Wage Structure in France, 1977–1996

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Introduction

The story of wages and mobility both at the firm and at the worker level is one that until recently could not have been told. In France, matched employer-employee data was collected since the middle of the seventies, but only in the past few years has computer power, storage and ease of use, been enough to allow systematic study of the links between employee and firm characteristics.[1] In the spirit of the other contributions to this book, we will sift the wage structure in France during the twenty years between 1976 and 1996 through the sieve of intra- and inter-firm heterogeneity. The first section describes the data used; section 2 paints the picture of wage movements, while section 3 analyzes wage dispersion and variation through some sample statistics.

Description of the data used: the DADS

The DADS (Déclaration Annuelles de Données Sociales) is a longitudinal matched employer-employee data source collected by INSEE (Institut National de la Statistique et des Etudes Economiques) and maintained in the Division des Revenus/Exploitation des Fichiers Administratifs at INSEE. The data are based on a mandatory employer report of the gross earnings of each employee subject to French payroll taxes. The universe includes all statutory employed persons. Our analysis sample covers all individuals employed in French enterprises who were born in October of even-numbered years, with civil servants excluded. Our analysis sample runs from 1976 through 1996, with 1981, 1983 and 1990 excluded because the extracts from the master payroll records were not built for those years. The initial data set contained 16 millions observations. Each observation corresponds to a unique enterprise-individual-year combination. The observation includes an identifier that corresponds to the employee (called NNI below) and an identifier that corresponds to the enterprise (SIREN). For each observation, we have information on the number of days during the calendar year the individual worked in the establishment, as well as the full-time/part-time/intermittent/at home work-status of the employee. Each observation also includes, in addition to the variables listed above, the sex, month year and place of birth, occupation, total net nominal earnings during the year and annualized gross nominal earnings during the year for the individual, as well as the location and industry of the employing establishment. Nominal values were deflated by the consumer price index, and are written as thousands of 1980 FF.

Observation selection, variable creation, and imputation

An observation is identified by a combination of two identifiers, the firm ID and the person ID. The SIREN number has an internal structure that allows a check for coding errors. But, the NNI number has no such internal control. Although 90% of current DADS information is filed by the responding firm using an electronic medium (tape or diskette), the situation in the eighties was quite different. In that era, INSEE had to perform data entry by key punch from paper forms. Entry errors in the NNI occurred (exchange of two digits of the NNI, error in one of the digits, etc.). This phenomenon is well-known at INSEE but, despite many attempts, no general way of solving this problem was found. As a consequence, some observations have a NNI-year-SIREN combination such that no other observation has the same NNI. As a joint

[1] We gratefully acknowledge the irreplaceable help of the Cornell Restricted Access Data Center without which we would have suffered through our journey across the data, and of John Abowd whose contribution to the data used in this paper, and to all the derivative work engendered by it, can never be overstated.

product, some NNI-SIREN combinations have a unique missing year. Consider now the case of a worker with observations in, say, 1978 and 1980 in the same enterprise (SIREN) but no observation for 1979. If true, this history would mean that the worker was employed until some date in 1978 (depending on the number of days worked, December 31 most likely) and also employed after some date in 1980 (depending on the number of days worked, January 1 most likely) in this firm but not employed at all during year 1979. This is very improbable. In particular, because there is a layoff procedure in France in which workers may be recalled by their firms after some period of unemployment. Suggestions of D. Verger (head of the Division Revenus, in charge of the DADS at the beginning of the nineties) led us to adopt the following solution. Whenever an observation was missing in a given year while the same NNI-SIREN combination exists for the preceding and the following year, we created an observation for the missing year with the same NNI-SIREN combination. (This added 193,148 observations). Earnings are computed as the geometric mean of the preceding and following wages (in real terms). All other variables are taken at their preceding year value.

Because of the 1982 and 1990 Census, the 1981, 1983 and 1990 DADS data were not available. We used the same principle as the one described above to impute missing observations. Hence, imputation was performed only for those individuals that were present in the same firm in 1980 and 1982 or 1982 and 1984 or 1989 and 1991. (This added 759,017 observations to the sample). All variables were imputed as above.

Multiple jobs

Until now, nothing in our procedure rules out multiple job holding. Multiple jobs are difficult to handle in our data because we only have information on the number of days worked in each NNI-year-SIREN combination. Hence, we do not know the starting and the ending date of the spell in that year (for all spells that last less than 360 days, the maximum). To be able to build spells of employment for each worker, we only kept those individuals that never had strictly more than three employers in any year. We computed the number of employers any worker had in a year. We kept in our analysis file those workers who had at most three different employers in each year. At this stage, our sample only contains workers who hold at most three simultaneous jobs in a given year. Then, we computed the sum of all days worked in each year. If this number was strictly larger than 720 days for some year, i.e. the worker necessarily had three simultaneous jobs at some point of this year, we deleted the individual from our sample.

We define a job spell as an uninterrupted period of employment for a given NNI in a given SIREN over, possibly, many years.

Beginning and end of job spells

Since workers can have at most three types of job spells in a year, the possible sequence of job spells are limited. This allows us to compute exactly the beginning and the ending dates of a job spell. First, we identified for each individual the starting and the end years of a job spell. Then, we ordered these sequences. The different cases are the following:

When a job spell starts in year t but ends after December 31 of the same year, we compute the starting date within year t as $(360 - DP_t)/360$ where DP_t denotes the number of days worked in year t .

The end date within year t of a spell is computed symmetrically if the spell started before year t as $(DP_t - 360)/360$.

When a spell starts and ends the same year, and if there is no simultaneous job this year, the spell starts at the beginning of the year (January 1).

When a worker has multiple spells that all start and end the same year, we assume that the sequence of job spells is organized as follows. As long as the sum of days worked in this year is less than or equal to 360, the job spells are put in sequence one after the other, the first one starting January 1. Any spell with a number of days worked, $DP_{1,t}$ such that $DP_{1,t}$ $+DP_{k,t}$ >360 where k=2,3 (the other two potential spells) is also placed January 1. This finishes when the three spells (maximum possible) have been coded.

If a job spell ends in year t but started at some previous date, any other job spell that took place the same year t will start at the end of this spell if the total number of days worked for these two spells is smaller or equal to 360 but starts January 1 otherwise. The third spell, if it exists, is placed after the first of the two spells for which the sum is smaller or equal to 360.

The symmetric principles apply whenever a spell starts in year t and ends after December 31 for all spells that took place in year t .

At the end of this procedure, whenever a worker held three jobs simultaneously (think of a worker with three spells in a given year that all last 200 days), all his (her) observations were deleted. Altogether, both procedures for finding workers holding three simultaneous jobs or more eliminated from the sample 2,223,859 observations that correspond to 115,637 workers.4

Job duration

Individuals fell into two categories with respect to the calculation of job duration: those for whom the first year of observation was in 1976 with 360 worked days in that year and those that appear in the sample after this date or had less than 360 days of work in 1976. For the first category, we estimated the expected length of the in-progress employment spell by regression analysis using a supplementary survey, the 1978 Enquête sur la Structure des Salaires (ESS, Salary Structure Survey). In this survey, respondent establishments provided information on seniority, occupation, date of birth, industry, and work location for a scientific sample of their employees. Using this information, Abowd, Kramarz, and Margolis (1999, AKM hereafter) estimated separate regressions for men and women that we use to predict seniority for the in-progress spells in 1976 with 360 days worked (all coefficients are reported in AKM see in particular the data appendix).

Finally, as in AKM, we eliminated observations for which the logarithm of the real annualized total compensation cost was more than five standard deviations away from its predicted value based on a linear regression model of this variable on sex, region, experience, and education (see once more the data appendix in AKM).

Having done all these selections and imputations, the final data set that we use contains 13,770,082 observations, corresponding to 1,682,080 individuals and 515,557 firms. For international comparison purposes, only observations for full-time jobs where selected. This limits a potential bias since the number of part-time jobs doubled between 1979 and 1996. The share of women in the labor force also increased, by more than 5 percentage points, so we could potentially find different results if we produced separate tables by gender.

The years initially selected were 1977, 1979, 1987, 1989, 1993, 1996, since the sample period goes from 1976 to 1996. As described above, years 1981, 1983 and 1990 are not available, and unfortunately there was a complete overhaul of the computerized programs of the DADS in 1993. This last change made 1993 and 1994 too special to be useable. Hence we selected 1977, 1979, 1989, 1996, and only used 1987 when it was useful to compute ten-year-long differences.

The effect of the sampling scheme on our statistics

Our data only includes workers born on October of even-numbered years. Combined with missing information on the year and month of birth for some observations, the data is constructed so that it represents exactly a 25th of the total number of observations, and hence a 25th of the number of workers.

This sample selection procedure leads to unbiased worker dependent statistics and is perfectly appropriate for worker-centric models (job changes, wages, work experience, seniority, etc.).

