The decline in participation rates among the older age groups in France.

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I. In all the industrialised countries, activity is concentrated particularly in the median ages

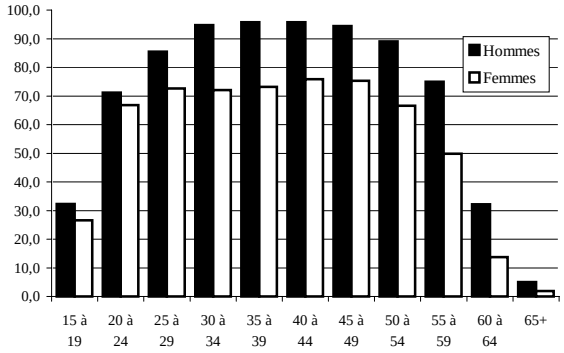
In all the industrialised countries, working life is today heavily concentrated in the median ages (25-54 years). Several factors can be put forward to explain this tendency. Productivity gains and the generalisation of retirement pension systems have permitted a general reduction in the period of active working life in the life cycle as a whole. The lengthening of the period spent in education has delayed the age of entry into working life. Finally, the rapid rate of technical progress may have increased early cessation of activity on the part of older workers meeting difficulty in adapting to technological change.

This phenomenon seems to be particularly marked in France (*graph 1*). Although more than 90% of men aged between 25 and 54 were economically active in France in 1999 as in all industrialised countries, participation rates were very low for the age groups younger and older than this. For the 15-19 age group, it was only 8% in 1999, whereas everywhere else it was above 20% and was even as high as 56% in the Netherlands. For the 20-24 age group, participation rates were still much lower in France than in the other countries examined, by an average of 21 points in 1999. At the other end of the age pyramid, participation rates in the over-55 group were also low, lower in France than elsewhere, although the difference was less marked.

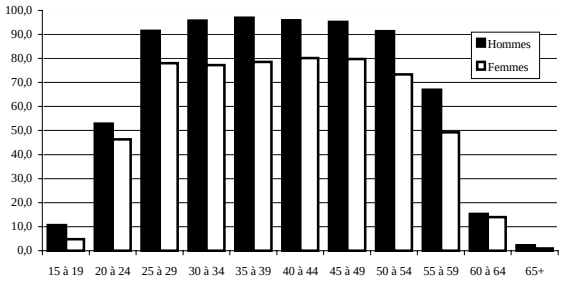
The slowdown in growth recorded in most of the developed economies and the substantial modifications in the demand for labour that have marked recent decades have probably contributed to this phenomenon. Some countries have encouraged older workers to withdraw from the active labour force in order to combat the rise in unemployment. However, the scale of the disparities observed between countries suggests that institutional arrangements for the ending of working careers and the transition to retirement have had a substantial effect on the participation behaviour of the older age groups.

Graph 1: Male and female participation rates by five-year age group in 1998 in 6 OECD countries

Allemagne (Ouest)



France



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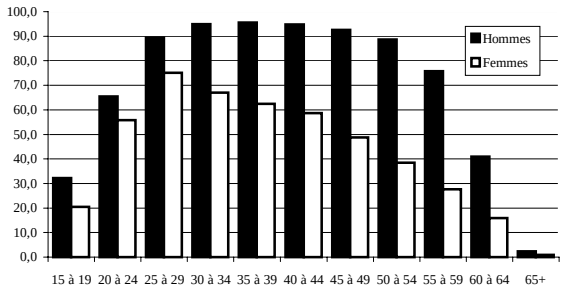
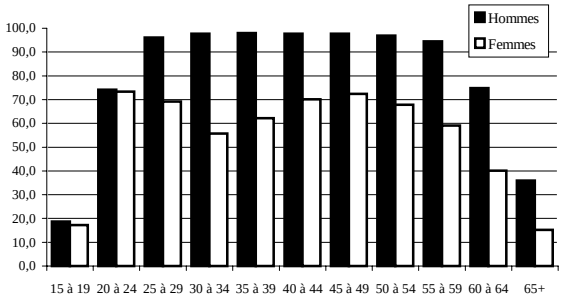
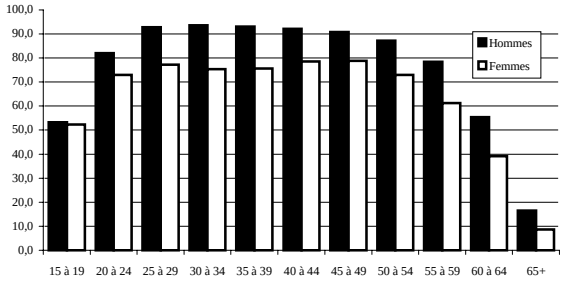


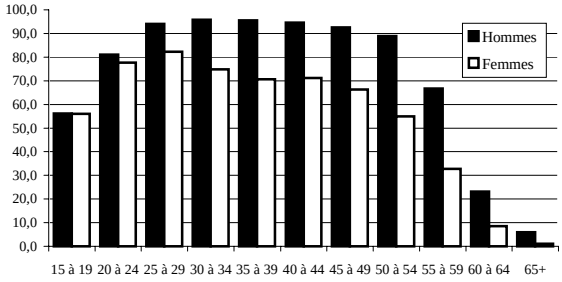
Japon



Etats-Unis



Pays-Bas



Source : OCDE

Participation rates among the older age groups have declined in all the industrialised countries, but at different speeds.

Activity beyond the age of 65 has become practically marginal, by reason of the development of retirement pension systems. In the vast majority of countries, the normal retirement age is 65 for men and 65 or 60 for women (*annex 1*). But the proportion of economically active workers among men aged between 55 and 64 has also declined sharply during the last 30 years (*graphs 2 and 4*). For women, the tendencies are less distinct, as the trend decline in activity among older workers is partly compensated by the increasing generalisation of female participation (*graphs 3 and 5*).

