

Wage resilience in France since the Great Recession

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From 2009 onwards, the slowdown in French real wages was less acute than that in labour productivity, which pulled French firms' margin rate down, falling to its lowest level since 1985. How can this resilience of wages be explained? Econometric models of wages show that it is usual for a slowdown in labour productivity not to be passed on in full to wages, but also that this mechanism is not sufficient in itself to explain the recent disconnection between real wages and productivity. Two potential explanatory hypothesis are sometimes proposed for this disconnection: a change in the labour force structure driven by greater job losses among lower-paid workers, and downward nominal wage rigidities for those employees who have not changed companies.

At the end of 2008 and in 2009, the fall in employment was accompanied by a change in the labour force structure. With a decline in the proportion of less qualified employees, job separation among those earning the lowest wages thus contributed to buoying up the average wage. Excluding employed population structure changes during the crisis, average wage would have grown by 0.7 points less each year between 2009 and 2012. However, the rise in the qualification level of the working population was already making a positive contribution to wages of 0.4 points per year prior to the recession. The effect of the change in composition due to the recession therefore seems quite weak.

In parallel, almost no downward wage rigidities were observed. For those persons remaining in the same firm, a significant amount of wage dropped, while wage freezes are rare. In addition to this, those enterprises that suffered a specific fall in their activity in 2009 adjusted wages downwards and these reductions were greater in scale, on average, than the price rises granted by companies whose activity improved. Nominal rigidities therefore cannot explain the inertia in wage dynamics, as shown by a macroeconomic analysis of wages.

Since 2008, wages have slowed down, but much less than the slowdown in productivity might have suggested

From the end of the 1980s to the 2009 recession, the margin rate¹ of French companies remained remarkably steady, at between 32% and 34% of value added. Since then, it has fallen almost continuously to a trough of 29.7% in 2013, almost 4 points below its 2007 peak (*figure 1a*). This fall was essentially the result of real wage² resilience over a period when productivity gains slowed from their average over the previous two decades.

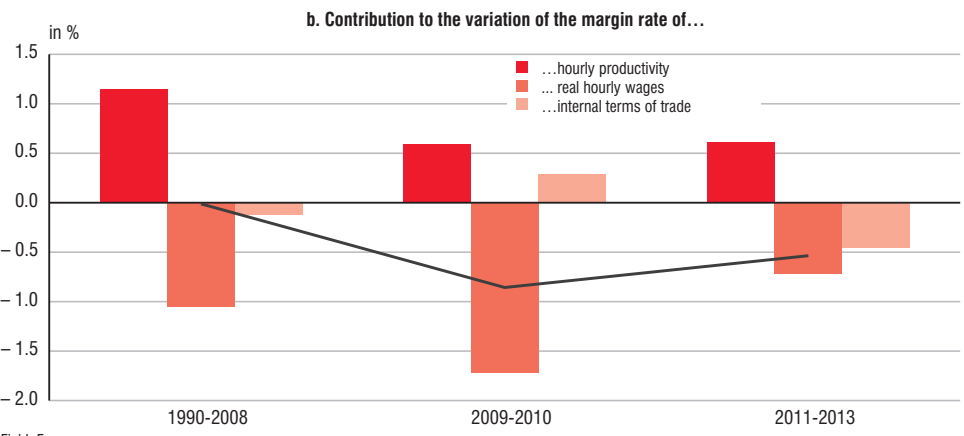
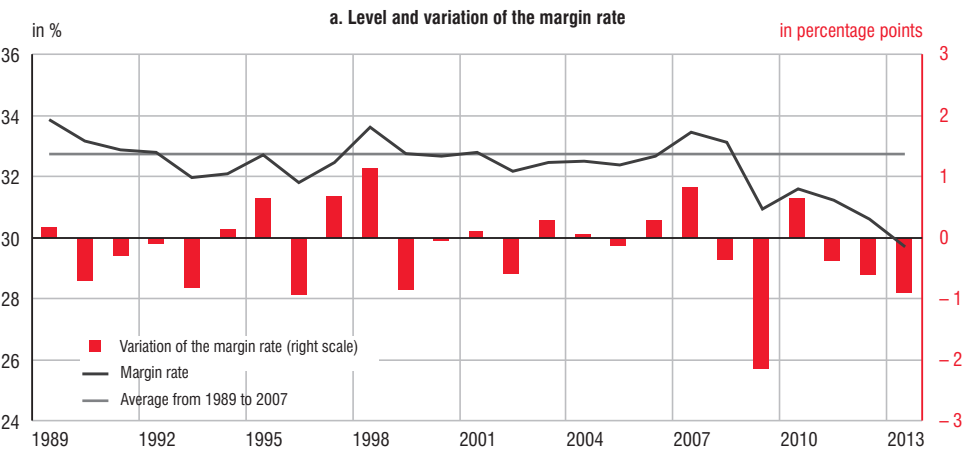
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1. Share of value added retained by companies after payment of wages and taxes net of production-related subsidies.

2. Deflated by consumer prices.

Three sub-periods can be observed (figure 1b). Between 1990 and 2008, real wages and productivity grew at the same rate and the margin rate was stable. In 2009-2010, the fall in inflation was only partly passed on to nominal wages, with the result that real wages accelerated despite the deterioration in the labour market, while productivity gains were slowing down very sharply. The margin rate fell significantly at this time, with internal terms of trade³ limiting this fall slightly. In 2011-2013, real wages slowed down distinctly and their growth was close to that in productivity. Terms of trade had a negative effect this time, however, causing the margin rate to fall again.