Statistics by firm, such as average firm wage or coefficient of variation of wage by firm, is however another matter. In a firm by a firm basis, conditional on the observation of the firm, because the sampling scheme is uniform, all statistics are unbiased. Nevertheless, since the probability that the firm is observed depends on the size of the firm, all statistics that depend on the size of the firm are biased. Hence, for example, the average number of workers per firm as measured in our statistics, divided by the sampling rate of 1/25th, is not an unbiased estimator of the true firm size. The bias depends on the probability of the firm being sampled: the larger the probability that a firm is not sampled, the larger the bias. We use this fact to investigate the bias by calculating some statistics only the larger firms in our sample, namely firms with more than 4 or 10 observations in our sample (the firms in this last category have on average more than 250 employees).

Let $i \in I$ be an index of the firms in our sample industries, and X_i the number of observations for firm i (a random variable). Let N_i be the size of the firm, p the sampling rate (in our case, $p = 1/25$), and q_N the probability that a given firm is of size N. We observe X_i only when the number of observations for that firm is non-zero; this happens with probability $1-(1-p)^{N_i}$. A firm of ten employees has a probability of one in three of being observed, a firm of twenty more than one-half. The true average firm size is $\frac{E(X_i)}{p}$ where the expectation is taken over I, but we observe only $E(X_i | X_i > 0) = \frac{E(X_i)}{P(X_i > 0)}$. Given the distribution of firm sizes, the bias is thus positively related to $P(X_i = 0) = \sum_n q_n (1-p)^n$. For a given distribution of firm sizes, this bias is constant across time. Other firm-level sample statistics, such as turnover, are also affected, but the bias can be shown to be constant if the size structure of firms is constant. These matters will be fully discussed elsewhere.

Wage institutions in France, a bird's eye view

The minimum wage

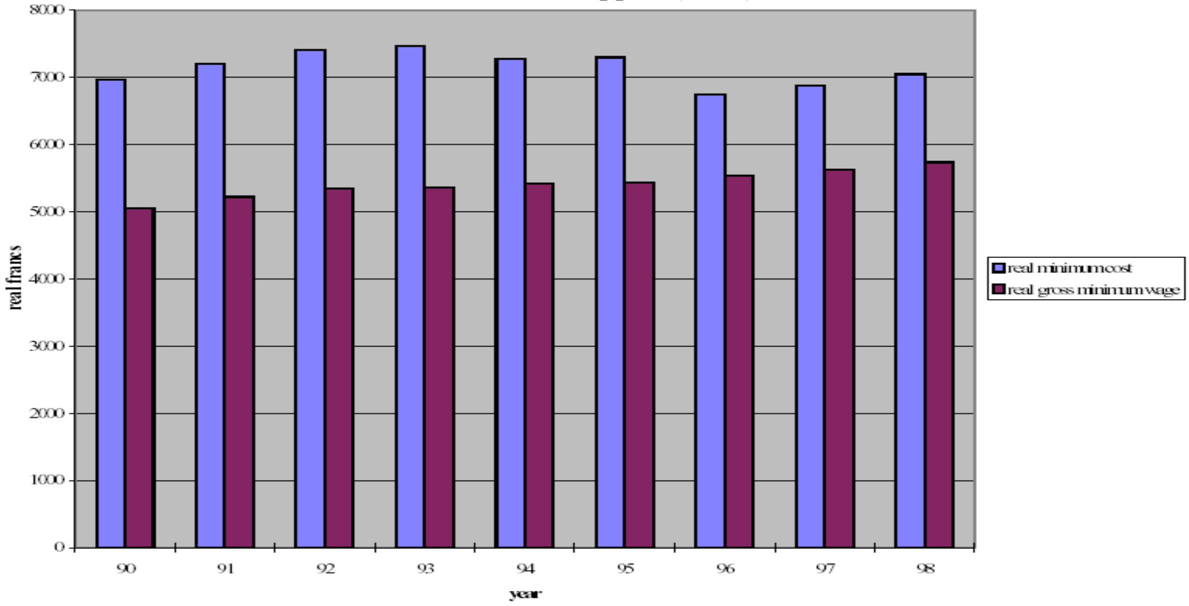
Since 1951, French industry has been subject to a national minimum wage (called the SMIC since the revisions to the relevant law in 1971) that is indexed to the rate of change in consumer prices and to the average blue collar wage rate.[2]

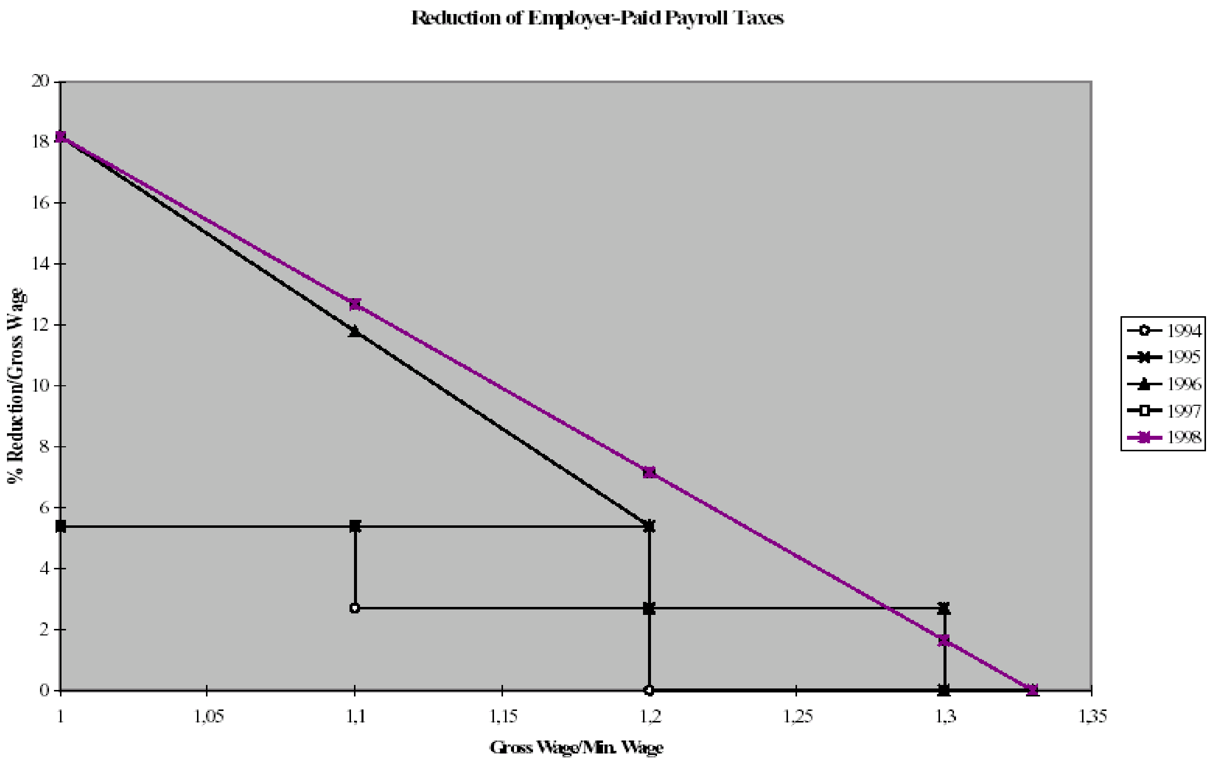
Figure A.1 depicts the changes in the (real) minima over the sample period (with the minimum wage in the US as a useful comparison). The French SMIC started its very sharp increase in the beginning of the seventies. In the rest of the sample period, the French SMIC continued its increase, partly mandated by one-shot increases and partly by formulaic increases. Note however that minimum wage rates delivered to the worker do not present the

[2] This section and the following borrow heavily from work by Abowd et al. (2004).

firm's minimum labor costs. Indeed, the structure of payroll taxes that augment wages as a part of labor cost has changed in France. After a constant increase in payroll tax rates from the early 1970s, they dropped sharply in 1994 and even more so in the ensuing years (see Kramarz and Philippon, 1999) as a part of an explicit program to lower total labor costs for workers at the minimum wage.