However, this decline in participation rates for the over-55s has not been on the same scale in all countries. Whereas participation behaviour for the over-55s in the various OECD countries could be seen to be comparable at the beginning of the 1970s, it is now quite differentiated. In 1970, the proportion of economically active workers among men aged between 60 and 64 was in all countries between 70% and 80%. By contrast, in 1999 the participation rates were highly dispersed (*graph 4*): whereas only 15% of men aged between 60 and 64 were economically active in France, the proportion in Japan was as high as 75%[1]. In the other countries, the participation rates fell between these two extremes. For the 55-59 age group, the dispersion in participation rates was smaller, being everywhere between 65% and 75%, except in Japan where it was close to 95%.

Box 1: Definition and measurement of the labour force

The labour force comprises people in work ("occupied active workers") or capable of being so (the unemployed). This definition is in reality interpreted in several ways, thus possibly leading to different measurements. The definition used here is based on the criteria defined by the International Labour Office (ILO). According to the ILO definition, a person is included in the labour force if he/she has worked (even for an hour) in the week in question, or says that he/she is actively seeking work (and is available in the next two weeks). The criteria used by the ILO are intended to capture the workforce available to contribute to production.

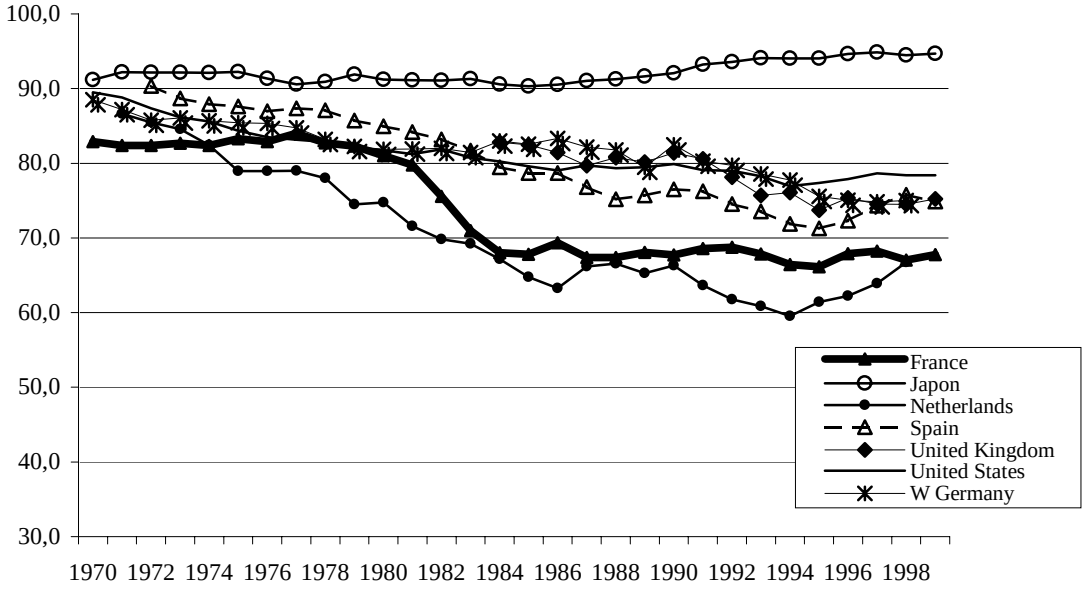
Retired people and "early retirees" are not included. In France, for unemployed people "relieved of the obligation to seek work", the situation is less clear-cut. The Labour Force Survey, from which the participation rates are calculated, does not explicitly distinguish those falling into this category. Because of the ambiguity of their status, these people can declare themselves to be "unemployed" (in which case they can be considered as part of the labour force if they also declare themselves to be actively seeking a paid job), "retired and pre-retired" or "other inactive" (in which case they will be classified as inactive). According to Blanchet and Marioni (1996), 20% of those not obliged to seek work may have declared themselves to be economically active in 1993.

The labour force as defined by the ILO can differ from the figure derived on a census basis, measured using individuals' spontaneous declarations, and that used in the national accounts, which aims to give the most exhaustive picture of the labour force (for a more detailed description of these differences, see Guillemot (1996)).

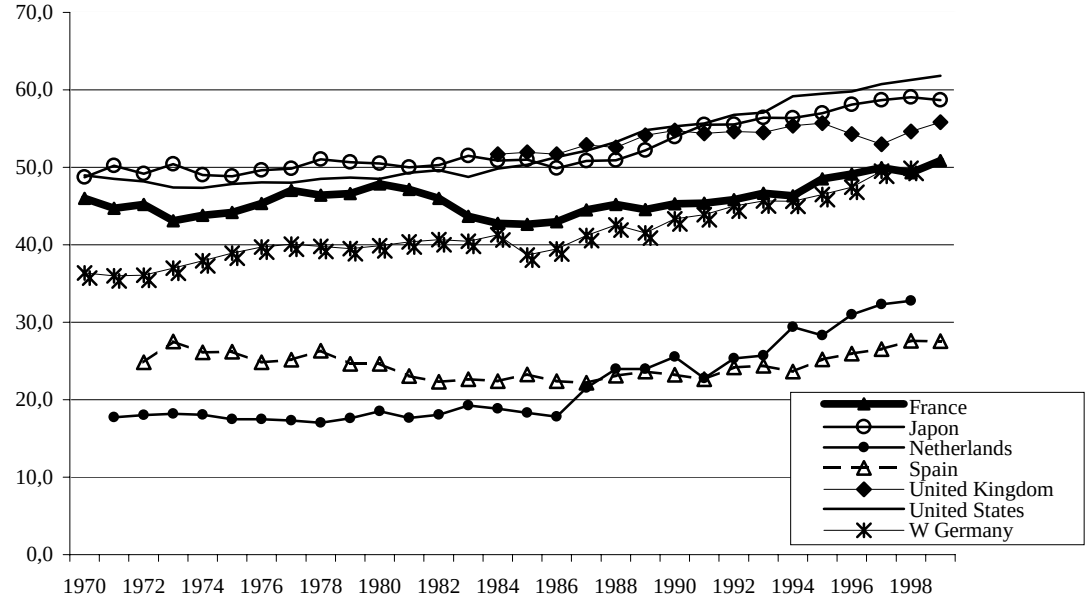
The participation rate is defined simply as the ratio of active workers to all individuals in the population considered. The unemployment rate measures the proportion of job-seekers among the economically active, in other words the number of job-seekers in relation to the total number of active workers.