1. Margin rate of non-financial corporations

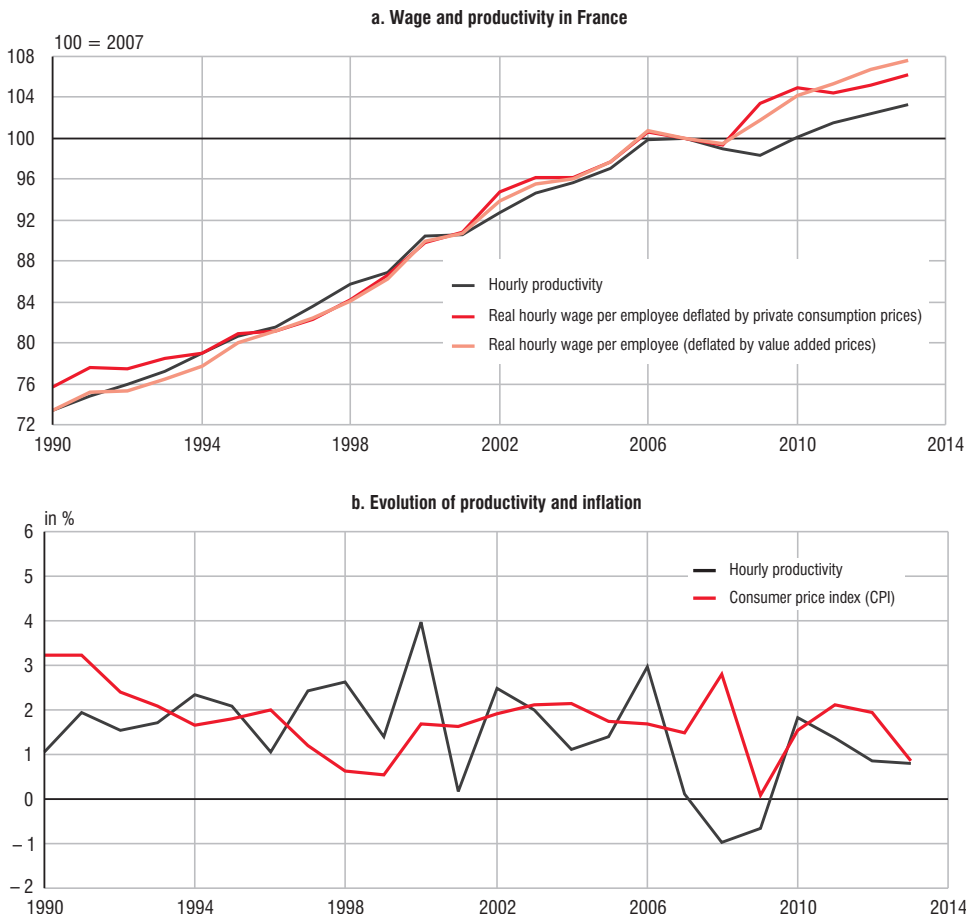


Field: France.
 Note: Margin rate at factor costs (Value added minus taxes and subsidies on production). A negative contribution of real hourly wages means that they have grown.
 Source: Insee, National Accounts.

3. The growth in sale prices (in prices of value added, to be more precise) was less than that in consumer prices on which employees base themselves in wage negotiations to maintain their purchasing power.

While real wages and hourly productivity followed similar trends from 1990 to 2008⁴, the slip in productivity in 2009 was not followed by wages. The modest upturn in 2010-2011 and relative stabilisation of activity in 2012-2013 did not bring convergence between these two values (*figure 2a*): the progression in real wages since 2008 has remained higher than that in productivity. The macro-econometric relation with the main determinants of wages shows the origin of this disconnect (*box 1*). The econometric estimation indicates that spontaneous indexing of wages on productivity is slow, and that even once the adjustment has been made, it is not spontaneously unit indexing: all other things being equal, a slowdown in productivity does not necessarily go hand in hand with an equivalent slowdown in wages. The slowdown in productivity was particularly pronounced in 2009 and 2010, even once corrected for the cycle effect.

2. Wage, productivity and inflation



Field: France.

Note: Margin rate at factor costs (Value added minus taxes and subsidies on production). A negative contribution of real hourly wages means that real hourly wages have grown.

Source: Insee, National accounts.

4. It is noteworthy that before 1990, this relation was not so well verified (see for instance the Value Added Sharing Report, Insee, 2009).

However, in 2009 and above all in 2010, even taking account of this phenomenon, the growth observed in wages remained significantly greater than expected on the basis of the determinants shown by econometric analysis. This gap then remained: from 2011, the growth in real wages was again globally in line with that in its determinants, but without catching up in any way.

2009 was also particular in two ways: for the first time since 1990, inflation was close to zero and hourly productivity had been strictly negative for two years (*figure 2b*). On account of the time taken by any adjustments, these shocks may have had an effect in 2009 as well as being taken into account by companies for their wage negotiations in 2010. The years 2009-2010 were therefore highly particular, but the fact that the misalignment was not absorbed suggests that the analysis has to be extended for the years following 2009.

Why do we have this lasting disconnection between productivity and wages? Could it result from the ongoing adjustment on the labour market? Were there any downward nominal wage rigidities?

Box 1

Macroeconomic modelling of wages corroborates the disconnection in wages in the post-Great Recession period

To confirm the disconnection between wages and their main determinants, a relation must be established to show their variation in relation to all their determinants, which is possible through econometric modelling. We chose to model gross wages in the non-agricultural market sectors on a full-time-equivalent basis (noted W hereafter, and WSG for the super-gross wage) for several reasons. First of all, this contains all the remuneration of employees, including bonuses and overtime. Next, it excludes wages in non-market branches, which are less cyclical and provide less information on the adjustments/shocks that can hit the economy. Finally, the wage in full-time-equivalents corrects a part of the structural change in working time, due to the growth in part-time work over the period, and short-term variations due to the use of flexibility mechanisms like part-time activity.

The traditional determinants of wages are:

- inflation (CPI), representing the price-rise expectations of agents at the point in time when wages are set;
- the unemployment rate (U, in Metropolitan France, as defined by the ILO), reflecting the bargaining power of workers and the degree of labour market tension;
- apparent labour productivity¹ (Π), tracing the trends in productivity and certain cycle effects (in conjunction with the unemployment rate);
- internal terms of trade (ToT), the ratio between the household consumption deflators and value added of the non-agricultural market branches;
- the employer social contribution rate (ESC);
- the minimum wage stimulus (CP), to take into account not only the book effect of a higher actual rise in the minimum wage than its automatic adjustment, but also its knock-on effects beyond the minimum wage itself.

The introduction of a dummy variable in the third quarter of 1982 (d82q3) reflected a period of temporary deindexing, while a step since Q2 1983 (*sup832*) allowed for the change in the wage formation process.

1. More precisely, in the scope of the non-agricultural market sectors, this is productivity on a full-time-equivalent basis, corresponding to the ratio between value added by volume and full-time-equivalent employment.

Box 1 (cont'd)

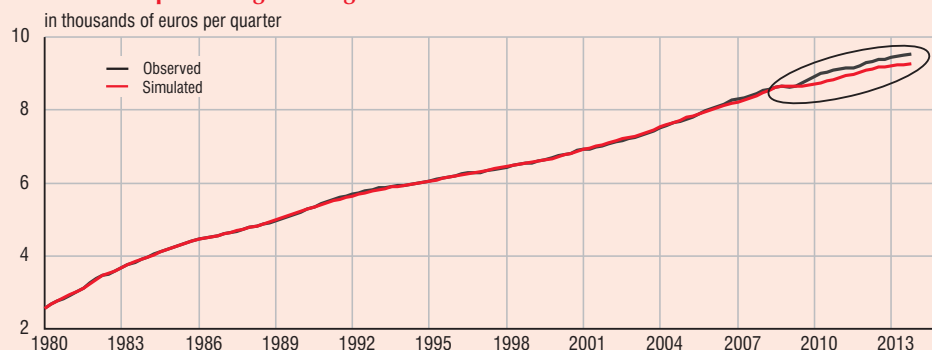
Finally, the modelling included an error-correction term (Wage Setting type) to force unit indexing of wages on prices over time, whereas indexing on a productivity shock is not on a unit basis. A rise of one percentage point in the unemployment rate reduces wages over the long term by 0.7% while a one-point increase in productivity improves wages by 0.46%. The power of the error-correction term, at 10% on a quarterly basis, is significant, confirming the existence of a cointegration relationship; the estimation was performed in one step (cf. tables given in Banerjee, Dolado and Mestre, 1998).