Figures 1a and 1b: Changes in the Real Minimum Cost and the Real Minimum Wage, from Kramarz and Philippon (2001)





Wage bargaining, the French way

During the sample period, the French labor market institutions were also characterized by important changes in the bargaining institutions and environment. In the 1970s, centralized collective bargaining agreements (*conventions collectives de branches*) were the basic elements of the negotiation process in France. The different industrial sectors had collective agreements that were negotiated by groups of unions and employer associations. These agreements were binding on the negotiating parties. The complete agreement was then typically extended to cover the entire industry (or region) by the Ministry of Labor and was then made binding on workers and firms that were not party to the original negotiation. More than 95% of the work force was covered by these collective bargaining agreements at the end of the 1980s, while union membership was approximately 10%. The collective agreements specified a set of minimum wages and wage progressions for the occupational categories covered by the negotiations (sometimes called a wage grid). But, beginning in 1982, the "*lois Auroux*" (a set of revisions to the body of labor law named after the Minister of Labor at the time) required firms with at least 50 employees to negotiate firm-level collective agreements (*accords d'entreprise*). Although firms were explicitly not obligated to conclude an agreement, 65% of the work force were employed at establishments or businesses where firm-level negotiations occurred either through the union delegates or some other worker representative. Among this 65% of the work force, only three-quarters of the workers ended up with an agreement as a result of these negotiations. Finally, the percentage of the work force covered by some establishment or firm-level agreement on wages is approximately 40% in 1992. The law required that the firm-level agreements could only improve the conditions stated in the industrial agreement, so that, over time, the firm-level agreements have become more important for wage determination than the industry agreements. Although more than 90% of French workers are covered by industrial agreements throughout our analysis period (1976-1996), firm-level negotiations outpaced renegotiations of industry-wide agreements in most industries. The regular increases in the national minimum wage (in particular those driven by the indexation to the average blue-collar wage rate) resulted in the lowest categories on the collective pay scales in most industry contracts for most occupations being below the national minimum by the beginning of the 1990s. When this occurs, it is the national minimum wage, and not the collectively bargained wage, that binds.

Product markets

Our sample period for France is not one of intense product market competition. Even though France, pushed by European institutions, started in the 1990s to deregulate some industries, the process is far from completion. During our sample period, near monopolies operated in many industries. Air France (airlines), Seita (cigarettes), Electricité de France (energy), and Gaz de France (energy) are all examples of firms in which the State has a majority equity stake and there are no local competitors (even though France imports cigarettes and allows foreign airlines to land in France). Entry into these industries was, and still is, heavily regulated. Surprisingly, it is also the case in many other apparently competitive industries, such as the retail trade, that entry regulations loomed and are still very important (see Bertrand and Kramarz, 2002 for the detrimental effect of the *loi Royer* on employment in the retail trade). Djankov et al. (2000) have also shown that entry regulations, as measured by requirements to starting a new business in France, are common, time-consuming and costly. This startup process takes 66 days and 16 different legal and administrative steps in France and only 7 days and 4 steps in the United States.

Macroeconomic conditions

During our sample period the economy has lived through several cycles, though the labor market has not (for this subsection, see Table A.1). The first years in our sample follow the end of *Trente Glorieuses*, the 30 years of golden prosperity after World War II. Unemployment increased steadily from around 3% in the beginning of the 70's to 10% in

1985. The years between 1987 and 1989 are two years were the economy returned to growth years (incidentally, 1989 and 1990 are exceptionally good wine years), and the only ones in which unemployment declined significantly. Growth then drastically slowed and unemployment soon increased, reaching 12% in 1996, the last year of our sample.

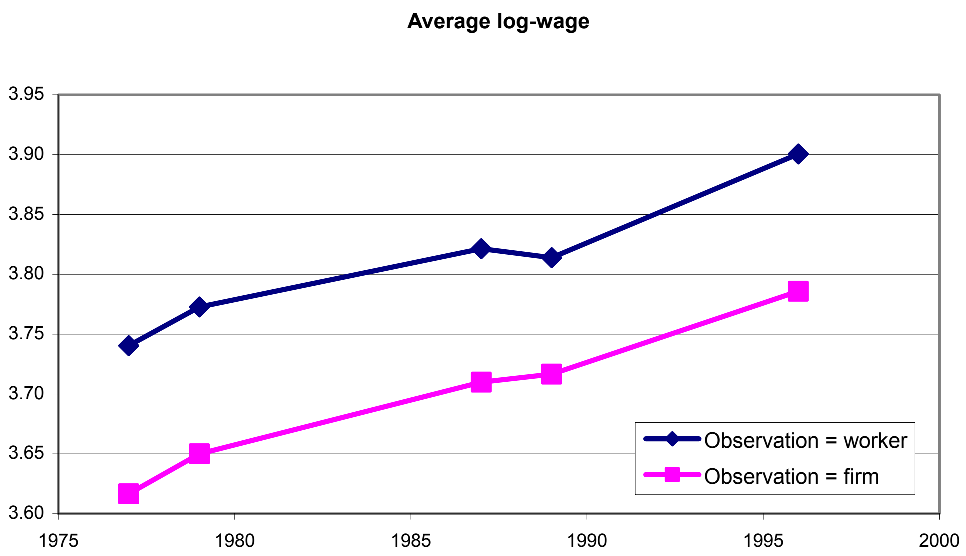
The heterogeneity of wages

We will start first by describing some sample wage statistics before delving into the depths of the distributions.

Levels

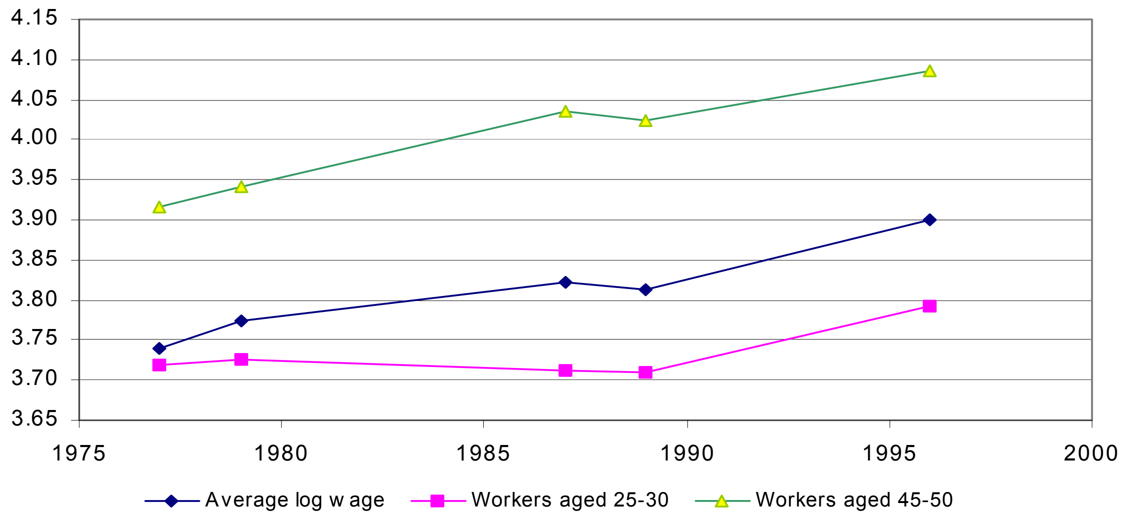
The central feature of the wages is that in real terms wages increase by around 0.8% per year. The increase is higher for the firm average wage than for the worker average wage. Only when the unemployment rate decreased by a bit more than 1% between 1987 and 1989 did real wages fall.

Figure 2a: Average log-wage across workers or firms



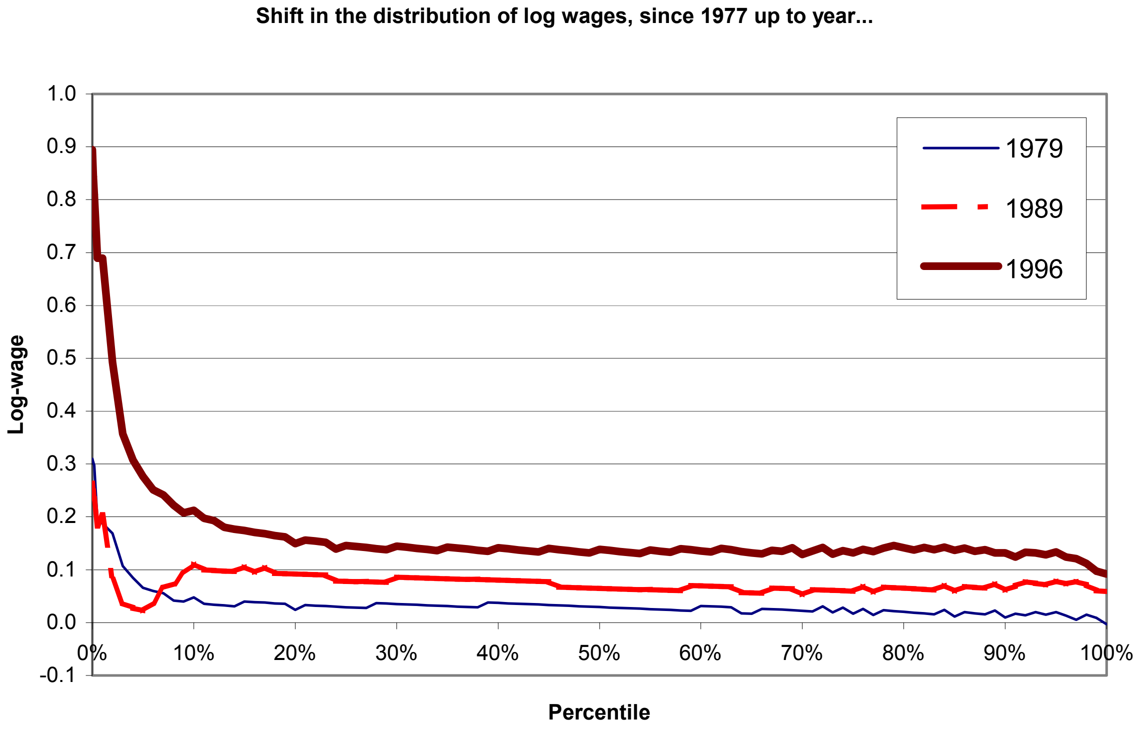
Wage increases were not shared equally between different categories of workers. Only from 1989 to 1996 did wages for young workers (25 to 30) increase, whereas for workers aged between 45 and 50 the increase was high at around 1% per year (except for the 1987-1989 period). Youth unemployment was an increasing problem during the whole period, and may have held entry wages down during that period.

