the tax rate remained constant over the period 1949-1956.

Indicators R223 ("impôts divers liés à la production") and R613 ("autres impôts sur le revenu et le patrimoine") were used as a starting point for the backcast of other taxes on production except taxes on wages (D292). R223 had to be distributed between NFCs and SPs. Given its nature of taxes on production, this indicator has been distributed like value-added (*cf.* graph 22). No specific computation was necessary for R613 because NFCs and SPs were already distinguished for this operation in base 70.

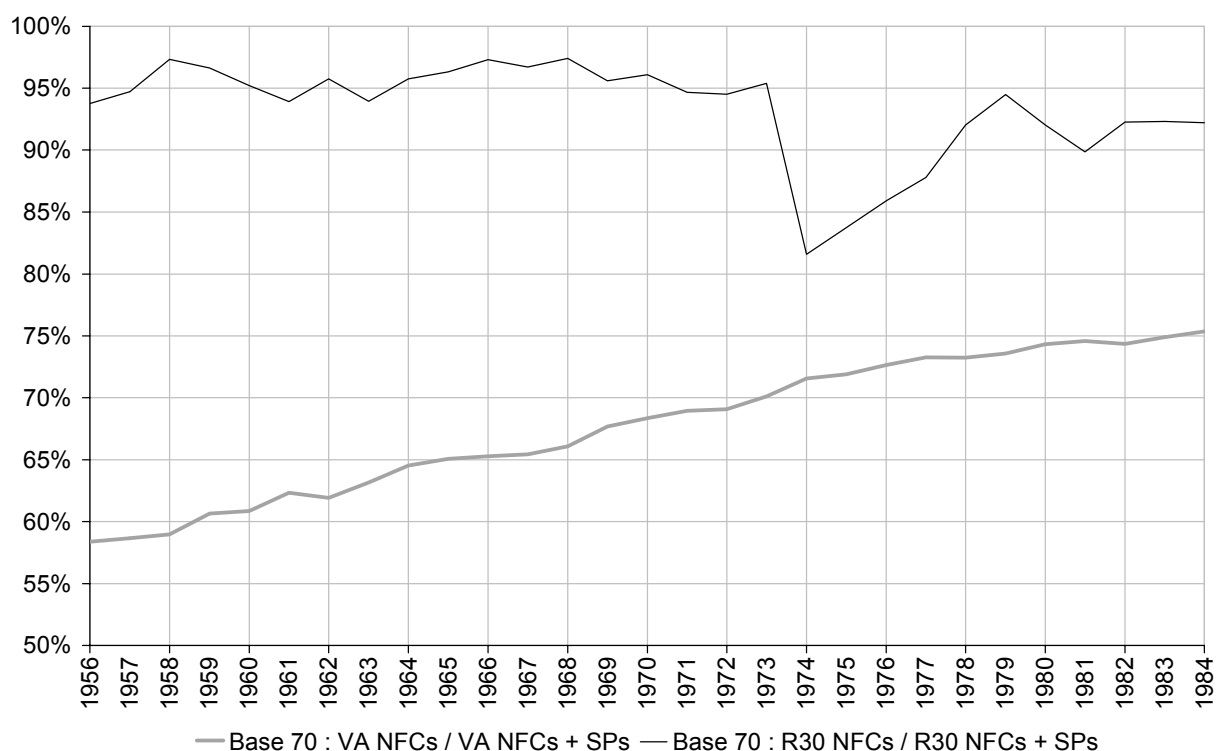
Graph 22 : Distribution of value-added, R221 ("impôts spécifiques sur les produits") and R223 ("impôts divers liés à la production") between NFCs and SPs in base 70



Distribution of subsidies between NFCs and SPs :

Contrary to taxes, a distribution following value-added didn't seem to be adapted for subsidies. Indeed, the share of subsidies on production (in a large sense, R30) allocated to NFCs over the period 1956-1973 remains constant although the contribution of NFCs to the value-added of NFCs + Sps increases (*cf.* graph 23). So, the distribution of subsidies on products (D31) and of subsidies on production (in a strict meaning, D39) between NFCs and SPs has been made over the period 1949-1955 like in 1956.