Equation estimated over the period 1980Q1 - 2008Q4, adjusted $R^2 = 94.8\%$ DW = 2.17

$$\Delta \ln W = \begin{aligned} & \frac{-0.50}{(-4.0)} - \frac{0.009 \times d82q3}{(-4.1)} - \frac{0.005 \times \text{sup}832}{(-4.0)} + \frac{0.26 \times \Delta \ln W_{-1}}{(4.0)} + \frac{0.30 \times \Delta_2 \ln CPI}{(6.5)} + \frac{0.12 \times (\Delta \ln \Pi + \Delta \ln \Pi_{-5})}{(4.0)} \\ & - \frac{0.3\% \times (\Delta U - \Delta U_{-1})}{(-2.7)} - \frac{0.17 \times \Delta \ln ToT}{(-3.2)} + \frac{0.06 \times \Delta \ln CP}{(2.2)} - \frac{0.13 \times \Delta \ln(1 + ESC)}{(-2.4)} + \frac{0.12 \times \Delta_2 \ln(1 + ESC)_{-3}}{(2.5)} \\ & - 0.09 \times \left[\ln WSG - \left(\ln CPI - \frac{0.59 \ln ToT}{(*)} + \frac{0.46 \ln \Pi}{(*)} - \frac{0.007 U}{(*)} + \frac{0.20 \ln CP}{(*)} \right) \right]_{-1} \end{aligned}$$

The dynamic simulation of wages was particularly satisfactory over the estimation period. However, it did confirm greater resilience of wages than might be suggested by the usual determinants over the period 2009-2010.

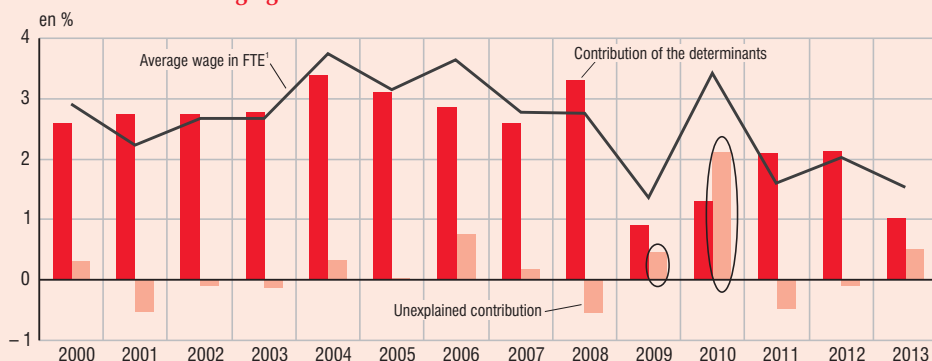
1. Full-time-equivalent gross wage observed and simulated



Field: France, non-agricultural market sector.

Source: Insee, Quarterly Accounts.

2. Contribution to wage growth



1. Full-time-equivalent.

Field: France, non-agricultural market sector.

Source: Insee, Quarterly Accounts.

To understand this disconnection properly, it could be useful to take account of adjustments in payroll linked to employment flows, given that the average wage calculation aggregates very contrasted population groups, especially in terms of income levels and vulnerability to shocks in activity. In times of crisis, exclusion of the lowest wages from the labour market modifies the structure of the labour force and, consequently, the average wage: the next part seeks to quantify this effect.

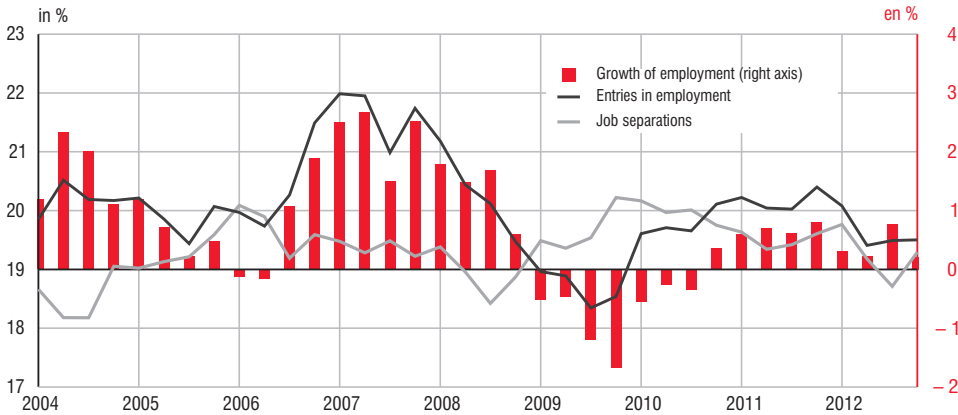
To study wage rigidities, the analysis will then focus on variations from one year to the next in the wages of active persons who have remained in employment in the same firm, using data from the Insee Labour Force Survey and a French firms' administrative data called "Déclarations Annuelles de Données Sociales" (DADS). Strictly speaking, wage rigidity should result in a very low frequency of wage cuts, but the analysis will also be extended to include cases in which the adjustment to a negative shock on the firm is less pronounced than that to a positive shock.

The slowdown in the average wage has been slightly held back by a composition effect of the labour force

Job separations have grown during the crisis...

In France, companies facing a fall in their activity adjust their payroll not only via wages, but also via their volume of labour: first cutting back on recruitments, then laying-off employees. The Great Recession was no exception: the contraction in employment was driven initially by a fall in hires in 2008, followed by a rise in job separations at the end of 2008 (figure 3 and Ananian *et al.*, 2012). Shortly after the upturn in mid-2009, the volume of people entering employment converged towards that of job separations.

3. Contribution to the growth of private payroll employment of entries and separations



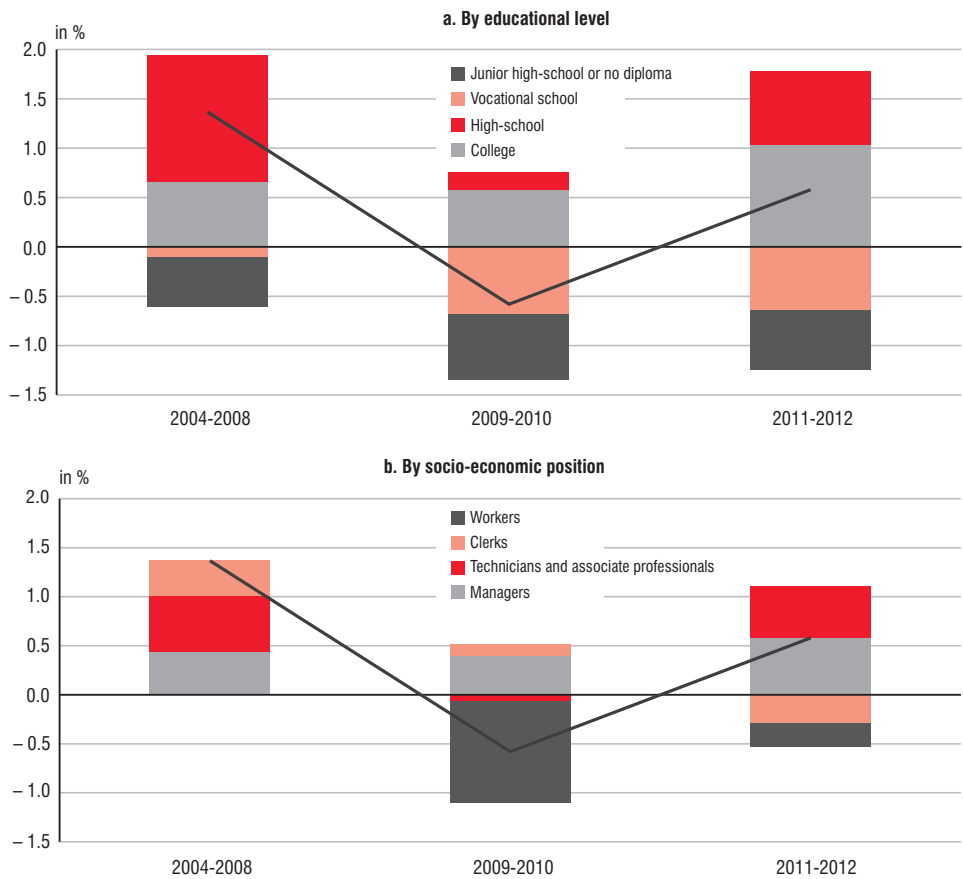
Field: Metropolitan France, private sector workers from 15 to 64 years old.
 Note: cumulation on 4 quarters. Enterings and job leavings in percentage of the employment in the last quarter.
 Source: Insee, Labour Force Survey, author's calculations.