Figure 2b: Average log-wage and age:



This increase in the real wage is also not constant across the wages. The wages on the middle half of the distribution of wages increased by 0.7% by year on average though the average wage increased by 0.8%. The difference is explained by the higher increase in the lower wages, 1.0% per year. In figure 3 we plot the increase in the log wage between 1977 and several years, at each percentile of the distribution. Three results are striking between 1977 and 1996: between for wages between percentiles 20% and 95%: the increase in wages is constant, wage increases were very high for the bottom part of the distribution, while top wages only received a below average increase. Wages were compressed from below while most of the rest of the distribution is unaffected: the minimum wage was increased in 1991 and 1992, while payroll taxes were reduced starting in 1994. The firms had clear incentives to compress the wages around the minimum wage, so as to benefit from the threshold based exemptions. Because of this reduction in labor cost, turnover was also lower for low wage workers.

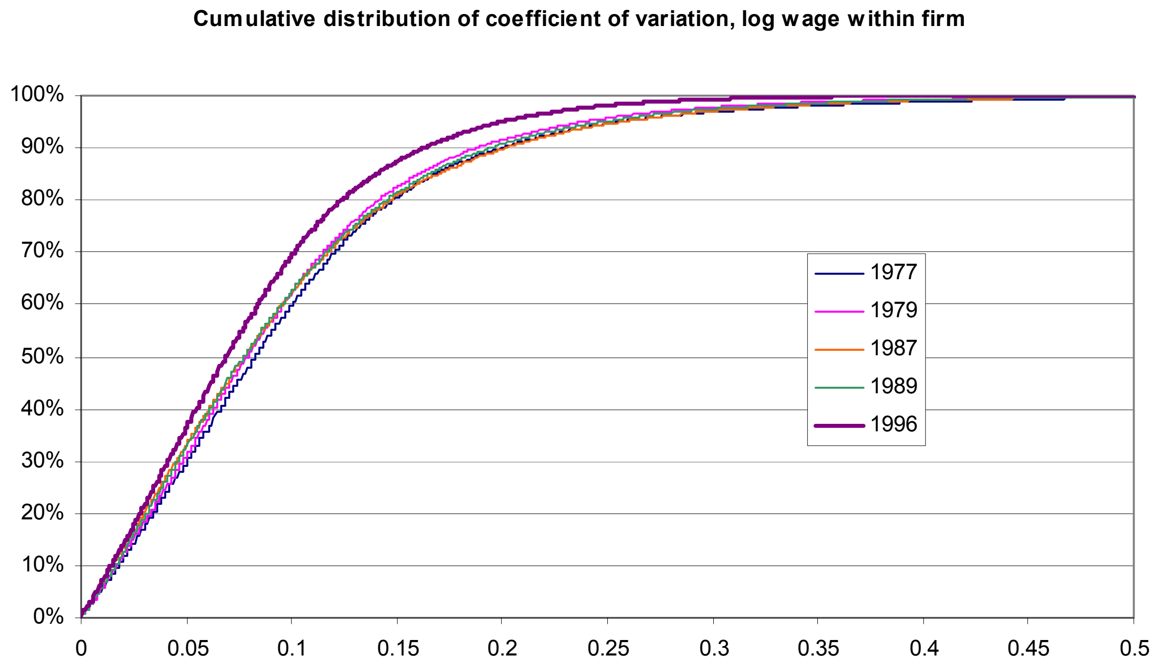
Figure 3 : Percentile-based increase in wages



Variance

Another striking feature in the data is the stability of the wage distribution within firms for most of our sample period. Proof of this is found in the distribution of the coefficient of variation (CV) of wages (figure 4) and in the table 2A. Between 1979 and 1989 the CV of log wages was constant at around 9.5%, after a small decline at the beginning of the period. The real change occurs between 1989 and 1996, where the CV decreased to 8.1%. The CV of wages (as opposed to log wages) also experiences this stability followed by a strong decrease.

Figure 4: Within-firm wage variance

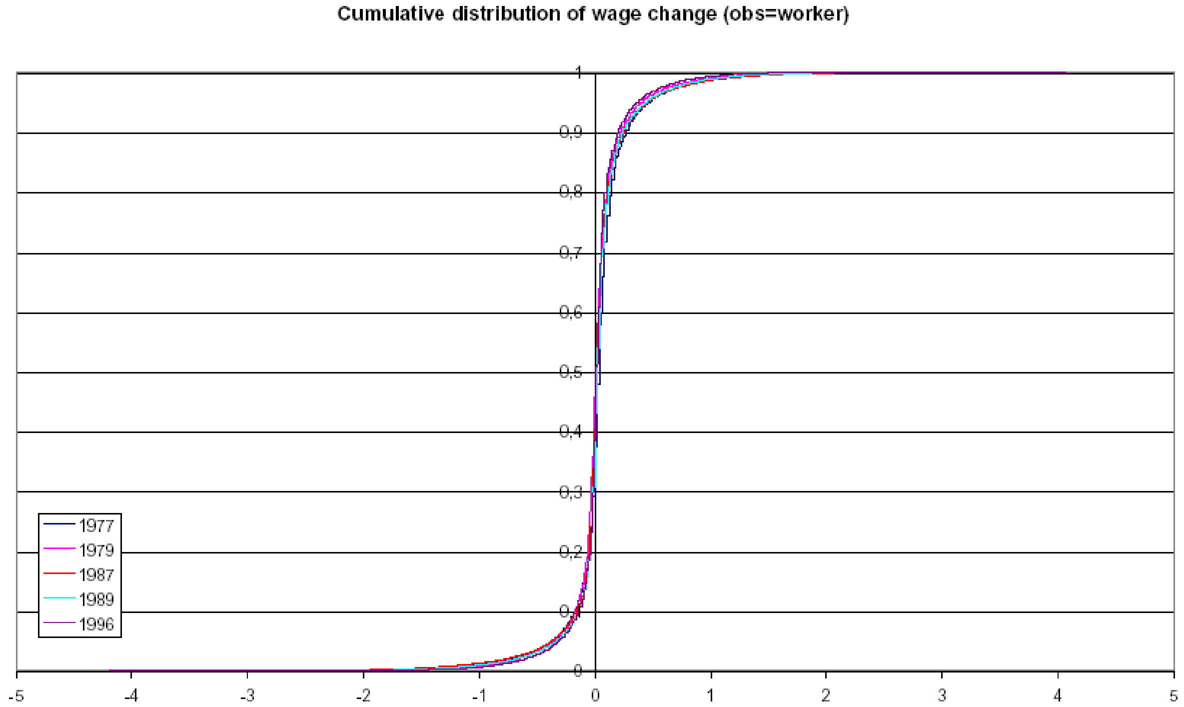


At the end of our sample period, between 1993 and 1996, the large decrease in payroll taxes, concentrated on the lower end of the distribution of wages (up to 1.33 of the minimum wage) had a very sizeable impact on the labor market. Kramarz and Philippon (2001) … estimate that the decrease in payroll taxes had a positive impact on the rate of firing of low wage workers. This cannot be confirmed however through the turnover statistics (table 4A): the exit rate is constant between 1987 and 1996. The concentration of wages however was altered, as we saw above.