Graph 23 : Distribution of value-added and of subsidies on production (R30) between NFCs and SPs in base 70¹⁴

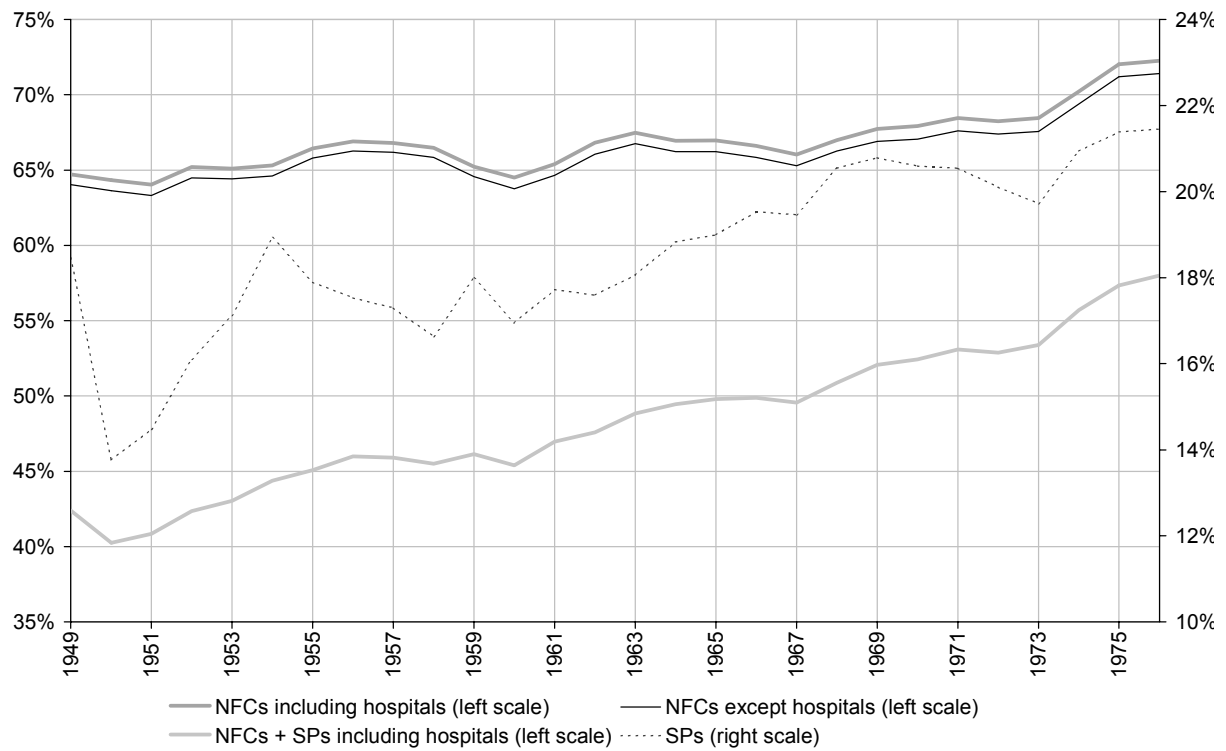


3 Conclusion

The increase in the labour share for the aggregate NFCs + SPs in the 1950s and 1960s is mainly due to the growing proportion of wage-earners in the economy. The progressive replacement of non-salaried workers by salaried workers leads to a generalization of remuneration in the form of wages instead of mixed income. Besides, the share of the compensation of employees in SPs is continuously growing up over the period. This reinforces the increase of the labour share for the aggregate NFCs+SPs. The computation of the distribution of value-added for NFCs alone allows to neutralize these effects which are specific to SPs. For NFCs alone, the distribution of value-added remains stable during the 1950s and 1960s.

¹⁴ The distortion in the distribution of subsidies between NFCs and SPs observed in 1974 is due to an important increase of the subsidies on production given to agricultural corporations (+210% ; their share in the global amount of subsidies on production given to NFCs and SPs increases from 7% in 1973 to 18% in 1974) in order to compensate for the fall in production and for the slow progression of production prices compared to the progression of intermediate consumption prices (*cf.* INSEE, 1975).

Graph 24 : Distribution of value-added in base 70



Annex 3: Influence of input prices on the distribution of value-added

We adopt a framework of monopolistic competition where the price elasticity of the demand for goods is supposed to be constant. With this hypotheses, corporations simultaneously determine the volume and the price of their output. The price elasticity of the demand for goods is noted $\eta_Y^P (\leq 0)$. The indicator of competition on the goods market is $\nu = \frac{1}{1 + \eta_Y^P}$: it is equal to one in a situation of perfect competition and is superior to one when the economy moves away from this situation.