1 This high figure is obtained at the price of extreme flexibility regarding the ending of careers.

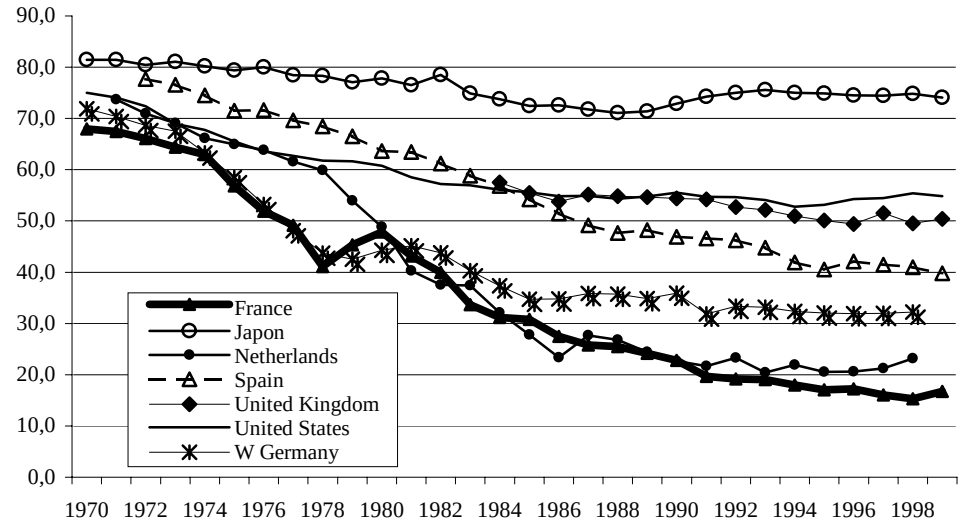
Graph 2: Participation rates for men aged 55 to 59 in 7 OECD countries



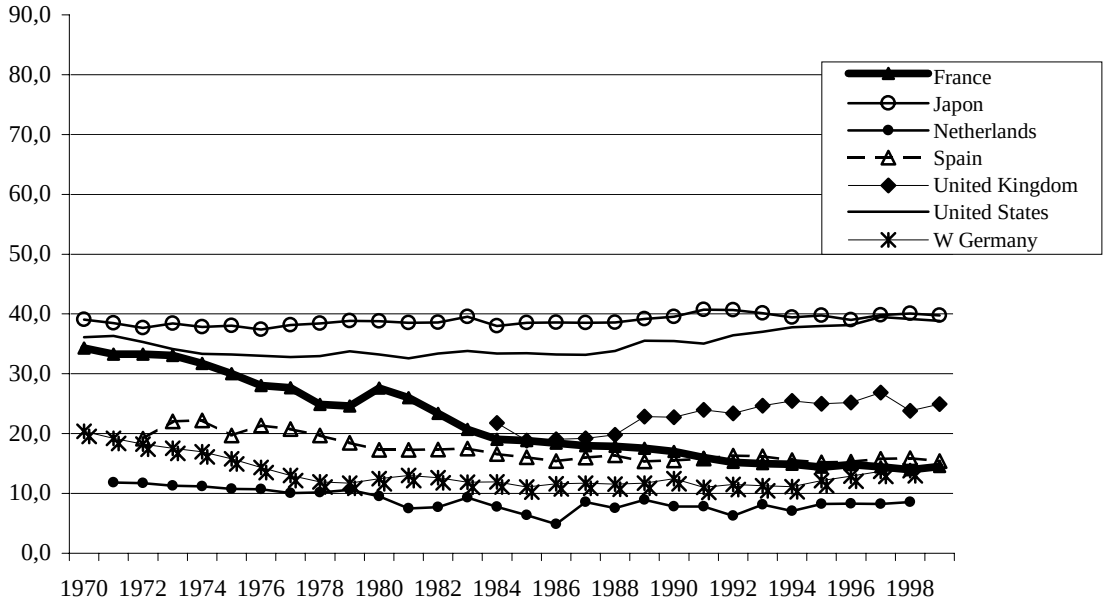
Graph 3: Participation rates for women aged 55 to 59 in 7 OECD countries



Graph 4: Participation rates for men aged 60 to 64 in 7 OECD countries



Graph 5: Participation rates for women aged 68 to 64 in 7 OECD countries



II. The decline in participation rates for the older age groups has gone hand in hand with a deterioration on the labour market

Several factors suggest that the acceleration in the decline in participation rates is not unconnected with the economic slowdown seen in most countries and the continual rise in unemployment that marked the 1970s and 1980s (*table 1*). Comparison between countries shows a negative correlation between the average unemployment rate for the period and evolutions in participation rates. In Japan, where full employment remained the norm until the mid-1990s, participation rates have remained very high.

Table 1: Unemployment rate (%) of active workers aged 15-64, annual averages

	1975	**1980**	**1985**	**1990**	**1995**	**2000**
W Germany	4,0	3,2	7,9	6,3	6,6	8,1
Spain	4,5	11,4	21,5	16,1	22,9	14,1
United States	8,6	7,3	7,3	5,7	5,6	4,0
France	3,7	6,2	10,3	9,2	11,7	9,5
Japan	1,9	2,0	2,7	2,2	3,3	4,7
Netherlands		4,6	13,2	7,4	7,1	2,8
United Kingdom			11,3	6,8	8,7	6,1*

* 1999 rate

Statistical analysis confirms the existence of a long-term relationship between participation rates and unemployment rates. For six countries, Germany[2], Spain, the United States, France, Japan and the Netherlands (the data available for the United Kingdom do not cover a sufficiently long period), we have examined the link between evolutions in the participation rate for men aged between 55 and 59 and between 60 and 64 and variations in the unemployment rate in recent decades.

A statistical test of the long-term relationship between unemployment rates and participation rates for older workers.