Earnings mobility

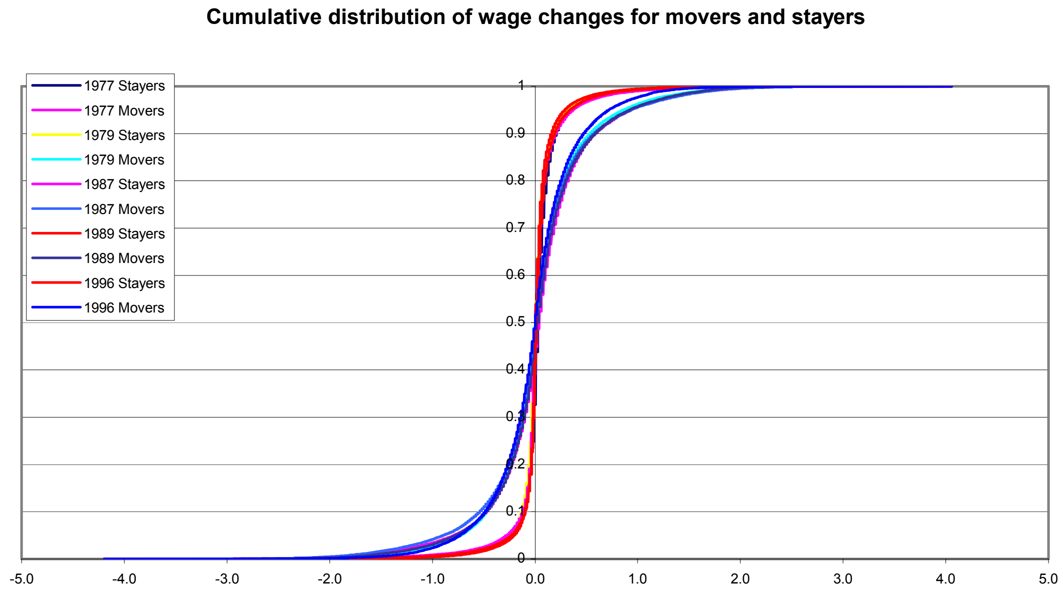
Buchinsky et al. (2003), while studying earnings mobility with a variety of different statistics, find that between 1971 and 1977 mobility strongly declined in France, and while the mobility stayed very low, no clear pattern could be seen afterwards. In our data, the distribution of wage changes is remarkably stable throughout our entire sample period, as can be seen from the figure 5a below.

Figure 5a: Log wage change



Furthermore, the distribution of wage changes for movers and stayers is also very stable during all our sample period: wage change for movers is much more dispersed, both in the upper part of the distribution and in the bottom part.

Figure 5b : wage change for movers and for stayers



Turnover

The relationship between job change and wage is studied by Abowd, Kramarz and Roux (2004) in a model of joint mobility and wages estimated firm by firm. They show that 30% of the variance is explained by a simple opposition between firms that have high-turnover – low wage – high returns to seniority and firms that have low-turnover – high wage – low returns to seniority.

Table 1: Correlation at the firm level between average wage and…

	1977	1979	1987	1989	1993	1996
…exit rate	-0.12	-0.14	-0.11	-0.13	-0.10	-0.05
…entry rate	-0.15	-0.17	-0.16	-0.16	-0.11	-0.12

Correlation between the average wage in the firm and exit and entry rates is consistently negative throughout the years. Hence, it confirms the above findings of Abowd, Kramarz, and Roux.

Turnover is mainly pro-cyclical in France (Dares 2003). However the interaction of different effects renders interpretation difficult. Abowd et al. (1999) with a different data set, conclude that:

> Adjusted establishment growth rates are procyclical (negatively related to changes in the unemployment ratio) with an elasticity of -0.14 (0.02 robust standard error). The employment entry rate is weakly countercyclical with an elasticity of 0.09 (0.04). The employment exit rate is strongly countercyclical with an elasticity of 0.23 (0.06) and the involuntary exit rate displays essentially identical countercyclicality. The employment quit rate is weakly countercyclical with an elasticity of 0.02 (0.004). Finally, the retirement rate is procyclical with an elasticity of -0.22 (0.06).

In our data, turnover is remarkably higher in 1977 than for all other years in our sample period. For example for our sample of large firms, the entry rate (the proportion of new workers in each firm) was above 30% in 1977 but was at or below 26% for all the other years in our sample.

The entry- and exit-rates in 1977 are high throughout the entire distribution, as can be seen in figures 6a-c and 7. This year excepted, the distribution of exit and entry rates is very similar from one year to the other. We can observe that a positive number of firms exhibit exit rates of one (the firm is destroyed). On average, 3% of the firms close every year.