...and slightly modified the composition of the labour force...

The average wage per capita, corresponding to the ratio between payroll and employment, shows changes in the labour force structure. During recessions, the rise in unemployment hits more the less qualified, thereby reducing the proportion of low incomes in wage distribution and mechanically causing a rise in the average wage per capita. These composition effects partly mask real variations in wages on the individual basis. To what extent do composition effects impact wage dynamics during the Great Recession?

At the start of 2009, the number of people leaving a job in a given quarter was greater than the number of people finding employment. Nonetheless, some categories of employees were less affected by the downturn; employment in these categories even increased. Such was the case for the most qualified people with a higher-education diploma and for managers among the socioprofessional categories (figure 4). Conversely, employment among the least qualified and among blue-collar workers fell sharply in 2009 and 2010.

4. Evolution of the employment and contributions by educational level and socio-economic position



Field: Metropolitan France, private sector workers from 15 to 64 years old, excluding self-employed people, farmers, craftspeople, merchants and entrepreneurs.

Note: over the period 2004-2008, private salaried employment under 15 to 64 years (excluding self-employed, etc..) rose 1.3% on average per year. College graduates contributed by 0.7 points to this growth while vocational school attendants weighed up to 0.1.

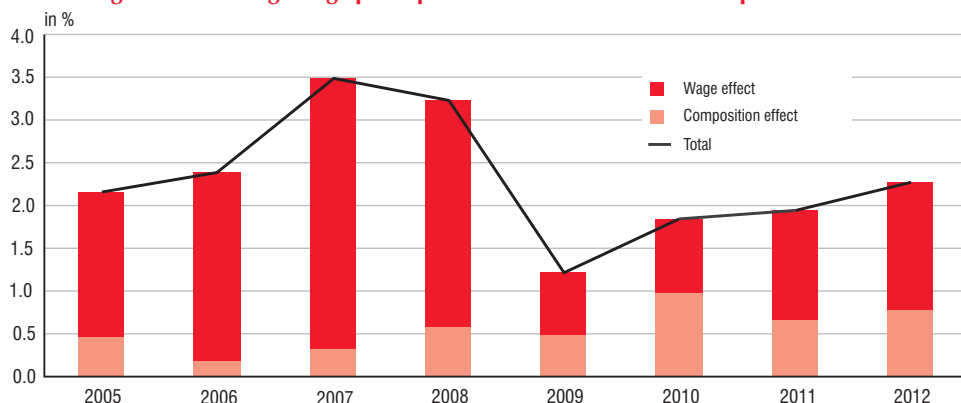
Source: Insee, Labour Force Survey.

...thereby limiting the slowdown in wages

We sought to conduct a direct study of the consequences of structure effects on the average wage of the sample. To do so, we used the Oaxaca decomposition (1973, *box 2*) which, on the basis of a reference year, compares the variation in the observed annual wage and in its counterfactual scenario based on a constant structure of the labour force. The structure of the labour force is subject to long-term trends and short-term shocks, between which a distinction must be made. Over 2004-2012, a first observation is required: the changes in the composition of employees contributed to the rise in average wages each year both before and after the crisis, due to the trend rise in the level of qualification of the labour force (*figure 5*). Between 2005 and 2008, this effect contributed 0.4 points to annual growth in wages. For example, if the structure of the labour force in 2005 had been the same as in 2004, the average wage would have grown by 1.7% instead of 2.2%.

Starting from 2009, the analysis gives rise to two important conclusions. First of all, it shows that the composition effects are a little greater: each year from 2009 onwards, these effects exceeded 0.5 points, with a maximum of 1 point in 2010 in particular (*figure 5*). These composition effects are explained by a stronger rise during the Great Recession in the proportion of managers, the more qualified and seniors (*box 2, figure*). Next, the analysis confirmed the slowdown in the average wage per capita for an unchanged structure (average annual growth of 1.1% in 2009-2012 against 2.4% between 2005 and 2008). All in all, the growth in average wage over the period 2009-2010 came to 1.5% according to the Labour Force Survey, of which 0.7 points from structure effects.

5. Annual growth of average wage per capita and contribution of the composition effect



Field: Metropolitan France, private sector workers from 15 to 64 years old, excluding self-employed people, farmers, craftspeople, merchants and entrepreneurs. Note: Between 2004 and 2005, the average wage increased by 2.2% with 0.5 point from the composition effect. In 2010, the modification of the private employment structure contributed 1 point to the total growth of the average wage.

Source: Insee, Labour Force Survey.

The contribution of the composition effect to growth in wages between 2008 and 2011 was close to that of Verdugo (2013), but the analysis above shows that half of this effect was structural: it was linked to a long-term trend and therefore cannot explain the resilience of wages since 2009⁵. In addition, this rise in the qualification of the labour force is also likely to have buoyed up average productivity.

5. On the basis of a decomposition of the wage distribution in France in groups formed by combining age and qualification levels, Verdugo (2013) explained the whole of the rise in the real average wage by composition effects (rise in the average real wage of 2% overall over 3 years between 2008 and 2011 against -0.8% based on a constant composition of the labour force). Verdugo (2013) also reasoned in real wage terms and seems to explain the correction in prices only by the wage effect. Other differences of less importance are also present: the scope of the analysis and wage variable used were not exactly the same, nor was the structure decomposition method.

Finally, while it does show the sort of composition effect that is usually observed when labour markets deteriorate, this effect is already taken into account in the econometric model through the impact of unemployment on wages⁶. All in all, the effect of the composition of the labour force can only explain a marginal part of the unexpected resilience of real wages in recent years.

Box 2

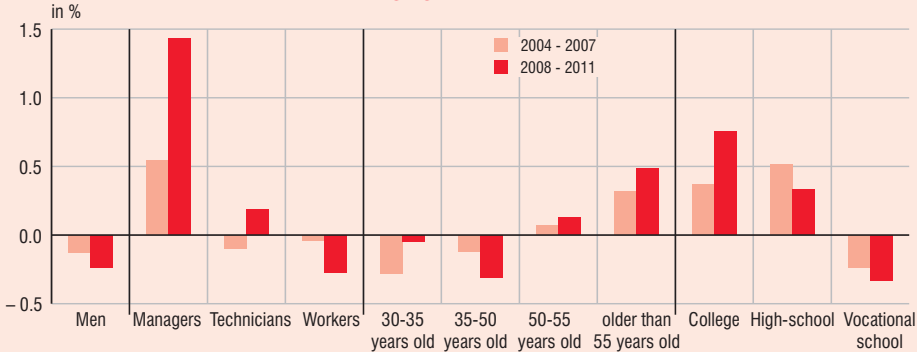
Oaxaca decomposition of average wage growth