The unemployment rate and the participation rate for the over-55s are co-integrated

The profiles of participation rates and unemployment rates over the past 30 years suggest that the latter are non-stationary. We tested for the existence of a cointegration relationship between participation rates and unemployment rates using the Shin (1994) procedure.

We took the participation rates for men for each country and for two five-year age groups (55-59 and 60-64). The unemployment rate is that of the whole of the economy, in order to limit the endogeneity of this variable. The data are annual. The period of estimation is 1970-1999 for Spain, the United States, France and Japan, 1970-1998 for Germany and 1982-1998 for the Netherlands.

For each country and for the two age groups, the participation rate was regressed on the unemployment rate as well as on its advanced and lagged differences. Given the small number of observations, we finally took only one lag of one period. We also added a time trend in the relationship when the form of the series made this necessary, as was generally the case, except for the participation rates for the 55-59 age group in France and the 60-64 age group in Japan.

2 In order to avoid the problems of statistical harmonisation following German unification, we limit ourselves here to the territory corresponding to West Germany.

The equation estimated as a result is then:

$$ACT_t = \alpha + \beta * t + \gamma * CH_t + \delta_1 * \Delta_{t-1} CH + \delta_2 * \Delta_t CH + \delta_3 * \Delta_{t+1} CH + u_t .$$

Since the ratio variables are, by nature, bounded, we used a logistic function to bring us back to Y, thus reducing the sources of heteroskedasticity and theoretically improving the efficiency of the estimate. The transformed variables are denoted by CH and ACT: $CH = \log(\frac{txch}{1-txch})$ and $ACT = \log(\frac{txact}{1-txact})$ (where txch stands for the unemployment rate and txact stands for the participation rate).

The stationarity of the residuals was tested by means of KPSS. An estimator $\hat{s}^2$ of the variance is given using a Bartlett kernel estimate.

The test statistic was then provided by $S = \frac{1}{\hat{s}^2} \frac{\sum_{t=1}^{T} (\sum_{j=1}^{t} \hat{u}_j)^2}{T^2}$, to be compared with the values tabulated by Shin[3] (Shin, 1994 or see Salanié, 1999).

The null hypothesis is stationarity of the residuals, i.e. cointegration. In none of the countries considered here could cointegration be rejected at the 5% level. We can therefore conclude that there exists a negative long-term relationship between the participation rates for older workers and the unemployment rate.

The unemployment rate can be seen to be a cause, in the Granger sense, of the participation rates for older workers over the long term

In order to identify the direction of this relationship, we carried out a Granger causality test. More precisely, we tested the influence of past changes in the unemployment rate on present changes in the participation rate, which would reflect a short-term causality -- in the Granger sense -- of the unemployment rate on the participation rate, as well as that of past deviations from the long-term relationship (in that case we talk rather of long-term causality, still in the Granger sense).

In practice, we tested the relationship:

$$\Delta_t ACT = b_1 * \Delta_{t-1} ACT + b_2 * \Delta_{t-2} ACT + c_1 * \Delta_{t-1} CH + c_2 * \Delta_{t-2} CH + d * (ACT_{t-1} - \hat{\alpha} - \hat{\beta} * (t-1) - \hat{\gamma} * CH_{t-1}) + v_t$$

where $\hat{\alpha}$, $\hat{\beta}$ and $\hat{\gamma}$ are the estimators of the coefficients of the long-term relationship previously estimated (with beta = 0, as necessary). The addition of a constant to the equation was systematically rejected by the tests.

We then tested the significance of the terms c_1 and c_2 in other words the short-term causality (in the Granger sense) of the unemployment rate on the participation rate, as well as that of d, in other words the long-term causality.

In all cases, the estimations led to the rejection of the existence of a short-term causality of the unemployment rate on participation rates (Wald test for simultaneous nullity of the terms).

On the other hand, the significance of the coefficient corresponding to the long-term

[3] The asymptotic critical value of the test at the 5% level was 0.314 in the case without the trend, 0.121 with trend.

relationship was accepted in practically all cases, except for the Netherlands, Germany (for the 55-59 age group) and the United States (60-64 age group). However, the results depend on the introduction or otherwise of a time trend in the long-term relationship. We present the results of the estimates in an annex.

The estimates therefore confirmed the existence of a statistical long-term link between the participation rates for the older age groups and the unemployment rate. The rise in the unemployment rate has coincided with lasting changes in participation rates in all the countries examined. This result agrees with the work carried out by Jacquot (1994), which highlighted the existence of the structural and not simply cyclical impact of the unemployment rate on the global labour force. However, the estimates did not explain the economic mechanisms operating behind this statistical link.

Participation rates for older workers seem to be more sensitive to a downward flexion effect.

Variations in the participation rate in response to short-term fluctuations and especially to fluctuations in the unemployment rate are denoted by the term "flexion". The first empirical estimates for France are the work of Salais (1971).

Economic theory in this connection generally describes two economic mechanisms with opposing consequences but what: that of the "additional worker", according to which the supply of labour increases with unemployment, as the result of the income loss generated within a household by the unemployment of one of its members; conversely, the so-called "discouraged job-seeker" effect suggests there should be a decreasing relationship between the level of unemployment and supply of labour. When the economic situation deteriorates, certain "discouraged" job-seekers give up looking for work, believing that their chances of finding any are too small. Symmetrically, in an upswing phase, a rise in the number of jobs is not matched one-for-one by a fall in the number of job-seekers. Seeing the prospects of recruitment improve, some previously inactive people decide to return to the employment market.

Empirical analyses using individual data make it possible to bring out these two effects. At macroeconomic level, it is the "discouraged job-seeker" effect that generally predominates (see for example Jacquot, 1994, and also for a more detailed description of the theoretical foundations of flexion).

For older job-seekers, the "discouragement" effect can be particularly relevant when unemployment increases. The probability of finding a job again seems small for those over the age of 50. In France, more than two in three job-seekers aged over 50 had been without work for more than a year in March 2000, whereas long-term unemployment affected only two in five job-seekers aged between 25 and 50.