Figure 6a : Average turnover

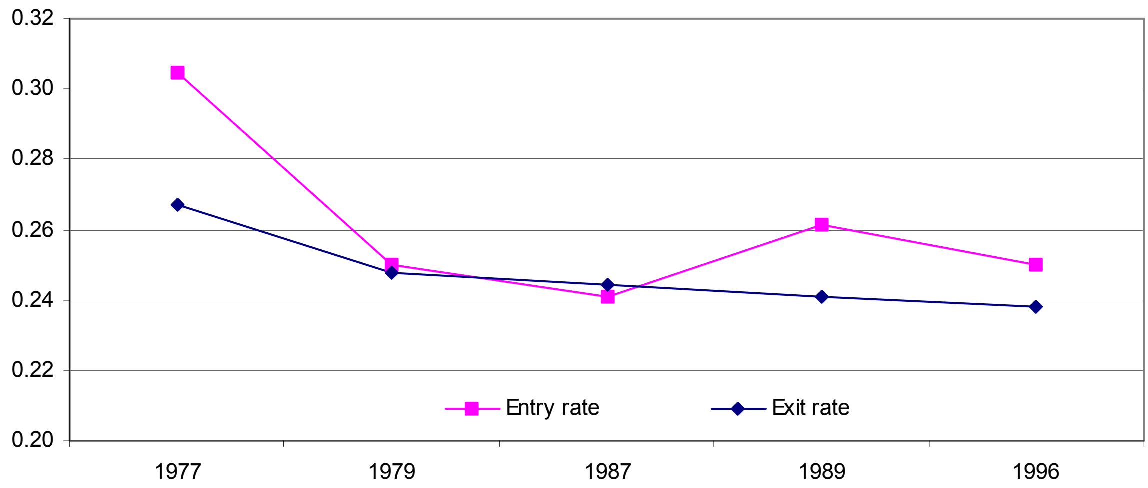


Figure 6b : Distribution of average firm exit rates

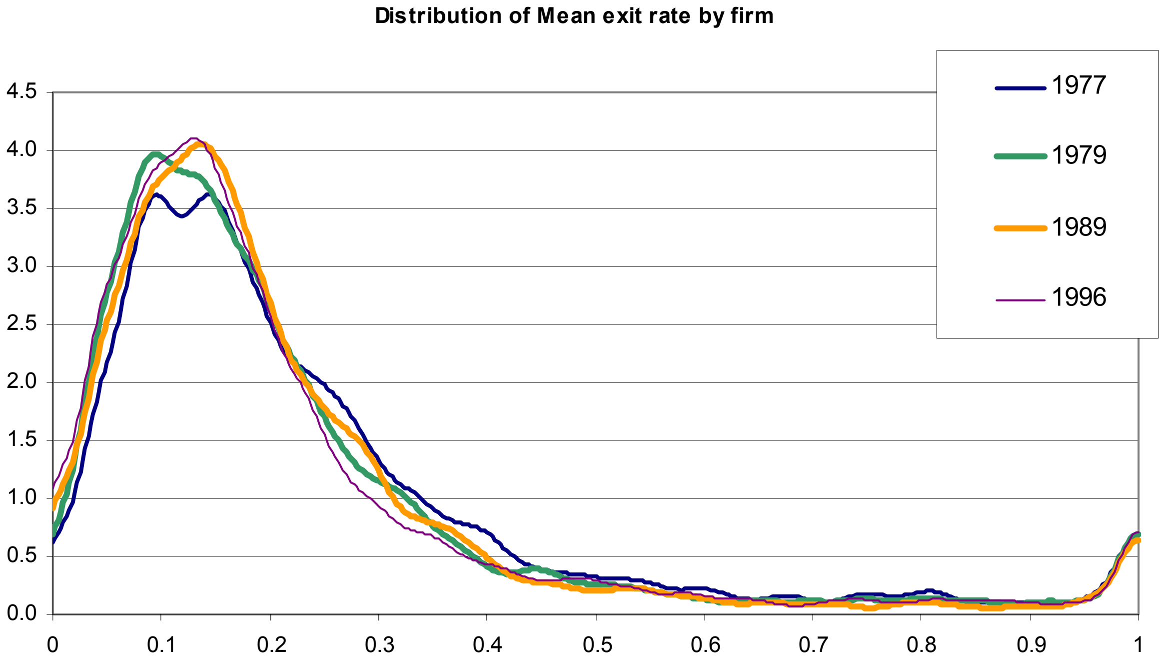


Figure 6c : Average exit rates across the distribution of firms

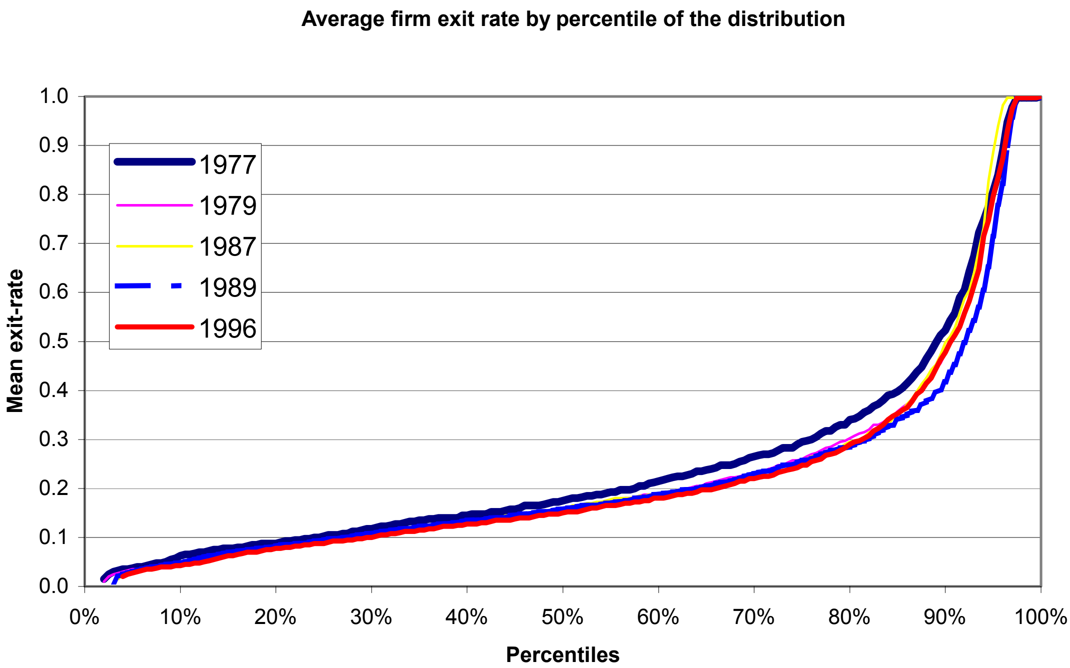


Figure 7 : Distribution of average firm entry rates

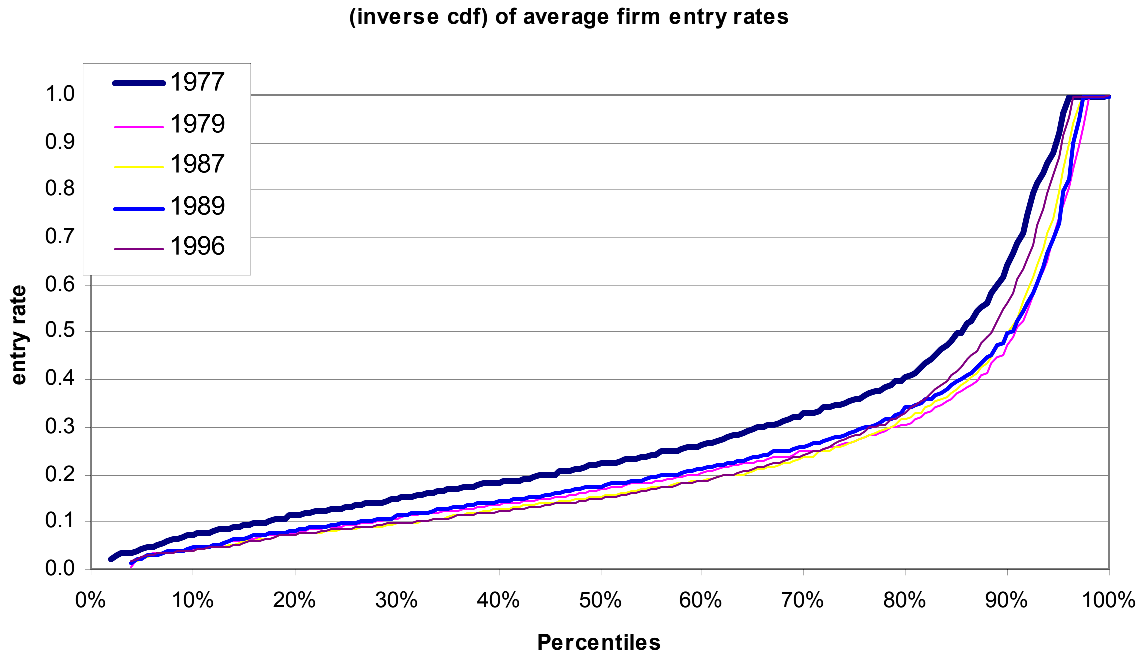


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Table A.1 : Macroeconomic Conditions

	Unemployment rate, ILO	GDP	GDP 5 years	Percentage of part time workers	Percentage of women in labour force
1970	2,5	5,5%			35,7
1971	2,7	4,8%		5,8	36,1
1972	2,8	4,4%		5,8	36,5
1973	2,7	5,4%		5,9	36,8
1974	2,8	3,1%	4,6%	5,9	37,0
1975	4,1	-0,3%	3,5%	8,1	37,4
1976	4,5	4,2%	3,4%	8,1	38,0
1977	**5,0**	**3,2%**	**3,1%**	**8,7**	**38,6**
1978	5,3	3,4%	2,7%	7,9	39,0
1979	**5,9**	**3,3%**	**2,8%**	**8,2**	**39,5**
1980	6,3	1,6%	3,1%	8,3	39,9
1981	7,4	1,2%	2,5%	8,4	40,3
1982	8,1	2,6%	2,4%	9,2	40,8
1983	8,4	1,5%	2,1%	9,7	41,3
1984	9,8	1,6%	1,7%	10,3	41,8
1985	10,2	1,5%	1,7%	11,0	42,2
1986	10,4	2,4%	1,9%	11,8	42,5
1987	**10,5**	**2,5%**	**1,9%**	**11,8**	**43,0**
1988	10,0	4,6%	2,5%	12,1	43,1
1989	**9,4**	**4,2%**	**3,0%**	**12,1**	**43,3**
1990	8,9	2,6%	3,3%	12,0	43,4
1991	9,3	1,0%	3,0%	12,0	43,7
1992	10,2	1,5%	2,8%	12,7	44,2
1993	11,5	-0,9%	1,7%	13,9	44,5
1994	12,1	2,1%	1,2%	14,8	44,9
1995	11,4	1,7%	1,1%	15,6	45,0
1996	**12,0**	**1,1%**	**1,1%**	**16,0**	**45,2**
1997	12,1	1,9%	1,2%	16,8	45,4
1998	11,5	3,4%	2,0%	17,2	45,6
1999	10,8	3,2%	2,3%	17,3	45,7
2000	9,5	3,8%	2,7%	16,9	45,8
2001	8,7	2,1%	2,9%	16,4	45,9
2002	9,0	1,2%	2,7%	16,2	46,1

Figure A.1: Real minimum wage in France and in the United States (=100 in 1960)