The mechanisms described thereafter are relying on the hypotheses that the quantity of goods produced by firms and their demand for labour is a consequence of their profit maximization. Considering that the equilibrium on the goods market is determined by the supply side, we implicitly consider the medium / long term. Moreover, input prices are supposed to be determined exogenously. For the cost of capital, this corresponds to the traditional small open economy hypotheses. For the cost of labour, we make the assumption that supply perfectly adjusts to demand, whatever the wage level fixed exogenously. This determination of employment by the demand side seems to be reasonable in an economy where the unemployment rate is high.

$$S_L = \frac{WL}{P(Y)Y} \text{ corresponds to the labour share in value-added.}$$

1 Influence of the labour cost on the distribution of value-added

$$\frac{\partial \ln S_L}{\partial \ln W} = 1 + \underbrace{\frac{\partial \ln L}{\partial \ln W}}_{\eta_W^L} - \frac{\partial \ln P}{\partial \ln W} - \underbrace{\frac{\partial \ln Y}{\partial \ln W}}_{\eta_W^Y}$$

Computation of $\frac{\partial \ln P}{\partial \ln W}$:

$$\frac{\partial \ln P}{\partial \ln W} = \frac{W}{P} \frac{\partial P}{\partial W} = \frac{W}{P} \frac{\partial P}{\partial Y} \frac{\partial Y}{\partial W} = \underbrace{\frac{Y}{P} P'(Y)}_{\eta_Y^P} \underbrace{\frac{W}{Y} \frac{\partial Y}{\partial W}}_{\eta_W^Y}$$

We can infer: $\boxed{\frac{\partial \ln S_L}{\partial \ln W} = 1 + \eta_W^L - (1 + \eta_Y^P) \cdot \eta_W^Y}$.

Computation of η_W^L (unconditional elasticity of labour demand to the wage¹⁵) :

Labour demand can be expressed with the cost function (Shephard lemma) :

¹⁵ This unconditional elasticity characterizes how labour demand adjusts to a wage variation. Two different effects are at work : substitution between capital and labour and adjustment of the volume of output. As for conditional elasticity, it characterizes how labour demand adjusts to a wage variation when the volume of output is maintained constant : the only effect at work is capital-labour substitution.

$$L = \frac{\partial C(W, R, Y)}{\partial W} = C_W(W, R, Y)$$

When this expression is derived with respect to the wage, one obtains :

$$\frac{\partial L}{\partial W} = C_{WW} + C_{WY} \frac{\partial Y}{\partial W} \Rightarrow \eta_W^L = \underbrace{\eta_W^{-L}} + \underbrace{\eta_Y^{-L} \eta_W^Y}_{<0} \cdot \eta_W^{-L}$$

is the conditional elasticity of labour demand to the wage (measure of the substitution effect between capital and labour when the volume of output is fixed).

We can infer:

$$\frac{\partial \ln S_L}{\partial \ln W} = 1 + \underbrace{\eta_W^{-L}}_{<0} + \underbrace{\eta_Y^{-L} \eta_W^Y}_{<0} - \left(\underbrace{1 + \eta_Y^P}_{>0} \right) \cdot \underbrace{\eta_W^Y}_{<0}$$

In case of wage increase, the unconditional demand of labour (elasticity $\eta_W^L < 0$) decreases unambiguously (volume and substitution effects are both negative¹⁶) but it is not possible to say, on general, if the total wage amount will increase or decrease ($|\eta_W^L|$ must be inferior to one to have an increase). Moreover, value-added at constant prices decreases, which leads to increase the share of the compensation of employees in value-added (this effect is more noticeable when competition is weak on the goods market : in this case, corporations are able to pass an increase in input prices in their prices).

Computation of η_W^{-L} (conditional elasticity of labour demand to the wage) :

The properties of the cost function allow to express conditional elasticity of labour demand as a function of the labour share and of the elasticity of substitution between capital and labour.

Indeed, the elasticity of substitution σ can be written as a function of the cost function :

$$\sigma = \frac{C \cdot C_{WR}}{C_W \cdot C_R}$$

Moreover, the conditional demand of labour, resulting of cost minimization for a given level of output, only depends on the ratio of labour cost to capital cost and on the level of output : $\bar{L} = \bar{L}\left(\frac{W}{R}, Y\right)$.