The difficulties encountered by older workers on the employment market may also be linked to the structural transformations that have taken place in recent decades in the industrialised countries. The diffusion of new technologies and competition from countries with low labour costs have contributed to the decline of the traditional industrial sectors. This has led to major restructuring and massive lay-offs. Older workers, many of whom are unskilled, have borne the brunt of the adjustments[4].

Quite apart from the strictly "cyclical" effect, it is highly likely that the unemployment rate can also have a lasting impact on participation rates. This is the hypothesis formulated by Jacquot

[4] See for example Blöndal and Scarpetta (1998). It emerges from this study of the labour force in the European Union that there is a distinctive profile of "early retirees" as regards qualification and sector of activity of last employment. In 1995, in the 55-64 age group, those with few qualifications or whose last job was in one of the sectors most affected by the transformations of the last 30 years (manufacturing, construction, mining) were more frequently involved in early retirement arrangements than others.

(1994), who estimates the active population using an error-correction model, revealing a long-term relationship between labour force and unemployment, from which he deduces a structural flexion that is distinct from the simply "cyclical" flexion brought about by short-term mechanisms.

This hypothesis is supported by several considerations. Withdrawal from activity on the part of certain workers may be definitive, especially if it is assisted by specific arrangements. In many countries, early withdrawal from activity has been encouraged as a response to the difficulties encountered by older workers on the employment market. In France, for instance, job-seekers aged over 50 can be "relieved of the obligation to seek work"[5], while still preserving their rights to unemployment benefit. Moreover, early retirement enables older workers laid off under a corporate job-reduction plan to benefit from replacement incomes until retirement age. In other countries, invalidity allowances perform this function more or less explicitly, as in the Netherlands, where from 1972 to 1987 difficulty in finding a job constituted in itself a reason for a declaration of invalidity. The evolutions and dispersion between countries of the rate of invalidity of older workers suggests that similar practices are applied elsewhere (*table 2*).

Table 2: Recipients of invalidity pensions as % of the population concerned

		1975	1980	1985	1990	1995
W Germany	25-54 ans	0,8	1,0	1,1	1,0	1,0
	55-64 ans	9,2	10,5	13,6	9,7	9,4
Spain	25-54 ans	Nd	1,5	1,9	1,4	1,4
	55-64 ans	Nd	11,5	13,4	10,4	9,9
United States	25-54 ans	1,3	1,3	1,2	1,4	2,1
	55-64 ans	7,0	7,6	6,5	6,6	8,0
Japan	25-54 ans	Nd	Nd	nd	1,0	1,1
	55-64 ans	Nd	Nd	nd	2,0	2,0
Netherlands	25-54 ans	3,6	6,3	6,9	7,8	6,9
	55-64 ans	12,4	21,4	23,4	24,1	23,5
United Kingdom	25-54 ans	0,9	1,2	1,6	2,2	3,2
	55-64 ans	3,8	5,0	6,8	9,0	12,7

Source : OCDE .

III. A model for participation rates in France

Our model estimates participation rates by gender and five-year age group using annual data, available from 1970 to 1998. In this case, our approach is mainly descriptive, aiming at identifying evolutions in the participation rate as a function of the various variables with which it can be correlated. In order to take account of disparities in participation behaviour depending on age and gender, the estimates have been made for two five-year age groups, for men and for women.

The rate of unemployment in the economy supplies a measure of the immediate economic situation on the employment market. We used the overall unemployment rate (unemployment rate for ages 15 to 64) rather than the specific unemployment rate for each age group. This is in the interests of simplicity and in order to limit the endogeneity bias that this variable might introduce.

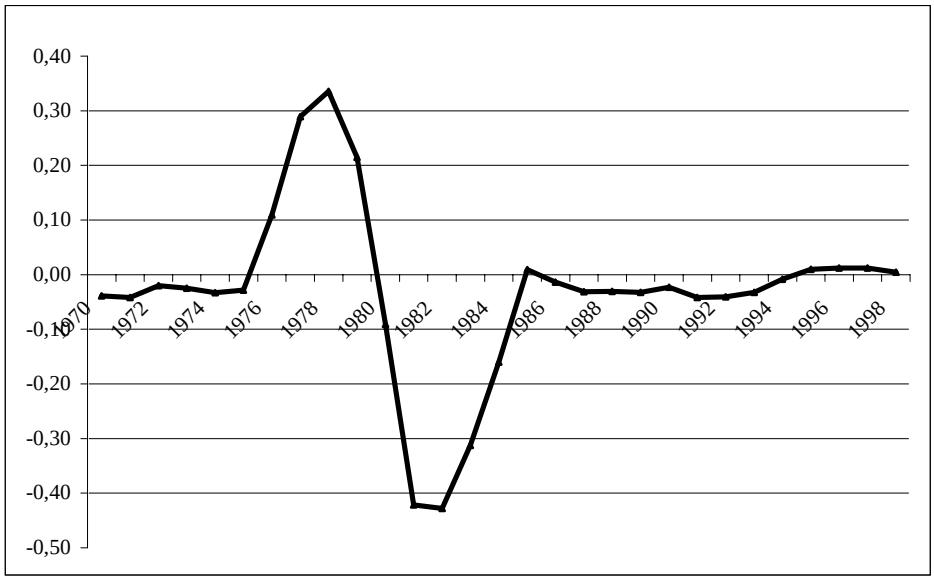
Institutional variables were also used. In particular, for the older workers, we use the ratio of early retirees in each age group (55-59 and 60-64), as well as the ratio of those relieved of the obligation to seek work. Whereas “cyclical flexion” measures the short-term movements in the participation rate in response to variations in the unemployment rate, the term "institutional flexion" will be used for now on to denote trend inflexions in participation rates linked to institutional

[5] And hence, in theory, no longer form part of the labour force. In practice the situation is more complex (box 1).

incentives to take early retirement.