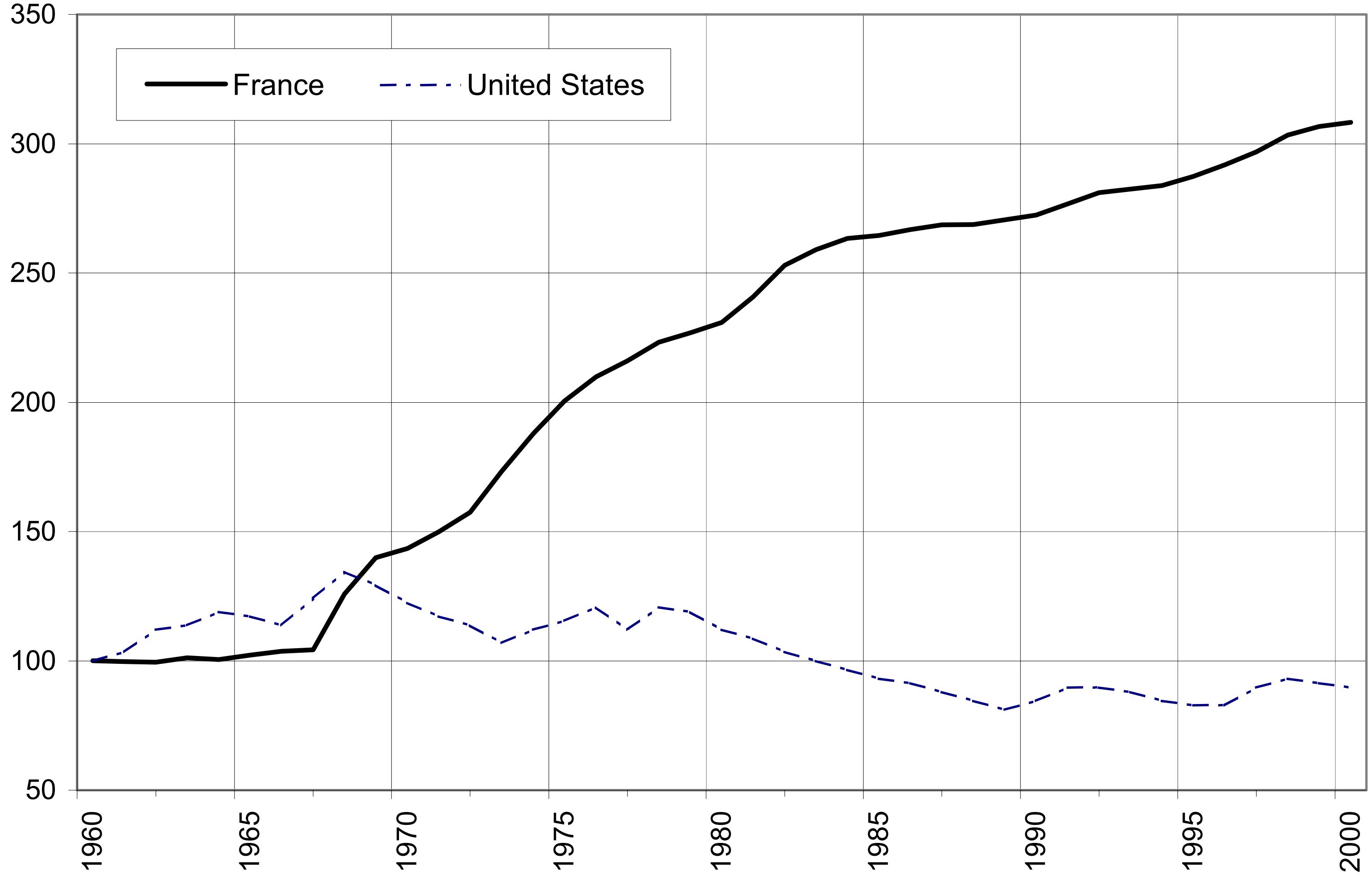
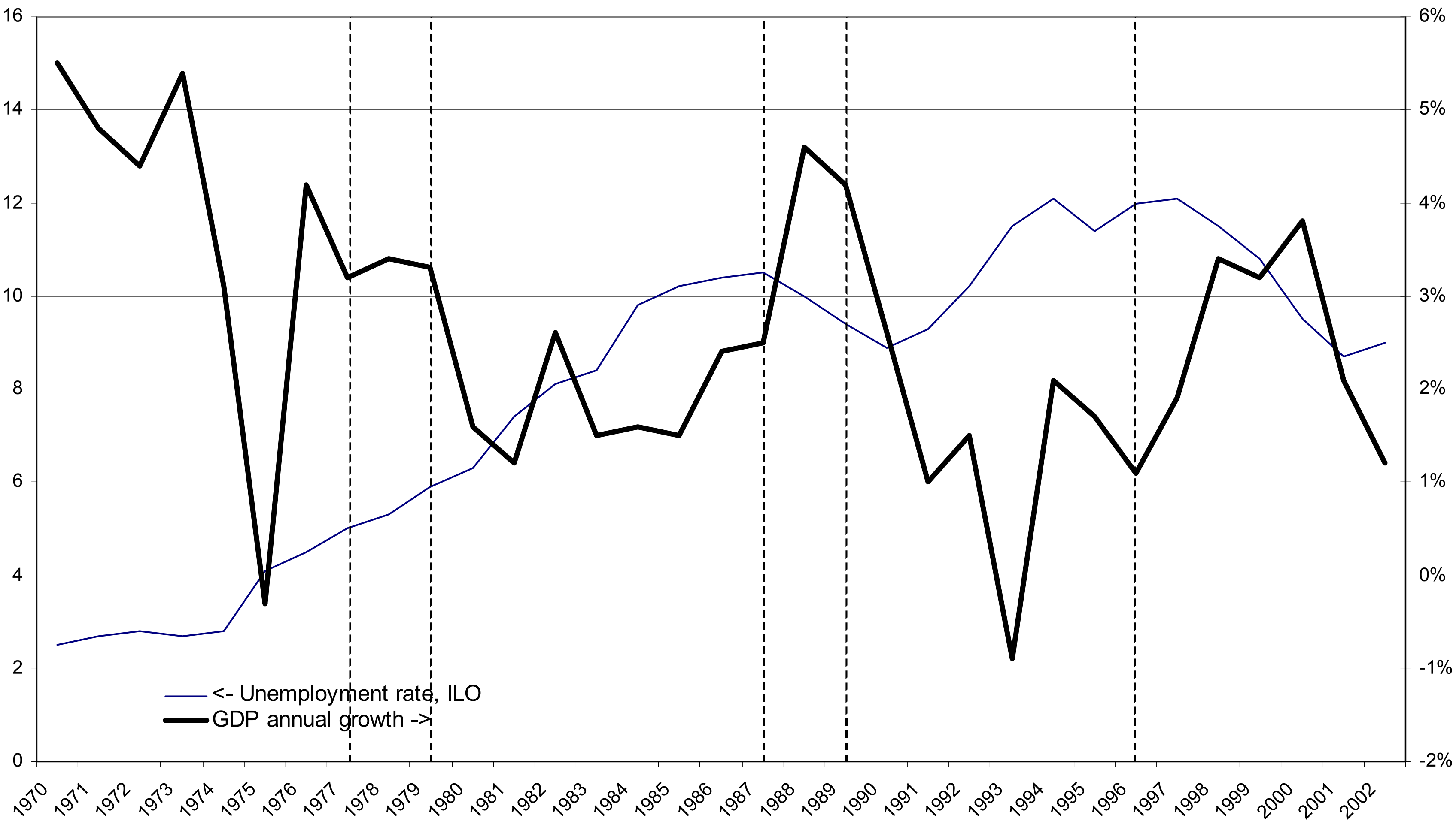


Figure A.2: Macroeconomic conditions in France



Dashed lines represent our sample years.

Table 2A: Structure of Wages Within and Between Firms

	Wage					Log-Wage				
	1977	**1979**	**1987**	**1989**	**1996**	**1977**	**1979**	**1987**	**1989**	**1996**
Average wage (by worker)	49.0	50.2	53.4	52.6	56.3	3.74	3.77	3.8214	3.8139	3.90
(s.d.)	31.4	31.4	35.5	33.4	34.3	0.55	0.52	0.55	0.54	0.49
(75%-ile)	56.0	57.2	60.0	59.6	64.1	4.02	4.05	4.09	4.09	4.16
(25%-ile)	31.4	32.4	34.3	34.1	36.3	3.45	3.48	3.53	3.53	3.59
[N – workers]	567741	576166	545802	595158	639671	567741	576166	545802	595158	639671
Average average wage (by f	43.9	45.0	48.4	48.3	50.6	3.62	3.65	3.71	3.72	3.79
(s.d.)	27.2	27.4	31.6	30.0	30.2	0.53	0.51	0.53	0.51	0.46
(75%-ile)	50.2	51.2	54.5	54.5	56.6	3.89	3.91	3.97	3.97	4.01
(25%-ile)	29.2	30.0	32.0	32.1	33.9	3.36	3.39	3.46	3.46	3.52
[N – firms]	173949	180922	188927	205300	213493	173949	180922	188927	205300	213493
Average stdev wage (by firm	18.5	18.4	20.6	19.7	19.3	0.36	0.35	0.36	0.36	0.31
(s.d.)	20.8	20.8	24.7	22.4	21.9	0.29	0.27	0.30	0.28	0.24
(75%-ile)	23.2	23.3	25.7	24.9	24.7	0.50	0.48	0.50	0.50	0.44
(25%-ile)	5.6	5.5	5.5	5.6	5.3	0.15	0.15	0.14	0.14	0.13
[N – firms]	61229	62613	61200	67675	68997	61229	62613	61200	67675	68997
Average CV Wage	0.355	0.344	0.351	0.345	0.314	0.100	0.094	0.096	0.095	0.081
(s.d.)	0.261	0.255	0.269	0.257	0.235	0.084	0.076	0.082	0.079	0.062
(75%-ile)	0.501	0.485	0.506	0.496	0.450	0.133	0.127	0.131	0.129	0.111
(25%-ile)	0.152	0.146	0.138	0.141	0.128	0.042	0.040	0.037	0.038	0.034
[N – firms]	61229	62613	61200	67675	68997	61229	62613	61200	67675	68997
Correlation average wage/st	0.738	0.738	0.757	0.747	0.744	0.05	0.13	0.10	0.09	0.28
Average wage, workers 25-3	45.0	44.9	44.9	44.7	48.0	3.72	3.73	3.71	3.71	3.79
(s.d.)	20.6	19.4	22.6	21.2	22.8	0.43	0.40	0.43	0.42	0.38
(75%-ile)	52.3	52.1	50.6	50.9	54.1	3.96	3.95	3.92	3.93	3.99
(25%-ile)	33.2	33.7	33.3	33.1	35.1	3.50	3.52	3.51	3.50	3.56
[N – workers]	118883	118714	111334	120296	117395	118883	118714	111334	120296	117395
Average wage, workers 45-5	58.7	59.5	66.3	65.4	67.3	3.92	3.94	4.04	4.02	4.09
(s.d.)	38.5	37.4	43.3	41.5	39.1	0.55	0.52	0.55	0.55	0.47
(75%-ile)	67.5	68.6	76.3	75.7	77.6	4.21	4.23	4.33	4.33	4.35
(25%-ile)	36.0	37.2	40.5	40.3	43.1	3.58	3.62	3.70	3.70	3.76
[N – workers]	63676	64243	55105	61302	95650	63676	64243	55105	61302	95650