This decomposition, which was initially developed to explain differences in wages between different groups (gender or ethnic groups in the United States...), can be adapted to the decomposition of variations in wages over time. To do so, an estimation was made of the logarithm of the wage of individual i (w) using the usual determinants (X), which is to say gender, age in 5 categories (under 30, 30 to 35 years, 35 to 50 years, 50 to 55 years and over 55), socio-economic position (managers, technicians, clerks, workers) and educational level (College, high-school, vocational school, junior high-school or no diploma): $w_i = \beta_o + \sum_k \beta_k X_{i,k} + \epsilon_i$

The estimation was conducted separately for each year. The difference between two years A1 and A2 expresses the growth rate of wages in terms of a composition effect and a wage effect

$$\overline{w}_{A2} - \overline{w}_{A1} = \underbrace{\hat{\beta}_{0,A2} - \hat{\beta}_{0,A1} + \sum_k \overline{X}_{A1,k} (\hat{\beta}_{A2,k} - \hat{\beta}_{A1,k})}_{\text{wage effect}} + \underbrace{\sum_k \hat{\beta}_{A2,k} (\overline{X}_{A2,k} - \overline{X}_{A1,k})}_{\text{composition effect}}$$

Contributions of characteristics to wage growth



Field: Metropolitan France, private sector workers from 15 to 64 years old, excluding self-employed people, farmers, craftspeople, merchants and entrepreneurs.
 Note: between 2004 and 2007, for every 1 point of growth in the average wage over the three years due to the change in the structure of the active population in employment, half came from the rise in the proportion of managers.
 Source: Insee, Labour Force Survey.

Downward nominal wage rigidities: another possible explanation of wage resilience

Another possible explanation of wage resilience over the period of the Great Recession is the presence of wage rigidities, notably downward rigidities. The study then focused on this explanatory factor, seeking first to specify what is meant by wage rigidities.

6. It should be noted that the macroeconomic specification was estimated in a period during which France did not experience any recessionary periods on such a scale. The behaviour of companies towards their workforce may therefore have been particular in recent years.

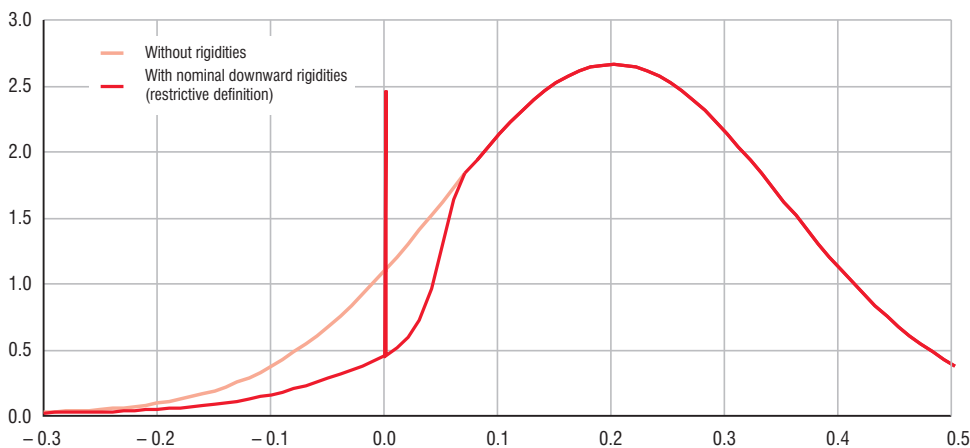
Wages present nominal downward rigidities when individual variations in wages show a high proportion of zero values

Economic theory defines wage rigidities as the result of mechanisms implying that wages change less than they should, whether upwards or downwards. The difficulty therefore consists in determining the counterfactual variations in wages, meaning those that would have been observed in the absence of any rigidity. Two hypotheses are generally applied to these variations: they must be equal to the sum of inflation and the variation in labour productivity and their distribution must be symmetrical [Card and Hyslop, 1996]. It should be noted that these two hypotheses are independent of each other: the distribution of wages variations may be perfectly symmetrical around its median, while resulting in an average value below the sum of inflation and the variation in productivity. When the symmetry hypothesis is not met, we speak more specifically of downward or upward wage rigidities, depending on the direction of the asymmetry. It is a downward wage rigidity that we are seeking to identify more particularly here.

Possible origins of downward nominal wage rigidities may be many and have been abundantly illustrated in the literature: regulations, the existence of a minimum wage or the risk of discouraging employees and of reducing their productivity⁷. One broad category of explanations of these rigidities is based on behavioural models and on the idea that wage policy is the fruit of negotiations between an employer and an employee, the result of which depends on the financial situation of the firm, the overall situation of the employees in the firm and even the level of wages in the economy as a whole⁸.

Whatever the origin of these nominal wage rigidities, a distinction can be made between two more or less restrictive definitions. The first and most restrictive one takes downward rigidities as being situations in which, for a large number of companies, wages cannot be reduced and therefore do not change at all. In this situation, the distribution of variations in wages should show a concentration around zero and an asymmetry with a shortage of negative variations (*figure 6*). The second broader definition characterizes downward nominal wage rigidities as the situation in which responses to productivity or activity shocks are asymmetrical: the drop in wages is less intense when the shock is negative. In both cases, a poor economic outlook is thought to reinforce the average effect of such rigidities on wages.

6. Theoretical nominal distribution of changes in wage with and without rigidities



7. According to efficiency wage theory, due to information asymmetry between employee and employer, it may be in the interest of an employer to set a wage that is higher than the equilibrium level on the labour market in order to encourage employees to be more efficient.

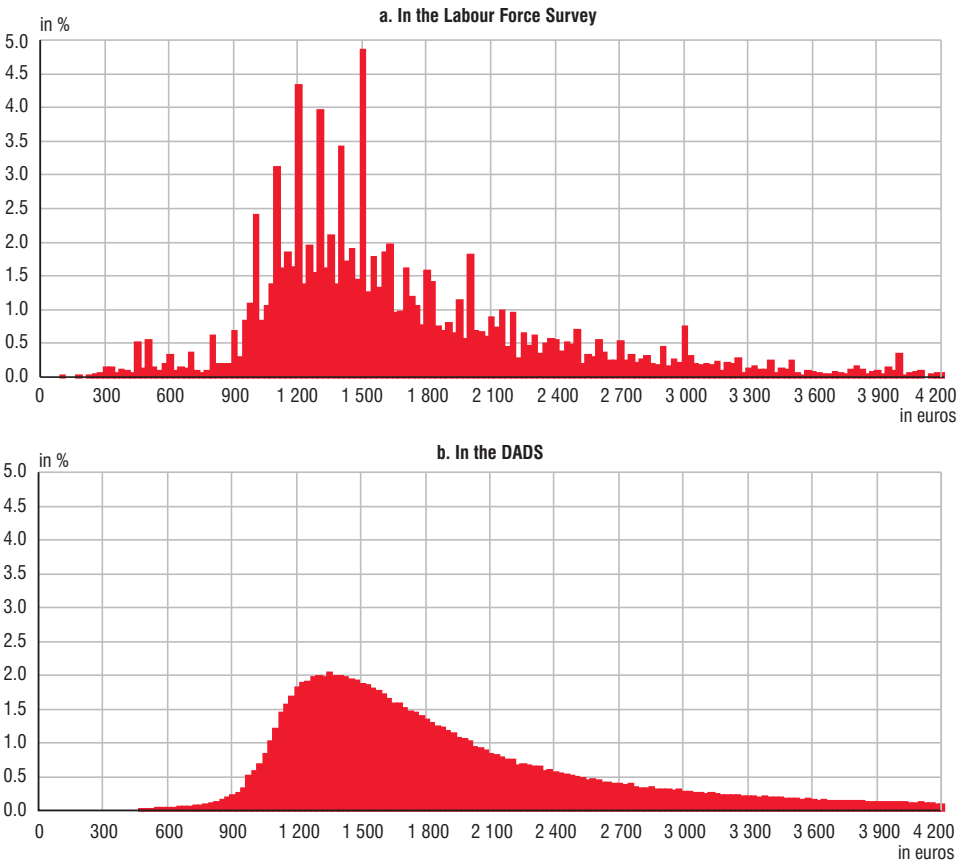
8. See Askenazy et al. (2013) for an overview of the possible origins of wage rigidities.