It also seemed necessary to take into account the distortions brought about by structural demographic effects, distortions that are linked to the aggregation of five successive annual cohorts in a single age group. In particular, for the older workers, whose participation behaviour declines very rapidly with age, demographic shocks can lead to variations in the participation rate for the age group. This is what occurred for the 60-64 age group at the end of the 1970s, with the arrival at retirement age of the "empty cohorts", i.e., those born between 1915 and 1918. As a result, for 1975, people aged exactly 60 (born in 1915) are under-represented in the 60-64 age group (which comprises people born between 1911 and 1914). Since the participation rates in this age group decline steeply with age, the fall in the proportion of 60-year-olds, those who tend to be more active, leads to an accelerated decline in the average participation rate for the age group as a whole. This tendency is also seen for the 55-59 age group, although on a diminished scale, since the decline in the participation rate with age is less steep in this case. The average age of the group being observed is a synthetic indicator of this effect. The centred variable (the deviation of the observed mean age from the mean age of the age group if the five years are represented on an equal basis) is used. The following graph illustrates its behaviour for the 60-64 age group.

Graph 6: Average age of the 60-64 age group



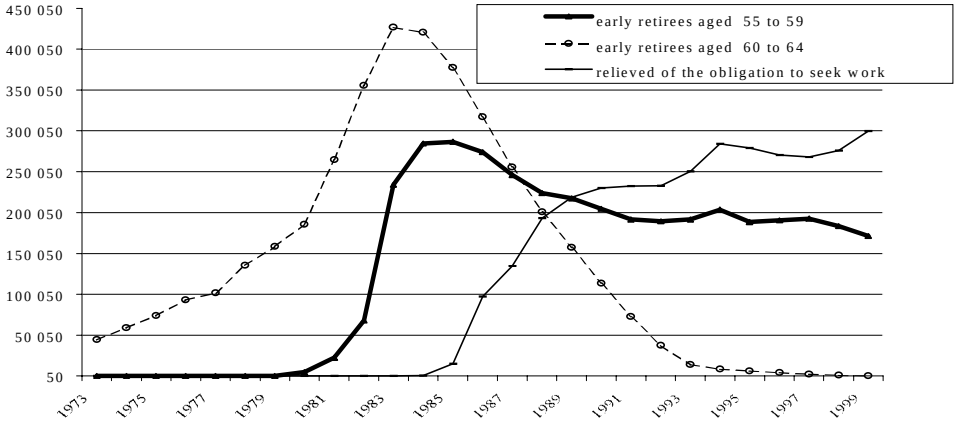
Lastly, we introduced, when necessary, a time trend, in order to capture trend evolutions in participation rates. Whenever possible, this trend was estimated in logistic form, being written $\frac{tx_0 + tx_1 e^{a+bt}}{1+e^{a+bt}}$. This expresses the transition from the initial rate tx_0 to the limiting rate tx_1. The speed of transition is measured by the parameter b, which, by convention, is taken to be positive. The logistic trend has the advantage over the linear trend of supplying estimates of rates that are always within the range from 0 to 1 if the limiting rates tx_0 and tx_1 are as well. The utilisation of the logistic trend does not permit linear estimation. The coefficients are estimated by non-linear least squares.

Arrangements for withdrawal from activity have a substantial impact on the reduction in participation rates for the older workers.

In France, early retirement for older workers has since the beginning of the 1970s been encouraged by numerous institutional arrangements, as shown by the evolution in the number of early retirees and unemployed people relieved of the obligation to seek work (*graph 7*). The rise in the total numbers benefiting from arrangements for early cessation of activity has accelerated strongly since 1977, peaking in 1984, when 700,000 people were involved, compared with 44,000 in 1973. From

1985 on, there has been a slight decline, with the lowering of the statutory retirement age in 1983 automatically ending the possibility of direct access to early retirement for those aged between 60 and 65. During the 1990s, the number benefiting from early retirement stabilised at around 460,000 to 500,000. The main public instrument from then on was the relief from the obligation to seek work (60% of beneficiaries).

Graph 7: Evolution since 1973 in the number of people (thousands) receiving early retirement pensions or relieved of the obligation to seek work



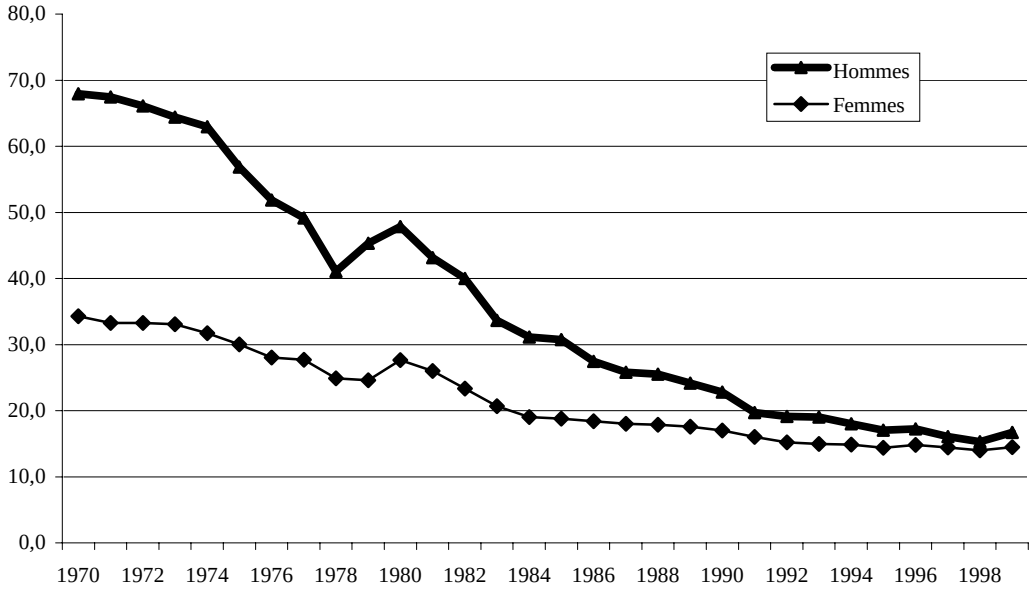
Source : DARES.