We can infer: $\frac{\partial \bar{L}}{\partial W} = -\frac{R}{W} \frac{\partial \bar{L}}{\partial R}$.

$$\eta_W^{-L} = \frac{W}{L} \frac{\partial \bar{L}}{\partial W} = -\frac{W}{L} \frac{R}{W} \frac{\partial \bar{L}}{\partial R} = -\frac{R}{L} \cdot C_{WR} = -\frac{R}{L} \frac{C_W \cdot C_R}{C} \sigma = -\frac{R}{L} \frac{\bar{L} \cdot \bar{K}}{C} = -(1-s) \cdot \sigma$$

¹⁶ For a general function of production, the sign of η_Y^{-L} can be positive or negative. Nevertheless, it is always positive for an homogenous production function.

where S corresponds to the share of the compensation of employees is the total production cost.

For a production function homogenous of degree one (i.e. : with constant returns to scale), there's a simple relationship between the labour share in production cost (S) and the labour share in value-added (S_L).

In this case, the cost function is also homogenous of degree one :

$$C(W, R, Y) = C(W, R, 1) \cdot Y \Rightarrow \frac{\partial C(W, R, Y)}{\partial Y} = C_Y(W, R, Y) = C(W, R, 1) = \frac{C(W, R, Y)}{Y}$$

$$\text{We can infer: } S = \frac{WL}{C} = \underbrace{\frac{WL}{P(Y)Y}}_{S_L} \cdot \underbrace{\frac{P(Y)Y}{C}}_{P(Y)=v \cdot C_Y} = S_L \cdot \underbrace{\frac{v \cdot C_Y \cdot Y}{C}}_{C_Y=C/Y} = S_L \cdot v$$

$$\text{In the end : } \boxed{\eta_W^{-L} = -(1-S) \cdot \sigma = -(1-v \cdot S_L) \cdot \sigma}$$

Computation of η_Y^{-L} (conditional elasticity of labour demand to the volume of output) :

By deriving the relationship describing the homogeneity of the cost function $C(W, R, Y) = C(W, R, 1) \cdot Y$ with respect to W and to Y , we successively obtain :

$$C_W(W, R, Y) = C_W(W, R, 1) \cdot Y$$

$$\text{et } C_{WY}(W, R, Y) = C_W(W, R, 1) = \frac{C_W(W, R, Y)}{Y} = \frac{\bar{L}}{Y}$$

$$\text{We can infer: } \eta_Y^{-L} = \frac{Y}{\bar{L}} \frac{\partial \bar{L}}{\partial Y} = \frac{Y}{\bar{L}} \cdot C_{WY} \Rightarrow \boxed{\eta_Y^{-L} = 1}$$

Computation of η_W^Y (elasticity of the volume of output to the labour cost) :

The elasticity of the volume of output to the labour cost can be obtained from the profit optimization condition :

$$\Pi = P(Y)Y - C(W, R, Y) ; \frac{\partial \Pi}{\partial Y} = 0 \Rightarrow \underbrace{(1 + \eta_Y^P)}_{1/v} \cdot P(Y) = \underbrace{C_Y}_{=C/Y}$$

$$\text{Logarithmic derivation with respect to } W : \frac{P'(Y)}{P(Y)} \frac{\partial Y}{\partial W} = \frac{C_Y}{C} \frac{\partial Y}{\partial W} + \frac{C_W}{C} - \frac{1}{Y} \frac{\partial Y}{\partial W}$$

$$\Leftrightarrow \frac{1}{Y} \frac{\partial Y}{\partial W} \left[\underbrace{\frac{Y \cdot P'(Y)}{P(Y)}}_{\eta_Y^P} - \underbrace{\frac{Y \cdot C_Y}{C}}_{=1} + 1 \right] = \frac{C_W}{C}$$

$$\Leftrightarrow \eta_W^Y \cdot \eta_Y^P = S \quad \Leftrightarrow \quad \boxed{\eta_W^Y = \frac{\nu}{1-\nu} \cdot S = \frac{\nu^2}{1-\nu} \cdot S_L}$$

In the end, we obtain :

$$\frac{\partial \ln S_L}{\partial \ln W} = \underbrace{\underbrace{1}_{\text{Direct effect on wages}} - \underbrace{(1-S) \cdot \sigma}_{\text{Substitution effect}} + \underbrace{1 \cdot \frac{\nu}{1-\nu} \cdot S}_{\text{Volume effect}} - \underbrace{\frac{1}{\nu} \cdot \frac{\nu}{1-\nu} \cdot S}_{\eta_W^Y : \text{Volume effect}}}_{\eta_W^L : \text{Reaction of employment}} - \underbrace{\frac{1}{\nu} \cdot \frac{\nu}{1-\nu} \cdot S}_{\text{Reaction of VA at current prices}}$$

$$\Leftrightarrow \boxed{\frac{\partial \ln S_L}{\partial \ln W} = (1-S) \cdot (1-\sigma) = (1-\nu \cdot S_L) \cdot (1-\sigma)}$$