Biscourp et al. (2003) showed that there were no downward rigidities in France at the end of the 1990s according to the first definition, but that a lesser adjustment in wages was indeed observed as a consequence of negative activity shocks, which corresponds to the second definition. Conversely, Daly et al. (2012), analysing American data, observed a large proportion of wages that were constant from one year to the next and therefore concluded in the existence of downward nominal wage rigidities. Moreover, they showed that this proportion of rigid wages increased during recessions.

In the more restrictive meaning of the term, there were no downward nominal wage rigidities

In order to conduct a more in-depth analysis of downward rigidities in the more restrictive meaning of the term, we look at the proportion of employees who saw no variation in their wage between the beginning and the end of the period and we analyse its change over time. Two data sources are used: the Insee Labour Force Survey and the administrative social data (DADS, box 3); we consider only private-sector employees working full time and remaining in the same establishment between year n-1 and year n.

7. Distribution of the net monthly wage in 2007

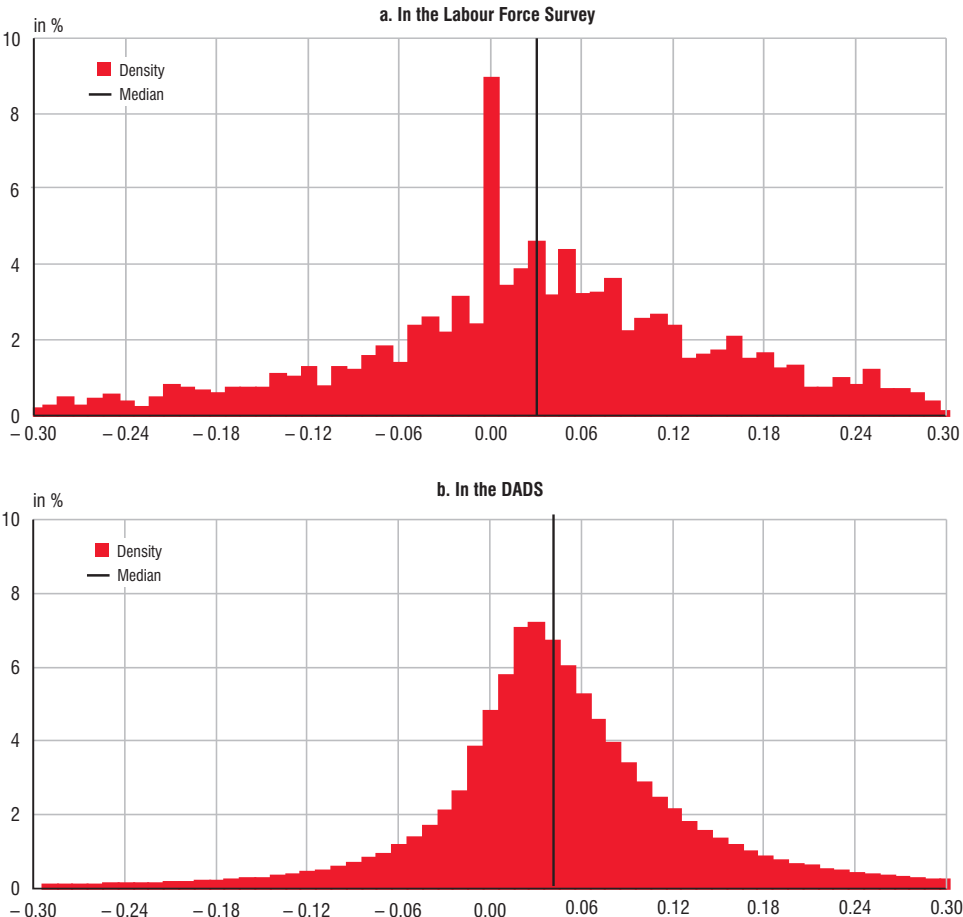


Field: France, full-time employees from the private sector working in the same firm two consecutive years for DADS; full-time private sector workers, from 15 to 64 years old, excluding self-employed people, farmers, craftspeople, merchants and entrepreneurs, and declaring working in the same firm since at least 15 months for Labour Force Survey.
Sources: Insee, Labour Force Survey, DADS.

Wage distributions are globally similar in both sources (*figure 7*). However, the wage distribution in the Labour Force Survey show peaks every hundred euros that are absent from the wage distribution in the DADS. While the DADS contain administrative data that are subject to audits, the Labour Force Survey is declarative in nature. One of the consequences is a tendency among respondents in the survey to round off the wage values they declare.

Among other things, this rounding off behaviour affects measurement of variations in wages in the Labour Force Survey: if the variation is less than one hundred euros, it is possible that the respondent may declare the same rounded off figure twice, in which case the measured variation will be zero. A large proportion of the variations in wages is therefore zero in the Labour Force Survey (*figure 8*), while this is not the case of the DADS: the phenomenon observed in the Labour Force Survey does not necessarily show the existence of downward nominal wage rigidities in the more restrictive sense of the term.

8. Distribution of the wages growth in 2008



Microeconomic sources used in this study

The Insee Labour Force Survey

The quarterly Labour Force Survey is available from Q1 2003 to Q4 2012, and is composed of the responses from six cohorts each quarter. Each cohort, defined by the quarter in which the first interview was conducted, is surveyed for five consecutive quarters, the first and last interviews including a questionnaire about wages.

To obtain variations in the net nominal wage, individual responses from the same cohort are matched at 15-month intervals: 35 re-weighted bases are created in this way, each one covering a period running from quarter q of year n to quarter $q+1$ of year $n+1$ (for $q = 1, 2$ or 3 , otherwise from Q4 of year n to Q1 of year $n+2$). The weightings were recalculated in order to take into account longitudinal nonresponse (see Ananian, Debauche and Prost, 2012).

The population under study comprises private-sector employees aged 15 to 64, excluding the self-employed, farmers, craftspeople, traders and company chiefs. In the second part of the study it was restricted to individuals who stated that they had more than 15 months' seniority in their firm, thereby guaranteeing that only people who had not changed firm over the period under consideration were surveyed.

The wage is the net monthly wage adjusted for nonresponses, including bonuses expressed as a monthly amount.