Against a background of increasing unemployment, early withdrawal from activity on the part of those whose "employability" seems reduced has been the subject of broad consensus. In France in 1996, only one early retiree in three said that he/she would have liked to continue professional activity. For the employing firms, the departure of older workers is often regarded as a solution making it possible to overhaul production methods, reduce the wage bill and rejuvenate the age pyramid at relatively low cost because of the important financial contribution made by society. Older workers are generally seen as being inapt to adjust to change rather than as a labour force rich in experience and know-how. Because of the policies relating earnings to length of service, the immediate cost of these workers seems too high when they become less productive. Employers then have an incentive to replace them with younger workers, better qualified and less well-paid. At the same time, the possibilities offered to older workers to adjust to evolutions in their environment are restricted, notably because the imminence of retirement reduces the interest for the employing firms to invest in re-training. Workers aged between 50 and 54 are therefore five times less likely to undergo training than those aged between 25 and 29 (OECD 1999).

The decline in participation rates for the over-60s began early in the 1970s

As of the early 1970s, the first arrangements for early retirement, targeted on the over-60s, and the existence of derogations with respect to the general retirement pension system triggered off a drop in participation rates for the over-60s. The introduction in 1983 of the right to retirement for all workers at the age of 60 gave support to this tendency without provoking a distinct break in participation behaviour. The collapse in participation rates for the over-60s in France is quite disproportionate to the evolutions seen in most other countries. In 1970 almost 70% of men in the 60-64 age group were economically active in 1970 but by 1983 this proportion had fallen by almost half. Today, participation rates for the 60-64 age group seem to be stabilising at around 17% for men and 15% for women (*graph 8*).

Graph 8: Evolution in the participation rate of the 60-64 age group in France between 1970 and 1999.



The evolution in participation rates for the 60-64 age group was modelled as described earlier. The proportion of early retirees[6] and the unemployment rate capture the institutional and cyclical flexions respectively. Another *a priori* relevant variable for measuring the institutional component of flexion would seem to be the ratio of the numbers relieved of the obligation to seek work, but this in fact never turned out to be significant. In order to take into account the impact of the modification in retirement age introduced in 1983, a dummy variable for the period 1983-1999 was introduced into the estimate. Finally, for this age group, the estimations did not make it possible to reject the existence of a time trend. This was represented in logistic form.

In the end, the general form of the equation that we have tested is therefore:

$$txact_t = \frac{tx_0 + tx_1 e^{a+bt}}{1+e^{a+bt}} + c*(agmoy_t^{60-64} - 62) + d*txprer_t^{60-64} + e*ind_{83} + f*txcho_t + u_t$$

The abbreviations used in the formulae are as follows :

txch	unemployment rate
txact	participation rate
agmoy	average age
txprer	ratio of early retirees
ind	dummy variable
txcho	unemployment rate
DRE	ratio of those relieved of the obligation to seek work

The estimation covers the period 1972-1998. The coefficients were estimated by the non-linear least squares method[7]. The results of the estimations will be found in an annex.

It was not possible to demonstrate a significant flexion linked to unemployment for either men or women. Moreover the series break related to the bringing forward of the retirement age in 1983, captured by a dummy variable for the period 1983-1998, turned out to be significant only for women and resulted in a reduction of two percentage points. The impact of the early retirement rate, weakly significant, was much smaller than for the 55-59 age group, with an estimated impact of -0.33 for men

6 This refers only to public arrangements for early retirement. There is no detailed information available on the scale of early retirement in the case of private firms.

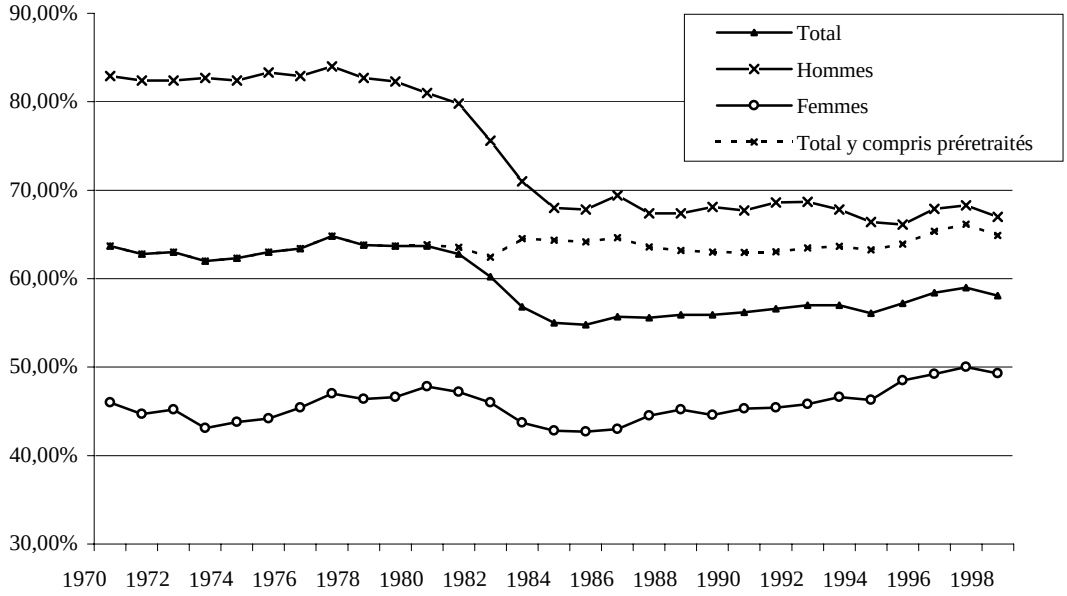
7 The variables for the ratio of early retirees may be endogenous to participation rates and this could bias the estimates (see below). However, it was not possible to obtain results using double non-linear least squares because of the non-convergence of the algorithm used.

and -0.17 for women. Most of the statistical fit in this case was provided by the trend. The estimated limiting rate was 14% for the women, 12% for the men.

The decline in the participation rates for the 55-59 age group corresponds mainly to the extension of early retirement.