Table 3A: Wage dynamics

	Wage					Log-wage				
	1977	**1979**	**1987**	**1989**	**1996**	**1977**	**1979**	**1987**	**1989**	**1996**
Average change in wage observation = a person	1.4	0.4	1.2	1.7	1.0	0.035	0.014	0.021	0.031	0.017
(s.d.)	16.5	15.2	20.5	16.2	19.8	0.321	0.289	0.329	0.301	0.254
75%-ile	4.5	3.2	3.7	4.2	3.2	0.102	0.070	0.075	0.084	0.062
25%-ile	-1.4	-2.4	-1.9	-1.3	-1.6	-0.032	-0.047	-0.037	-0.027	-0.031
[N – workers]	457552	483226	446971	482080	519770	457552	483226	446971	482080	519770
Average of firm average change in wage, observ = a firm	1.7	0.7	1.9	2.0	1.1	0.045	0.021	0.038	0.039	0.022
(s.d.)	13.4	13.1	17.8	14.2	17.6	0.249	0.234	0.281	0.254	0.217
75%-ile	4.2	3.1	4.3	4.2	3.0	0.105	0.074	0.096	0.090	0.065
25%-ile	-1.2	-2.1	-1.3	-1.2	-1.4	-0.029	-0.048	-0.029	-0.027	-0.030
[N – firms]	117235	127711	132046	141125	148995	117235	127711	132046	141125	148995
Average of s.d. of change in wage, observ = a firm	7.4	7.2	9.1	7.7	7.0	0.164	0.153	0.171	0.155	0.114
(s.d.)	11.2	10.7	15.2	11.4	11.6	0.189	0.176	0.217	0.193	0.136
75%-ile	8.4	8.3	9.8	9.1	7.5	0.207	0.197	0.216	0.197	0.144
25%-ile	2.1	1.9	1.9	1.8	1.5	0.048	0.043	0.039	0.038	0.031
[N – firms]	117235	127711	132046	141125	148995	117235	127711	132046	141125	148995
Avg Coefficient of variation of change in wages, observ = a firm)	0.52	0.21	0.40	0.56	0.30	0.31	0.64	0.37	0.21	0.55
(s.d.)	38.41	44.53	40.07	39.33	39.41	39.43	44.59	42.98	34.92	39.73
75%-ile	1.85	1.90	1.86	1.88	1.89	1.83	1.92	1.84	1.83	1.89
25%-ile	-1.14	-1.54	-1.37	-1.21	-1.27	-1.18	-1.51	-1.40	-1.30	-1.24
[N – firms]	117235	127711	132046	141125	148995	117235	127711	132046	141125	148995
Avg change in wage for people who change firms, observ = a person	0.6	-0.2	-0.1	0.8	-0.7	0.046	0.023	0.014	0.040	-0.004
(s.d.)	25.2	22.3	30.5	24.7	30.3	0.536	0.491	0.554	0.515	0.441
75%-ile	8.9	7.6	8.6	9.4	8.0	0.243	0.201	0.206	0.226	0.185
25%-ile	-5.8	-6.8	-7.3	-6.5	-8.4	-0.156	-0.174	-0.178	-0.159	-0.194
[N – workers]	75828	69471	56872	68056	68164	75828	69471	56872	68056	68164
Avg change in wage for people with tenure < 3 years, observ = a person	0.5	0.8	1.7	2.2	1.1	0.038	0.028	0.041	0.050	0.027
(s.d.)	22.4	17.5	24.8	18.8	23.9	0.467	0.357	0.424	0.374	0.333
75%-ile	6.6	4.6	6.2	5.9	5.3	0.19	0.11	0.14	0.13	0.12
25%-ile	-4.1	-2.8	-2.4	-1.7	-2.7	-0.11	-0.07	-0.05	-0.04	-0.06
[N – workers]	150402	240178	179578	224513	202023	150402	240178	179578	224513	202023
Avg change in wage for people with tenure $\geq$ 3 years, observ = a person	1.9	0.1	0.8	1.3	0.9	0.034	0.000	0.008	0.014	0.011
(s.d.)	12.5	12.5	17.0	13.5	16.6	0.216	0.199	0.244	0.218	0.188
75%-ile	3.9	2.2	2.4	3.1	2.3	0.079	0.044	0.046	0.057	0.041
25%-ile	-0.8	-2.1	-1.7	-1.2	-1.2	-0.016	-0.038	-0.032	-0.023	-0.023
[N – workers]	307150	243048	267393	257567	317747	307150	243048	267393	257567	317747

Table 4: Mobility

	All firms					Firms with more than 4 observations					Firms with more than 10 observations				
	1977	**1979**	**1987**	**1989**	**1996**	**1977**	**1979**	**1987**	**1989**	**1996**	**1977**	**1979**	**1987**	**1989**	**1996**
Number of firms	213803	220661	231209	256272	266541	21501	22218	20421	22791	23676	6746	7055	6283	7045	7601
Observations (employees, multiply by 25)	2.6	2.6	2.4	2.3	2.4	15.8	15.7	15.0	14.6	15.6	39.1	38.5	37.6	36.0	37.9
(s.d.)	31.4	31.0	29.3	24.3	31.4	97.0	96.6	97.5	79.4	104.3	170.7	169.1	173.6	140.4	182.0
Employment growth	0.079	0.042	0.057	0.027	0.025	-0.164	-0.168	-0.189	-0.178	-0.180	-0.090	-0.114	-0.139	-0.111	-0.117
(s.d.)	1.308	1.271	1.283	1.309	1.307	0.542	0.521	0.543	0.549	0.553	0.458	0.452	0.487	0.476	0.463
Exit rate, *observ = person*	0.297	0.273	0.274	0.288	0.280	0.257	0.232	0.230	0.231	0.235	0.240	0.215	0.213	0.211	0.221
Exit rate	0.368	0.343	0.339	0.368	0.348	0.303	0.277	0.272	0.280	0.269	0.267	0.248	0.244	0.241	0.238
(s.d.)	0.441	0.434	0.437	0.444	0.444	0.275	0.268	0.274	0.272	0.284	0.237	0.234	0.239	0.230	0.243
Exit rate, top quartile of firm wages											0.224	0.206	0.229	0.219	0.213
(s.d.)											0.272	0.268	0.279	0.266	0.282
Exit rate, bottom quartile of firm wages											0.364	0.345	0.322	0.325	0.321
(s.d.)											0.297	0.293	0.296	0.292	0.295
Entry rate	0.402	0.362	0.364	0.380	0.360	0.333	0.286	0.272	0.299	0.282	0.305	0.250	0.241	0.262	0.250
(s.d.)	0.448	0.440	0.445	0.447	0.446	0.283	0.268	0.272	0.275	0.287	0.250	0.229	0.237	0.236	0.251
Entry rate, top quartile of firm wages											0.22	0.16	0.18	0.18	0.19
(s.d.)											0.28	0.25	0.26	0.26	0.28
Entry rate, bottom quartile of firm wages											0.44	0.40	0.37	0.41	0.37
(s.d.)											0.31	0.30	0.30	0.31	0.31
% of workers who have been at firm 5+ years	0.40	0.30	0.28	0.26	0.29	0.49	0.40	0.38	0.35	0.40	0.54	0.45	0.41	0.38	0.44
(s.d.)	0.44	0.41	0.41	0.40	0.42	0.29	0.29	0.31	0.31	0.32	0.25	0.27	0.30	0.30	0.30
Correlation (exit rate, average wage), observ = a firm	-0.12	-0.14	-0.11	-0.13	-0.05	-0.12	-0.15	-0.07	-0.11	-0.04	-0.15	-0.18	-0.09	-0.11	-0.07
Correlation(exit rate, average wage change), observ = a firm	-0.01	-0.01	0.00	0.00	0.01	0.01	0.00	0.05	0.02	0.03	-0.01	0.00	0.06	0.02	0.03
Correlation(exit rate, s.d. of wage), observ = a firm	-0.01	-0.05	-0.02	-0.03	-0.01	0.01	-0.03	0.02	0.00	0.01	0.03	-0.03	0.02	0.03	0.03
Correlation (entry rate, average wage), observ = a firm	-0.15	-0.17	-0.16	-0.16	-0.12	-0.14	-0.19	-0.12	-0.14	-0.09	-0.16	-0.24	-0.14	-0.17	-0.08
Correlation(entry rate, average wage change), observ = a firm	-0.01	-0.01	0.00	0.01	0.02	0.02	0.03	0.05	0.05	0.05	-0.02	0.07	0.13	0.06	0.07
Correlation(entry rate, s.d. of wage), observ = a firm	-0.05	-0.07	-0.04	-0.06	-0.05	-0.04	-0.06	-0.01	-0.03	-0.03	-0.03	-0.07	0.01	-0.01	-0.02