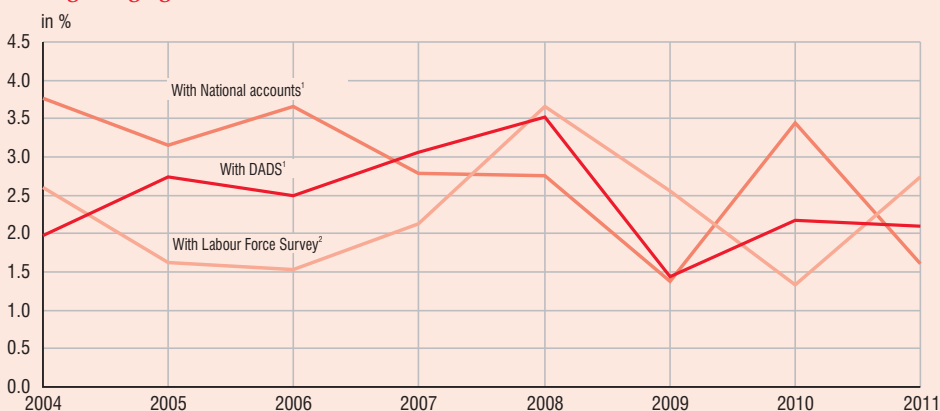
Annual Declaration of Social Data (DADS) and tax returns

We use DADS data matched with tax returns, using the Siren identification system for each firm over the period 2003-2011.

The DADS source provides precise information about wages, hours worked and employment. The results presented below were calculated using the "Posts" file, with a sample draw of one-twelfth. The DADS panel was used for the econometric estimations as it offers the advantage of allowing continuous observation of wages.

The tax returns provide fiscal, financial and business data. More specifically, we use the Ficus database, and then the Fare database from 2007. These data allowed us to extract the value added and revenue variables, but also the business sector (defined by the APE code) of each company. The APE sector variable was backwards-extrapolated to NAF rev.2 in Ficus from 2003 onwards, unlike DADS.

Average wage growth



1. Full-time-equivalent.

2. Full-time.

Field: full-time equivalent average gross wage in non-agricultural market branches for the national accounts; full-time net average wage of employees working in the private sector for the Labour Force survey; full-time equivalent net average wage of employees working in the private market non-agricultural sector for DADS.

Source: Insee, National accounts, Labour Force Survey, DADS.

Box 3 (cont'd)

The scope of the study is restricted to full-time private-sector employees. Our study focuses on the growth in net wages between two years. For this purpose we observe only those people who had remained in the same firm between year $n-1$ and year n , and who had worked in this firm for the whole year, in order to guarantee comparability of wages as measured annually.

The wage variable studied is a net social contribution wage, i.e. after deduction of social security, pension and supplementary insurance contributions, unemployment benefit contributions, and the deductible and non-deductible Generalised Social Contribution and Social Debt Repayment Contribution. In other words, net pay in the DADS corresponds to the net taxable wage minus the non-deductible Generalised Social Contribution and Social Debt Repayment Contribution. As for employee savings, these do not include incentives but do include profit-sharing when it is not invested in a company savings plan.

Growth in wages according to source

Growth in the average wage differed between these two data sources and from the average full-time equivalent wage in the national accounts (figure). These differences can sometimes reach two percentage points, for various reasons. The main reasons are:

- the way staff is assessed: for the national accounts, the average wage per capita corresponds to the ratio between gross payroll and average staff over the year; for the DADS and the Labour Force Survey, wage income corresponds to the ratio between payroll and total employees over the period, i.e. all individuals who have worked in the period, even if only for one hour;
- for the national accounts, the wage is gross, while for DADS and the Labour Force Survey it is net of the employee's social contributions;
- employee savings are included by the national accounts only.

A more detailed analysis of wage growth in DADS confirmed the absence of wage rigidities: like Biscourp et al. (2003) before 2000, we observed that over the period 2003-2010, the proportion of near-zero growth was very low (*figure 9*), with less than 1% of employees each year having a strictly stable wage and around 6% of wages showing growth of less than 0.5% in absolute value. The proportion of drops in wage was always higher than 20% and identical irrespective of firm size. For example, in 2008 the proportion of wages that dropped was 22% in firms with less than 20 employees, and 21% in those with more than 250 employees. 2009 and 2010 reveal the largest proportion of negative wage variations, close to one-third, which indicates wage sensitivity to the economic situation of firms.

9. Distribution of wages evolution between 2003 and 2010

in %

	Near-zero growth ($ \text{rate} < 0,5 \%$)	Negative evolution (rate $< 0 \%$)	Strong decrease (rate $< -5 \%$)
2003	7	28	11
2004	7	26	11
2005	6	23	9
2006	6	26	11
2007	6	22	9
2008	5	21	10
2009	7	33	15
2010	7	30	13

Field: France, full-time employees from the private sector working in the same company two consecutive years.

Note: in 2010, 7 % of employees have had a near-zero growth of their wage, 30 % a negative evolution et 13 % a strong decrease.

Source: Insee, DADS.

A significant proportion of wages drops each year without necessarily any change in working conditions

A part of wages decreases each year in France; wages are therefore not downward⁹ rigid in the most restrictive sense of the term. However, it is worth analysing whether the wage drops measured correspond to changes in the working conditions of employees (drop in the number of hours normally worked, end of night-shift work or Sunday working, etc.), as in that case we could not say there were no rigidities.

The Labour Force Survey contains a rich array of variables on working conditions whereas DADS data do not, and they can be used to test this hypothesis (*figure 10*). In the course of the 2000s, including the years of recession or sluggish growth, less than 15% of wage decreases can be explained by a change in working conditions. More specifically, just 6% of employees reporting a wage decrease had their working hours reduced. It therefore appears that a large share of wage drops came without a change in working conditions, and was probably due to a reduction in the variable part of compensation.

10. Loss of wages and modifications of working conditions

	in %	
	2005-2008	2009-2012
Proportion of employees whose nominal wage has decreased	33.2	37.7
among whom: working hours per week has decreased	5.7	5.8
do not work anymore (or less) on Saturday	2.7	2.5
do not work anymore (or less) on Sunday	1.6	1.8
do not work anymore (or less) during the night	1.5	1.3
increase of the number of "RTT" days that the employee is entitled to	3.6	2.4
increase of the number of days' leave that the employee is entitled to	2.6	2.1
job change compared to the last survey	0.6	0.4
workplace change compared to the last survey	0.2	0.5
profession change	2.8	4.2
at least one of these changes	14.2	13.1

Field: Metropolitan France, full-time private sector employees, from 15 to 64 years old, with fixed-term contracts or permanent contracts, and declaring working in the same company since at least 15 months.

Note: on average, between 2005 and 2008, 33,2% of employees have had a pay cut. Of those, a decline in seven is justified by at least one changing working conditions.

Source: Insee, Labour Force Survey.

During the recession, wages were adjusted both upwards and downwards depending on the activity shock specific to each firm

In this part we look at the broader definition of rigidities: there is downward rigidity when wages react relatively less to a negative shock than to a positive shock for the firm. We measured wage sensitivity to the firm's activity, whether decreasing or increasing.

The estimations were performed at individual level over the period 2003-2011 according to a model presented in *Box 4* which expresses wage growth as a function of the employee's and the firm's characteristics. The impact of the firm's activity on wages was analysed in order to test for the potential existence of an asymmetry in the response of wages.

9. Information about the variable part of wages is not available in DADS. The decreases observed very likely reflect adjustments to this variable part, which can take many forms (bonuses, 13th month, employee savings, etc.).