After simplification, the elasticity of the labour share to the labour cost $\left(\frac{\partial \ln S_L}{\partial \ln W}\right)$ only depends on the elasticity of substitution between capital and labour (σ) and on the labour share in the total production cost (S)¹⁷. It is positive only if the elasticity of substitution between capital and labour is inferior to one. Instead of as a function of S , one can express it as a function of S_L and of the indicator of competition on the goods market (ν) which appears as a constant of proportionality between production cost and value-added at current prices.

To sum up, the labour share in value-added reacts to several contradictory effects in case of an increase in the labour cost :

- a direct and immediate effect (through wages) which increases the total wage amount ;
- a substitution effect, more slowly to appear, which is unfavourable to employment and to the total wage amount : it is all the more so effective as the elasticity of substitution between capital and labour is high and as the labour share in the total production cost (S) is low¹⁸ ;

¹⁷ Even in a more general case where returns to scale are not constant, the elasticity of the labour share to the labour cost only depends on these two variables. Returns to scale (θ) only intervene when one wants to express the elasticity as a function of S_L instead of S because the relationship between these two variables may be written : $S = \frac{\nu}{\theta} \cdot S_L$.

¹⁸ A low labour share in the total labour cost corresponds to a weak utilization of this input. Therefore, substitution in favour of capital to reach a given production level in case of a wage increase is very high when it is measured in proportion of the initial labour volume used.

- two volume effects, equally more slowly to appear and which neutralize each other : the first one at the numerator, unfavourable to employment and to the total wage amount, the second one at the denominator which corresponds to a fall in value-added and, consequently, to a rise of the labour share in value-added ;
- a valorization effect : sell prices of corporations all the more reflect the input price increase as competition is weak on the goods market ; this effect leads to a decrease of the labour share in value-added.

2 Influence of the cost of capital on the distribution of value-added

$$\frac{\partial \ln S_L}{\partial \ln R} = \underbrace{\frac{\partial \ln L}{\partial \ln R}}_{\eta_R^L} - \frac{\partial \ln P}{\partial \ln R} - \underbrace{\frac{\partial \ln Y}{\partial \ln R}}_{\eta_R^Y}$$

$$\Leftrightarrow \frac{\partial \ln S_L}{\partial \ln R} = \underbrace{\eta_R^L}_{\text{Reaction of the total wage bill}} - \underbrace{(1 + \eta_Y^P) \cdot \eta_R^Y}_{\text{Reaction of VA at current prices}} = \underbrace{\eta_R^{-L} + \eta_Y^{-L} \eta_R^Y}_{\substack{>0 \\ \eta_R^L > 0 \text{ ou } < 0}} - \underbrace{(1 + \eta_Y^P) \cdot \eta_R^Y}_{< 0}$$

The unconditional elasticity of employment to the cost of capital (η_R^L), contrary to the elasticity to the labour cost, has an ambiguous sign because the substitution effect (corresponding to η_R^{-L}) and the volume effect (corresponding to $\eta_Y^{-L} \eta_R^Y$) have opposite signs.

As previously, we obtain :

$$\eta_R^{-L} = (1 - S) \cdot \sigma = (1 - \nu \cdot S_L) \cdot \sigma = -\eta_W^{-L} \quad ; \quad \eta_Y^{-L} = 1 \quad \text{et} \quad \eta_R^Y = \frac{\nu}{1 - \nu} \cdot (1 - S) = \frac{1 - S}{S} \cdot \eta_W^Y$$

We can infer :
$$\boxed{\frac{\partial \ln S_L}{\partial \ln R} = -(1 - S) \cdot (1 - \sigma) = -(1 - \nu \cdot S_L) \cdot (1 - \sigma) = -\frac{\partial \ln S_L}{\partial \ln W}}$$

The elasticity to the cost of capital is the opposite of the elasticity of the labour share to the labour cost. Indeed, the sum of the labour share and of the capital share in value-added is equal to one in this model¹⁹.

¹⁹ Even in a model where it would be accounted for taxes and subsidies, this result would be valid if the share of taxes net of subsidies in value-added remained constant.