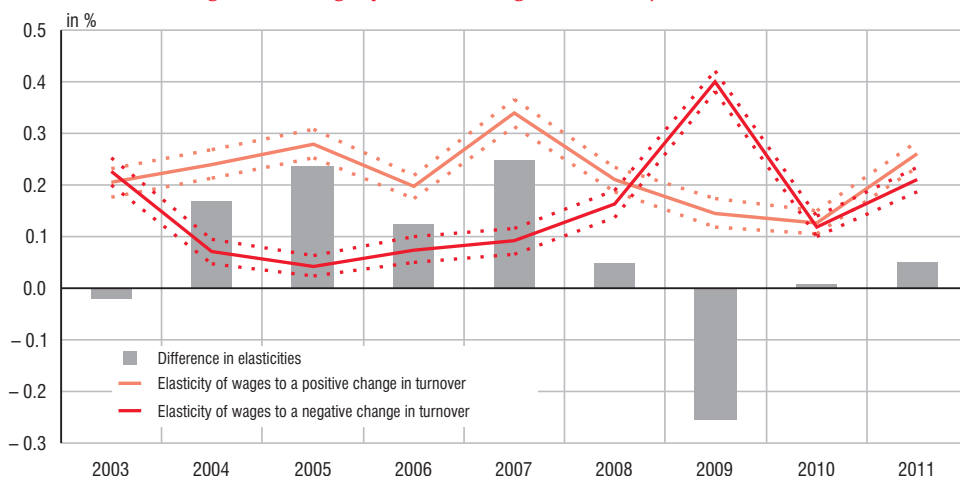
The analysis addressed specific activity shocks and did not include activity shocks that were common to the economy as a whole. Three main conclusions emerge (figure 11):

- **First, the response of wages to a specific activity shock is always very low:** a 10% activity shock for a firm is passed on at a level of 0.2% to its employees' wages in the same year¹⁰;

- **Next, in periods of medium or strong GDP growth, the increase in wages when the firm's activity grows is significantly larger than the decrease when activity falls.** There is therefore an asymmetry in favour of a reaction to a positive shock which characterises relatively stronger downward wage rigidities, highlighted by Biscourp and Fourcade in their studies of the late 1990s.

- **However, in periods of weak GDP growth the asymmetry disappears and is even reversed in 2009, a year of deep recession:** in that year, the wage dropped significantly faster when the firm experienced a negative activity shock than it increased when the firm experienced a positive activity shock. Additionally, the asymmetry in the response of wages to an activity shock disappeared in 2003 and 2008, both years of weak GDP growth, as well as in 2010, the year that followed the Great Recession. It made a timid reappearance in 2011.

11. Variation in wages following a positive or negative activity shock of 10%



Field: France, full-time employees from the private sector working in the same firm two consecutive years.

Note: in 2004, companies that have experienced a decrease (respectively an increase) of 10% of their turnover dropped wages by 0.4% (respectively increased wages by 0.2%), all else being equal.

Coefficients α^+ (pink) and α^- (red) were obtained by the model estimation on the DADS panel data from 2003 to 2011. The dashed lines represent the 95% confidence interval.

Source: Insee, DADS, Ficus, Fare.

10. This low response from wages to an activity shock is present in the works of Biscourp and Fourcade (2003) and is confirmed by other specifications of the estimated model, particularly when activity shocks in previous years are used (Box 4).

Theoretical model and estimation

We attempt to estimate variations in the wages of individuals who were employed in the same firm for two years running by using the methodology developed by Biscourp and Fourcade (2003). More specifically, we studied the asymmetry in the response of wage to an activity shock (measured via turnover, figures). Our focus on the year 2009, which was mainly marked by a demand shock [Cabannes et al., 2013], justifies the choice of this method which does not take account of any supply shocks. The model has a behavioural dimension: how will activity shocks, either upward or downward, influence wage bargaining and hence wage variations? Lastly, we should note that the presence of a simultaneity bias between wage growth and turnover variation is always possible, but this bias has no reason to affect the relation upwards more than downwards [Biscourp and Fourcade, 2003].

To take into account the unobserved heterogeneity of companies, which might skew the results, we used data from the DADS Panel which served to estimate a fixed individual effects model (using the "Within" method). The panel also served to cross-reference the year effect with coefficients α^+ et α^- in order to take account of the differences by year on the coefficient of interest.

The model presented linked wage growth to variations in turnover in the same year. However, part of wage bargaining takes place each year based on the previous year's results. Nonetheless, the model was also tested with turnover time-lagged by one year and the results were equivalent, although with lower significance. It therefore appears that a large part of adjustments is very rapid, occurring within the current year.

The estimated model is as follows:

$$\Delta \ln(w_{ijt}) = (\alpha_i^+ 1_{\Delta \ln(ca_{jt}) > 0} + \alpha_i^- 1_{\Delta \ln(ca_{jt}) < 0}) \cdot 1_t \cdot \Delta \ln(ca_{jt}) + \delta x_{ijt} + \eta_t + e_i + \varepsilon_{ijt}$$

where:

- i represents the employee, j the firm and t the year;
- w represents the net annual wage;
- ca represents the firm's total turnover;
- x represents the other explanatory variables, namely: variation in number of hours worked, gender, socio-occupational group (5 modalities), age, firm size (4 modalities), unemployment rate in the employment area in which the firm is located, sectoral dummies according to NAF rev. 2 (22 categories);
- 1_t year dummies;
- e_i individual fixed effects;
- ε_{ijt} represents the residual of the equation.

The wage rigidities hypothesis involves testing for the difference between the two coefficients α^+ and α^- . Indeed, these two coefficients respectively capture the effect of a positive or negative activity shock for the firm on wage growth. The case where $\alpha^+ > \alpha^-$ corresponds to a relatively stronger downward wage rigidity. The estimates by Biscourp and Fourcade (2003) covering the period 1994-2000 showed this situation, with a significant difference between these two parameters.

We then tested whether an equivalent situation was observed over the period 2003-2011, in particular in 2009 and 2010, the years when the productivity shock did not explain the observed variation in the average wage per capita.

Several robustness tests were carried out and confirmed the findings (see Audenaert et alii, 2014):

- Year-to-year estimates to verify that the coefficients of the control variables were stable over time;
- The use of another economic cycle variable instead of turnover: value added;
- Threshold effects: testing for the reaction to shocks with a higher or lower intensity than the inflation of the previous year, rather than to positive and negative shocks;
- The introduction of time-lagged variables of the variation in activity of companies, in order to take account of a diffuse wage adjustment. By using contemporaneous and time-lagged variables, the results remained the same and we observed that activity shocks had an effect on the determination of wages for the following year, but with less intensity than contemporary shocks.

The weak immediate response of wages to an activity shock, whether positive or negative, could however indicate some wage inertia

This study shows an asymmetry in wage rigidities according to the economic situation. One hypothesis to explain the sensitivity of these rigidities to the cycle can be found in behavioural models: with a general economic context which affects the result of wage bargaining, a sharp deterioration in this context may strengthen the bargaining position of employers rather than the one of workers, mainly because of the rise in unemployment. In the reverse economic situation, the same transmission channels might explain an asymmetry in the reaction of wages the other way round.

However, the contemporaneous wage response to a specific activity shock is particularly low, irrespective of the year. It is possible that part of wage variations are not decided at the firm level but at group level, based on sometimes differing firm turnovers. The analysis should therefore be pursued in order to understand the right level of analysis of wage bargaining. The weak reaction of wages to macroeconomic activity shocks in a given year could also be explained by the length of time wages take to adjust, which may be particularly long, or by constraints linked to branch agreements on wage formation [Avouyi-Dovi et al., 2013]. ■

Further reading

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