The build-up from 1982 on of early retirement for workers aged between 55 and 59 was accompanied by a virtually symmetrical drop in the participation rates for this age group. When the early retirees aged between 55 and 59 were fictitiously re-incorporated as active members of the labour force for this age group, much of the decline in participation rates was eliminated (*graph 9*).

Graph 9: Evolution in the participation rate of the 55-59 age group in France between 1970 and 1999.



The evolutions from 1970 to 1998 in the participation rate for the 55-59 age group were econometrically modelled as above. The increasing generalisation of female participation was taken into account in the modelling of the participation rates for women aged between 55 and 59 by incorporating a time trend. The trend was in this case estimated in linear form. This formulation is not entirely satisfactory since it ignores the fact that participation rates are necessarily bounded. The estimates nevertheless failed to validate the specification of the trend in logistic form for this age group. Moreover, female participation rates have a substantial auto-regressive component.

The introduction of a time trend to describe the evolutions in male participation rates in no case improved the estimates. Whatever the form, the estimated trend was never significant. Much of the break in series was linked to the introduction of early retirement. The deviation of the mean age from 57 enabling account to be taken of the demographic effects of the "empty cohort" was significant only for men.

The general form of the equation is:

$$txact_t = a + b*txcho_t + c*txprer_t^{55-59} + d*\frac{DRE_t}{Pop_t^{55-59}} + e*t + f*(agmoy_t^{55-59} - 57) + g*txact_{t-1} + u_t$$

The results of the estimations will be found in an annex, as well as the observed and estimated ratios and the contributions of the different variables. The fit is excellent for men, very good for women.

The estimates suggest that the impact of early retirement on the participation rates for the 55-59 age group was massive. It explains the bulk of the drop in participation rates for men in this age group, which fell from an average of 84% to a figure more than 15 points lower. The impact is more substantial for men than for women (-1.24 as against -0.37), probably because more early retirees were men than women[8]. For our estimates we used global figures for early retirement, men and women combined, for lack of more detailed information.

This early-retirement effect is amplified by the arrangements relieving some people of the obligation to seek work. The proportion of people involved turned out in fact to be very significant for men. Moreover, for men in this age group, participation rates turned out to be negatively correlated to the unemployment rate, confirming the existence of a cyclical flexion.

For women, the participation rate averaged 45%, but rose slightly over the period, at the rate of 0.3 of a point per year. It was not possible to elicit any "discouraged job-seeker" effect for female participation, since neither the unemployment rate nor the ratio of those relieved of the obligation to seek work emerged as significant.

These estimates may nevertheless be biased if the rate of early retirement or the ratio of those relieved of the obligation to seek work are endogenous, for example if these arrangements depend partly on the level of the participation rate or of its determinants. It is therefore necessary to turn to instrumental variables.

Several factors may explain the extension of early retirement in the past three decades. First, as we have already suggested, these arrangements probably constituted a response to the rise in unemployment and are therefore directly related to that rise. The first arrangements for early retirement, in the early part of 1970s, also seem to have been a means of "liberating" jobs for the baby-boom generation then arriving in large numbers on the labour market (see Jacquot,1997). The demographic weight of the age group in question is probably correlated to the rate of early retirement[9]. Finally, the use of these arrangements was probably all the more important as they were financially advantageous, especially when paid for by the authorities. In order to have an estimate of this impact, we constructed an indicator of the cost per head of early retirement for use as instrument.

Estimates based on double least squares are shown in the annex. The variables used turned out to be "good" instruments, in the sense that they were strongly correlated to the two potentially endogenous variables. The statistics for the regressions of the early retirement rate and the ratio of those relieved of the obligation to seek work on the exogenous variables, the R^2 and Fisher test statistic for joint nullity of coefficients, showed substantial explanatory power for the exogenous variables. Moreover, the Holly Sargan procedure applied to the ratio of those relieved of the obligation to seek work did not make it possible to conclude that this variable is exogenous, which is not the case for the early-retirement ratio. Finally, the tests did not reject strong exogeneity for the

8 According to figures from the UNEDIC unemployment benefit agency, women accounted for only 28.1% of early retirees (including those on progressive early retirement) in 2000. This partly reflects a sectoral difference, with men being more represented than women in industry, the sector which has had more recourse to early retirement than construction or the tertiary sector (Colin et al., 2000).

9 In fact, the participation rate is also correlated to contemporary values of this variable (whose numerator is the denominator of the participation rates). We therefore used as instrument the values for this variable lagged five times, thus making it exogenous to the participation rate.

projected variables. The coefficients estimated in this way came close to the results obtained by the ordinary least-squares method. The impact of the early retirement ratio on the participation rate for men (women) aged between 55 and 59 was estimated by the double least-squares method to be -1.27 (-0.34) and -1.36 (-0.46) depending on the set of instruments used, while the ordinary least-squares method gave -1.24 (-0.43). The estimates of the impact of the ratio of those relieved of the obligation to seek work varied only very slightly, from -0.33 to -0.34 using the instrument method, -0.32 for OLS. The flexion effect seems to be smaller, since the impact of the unemployment rate changes from -0.44 to -0.32.

Overall evolutions masking a high degree of heterogeneity of withdrawals from activity depending on status and generation

The overall evolutions described earlier mask a fairly high degree of heterogeneity in behaviour depending on activity status (self employed worker, worker in the public or private sector) and qualification, partly reflecting disparities in the rules governing end of career and retirement.

The gradual decline in the share of self employed workers in the population makes only a small contribution to the decline in participation rates, while the increase in qualification levels operates in the opposite direction.

The decline in participation rates is also linked to the fact that self employed workers, who traditionally tend to work longer, are proportionately less and less numerous in the population. Self employed workers pursue their activity longer on average than other workers, by reason of the less favourable retirement systems. There has also been a downward tendency in the participation rates for self employed workers but these still remain distinctly higher than the participation rates for other workers (*see graph in annex*). In March 2000, the inactive proportion of self employed workers between 60 and 64 was 65%, whereas it was 20 points higher for the other workers. From the age of 65 on, the differences fade out, with practically all people no longer economically active (*table 3*).

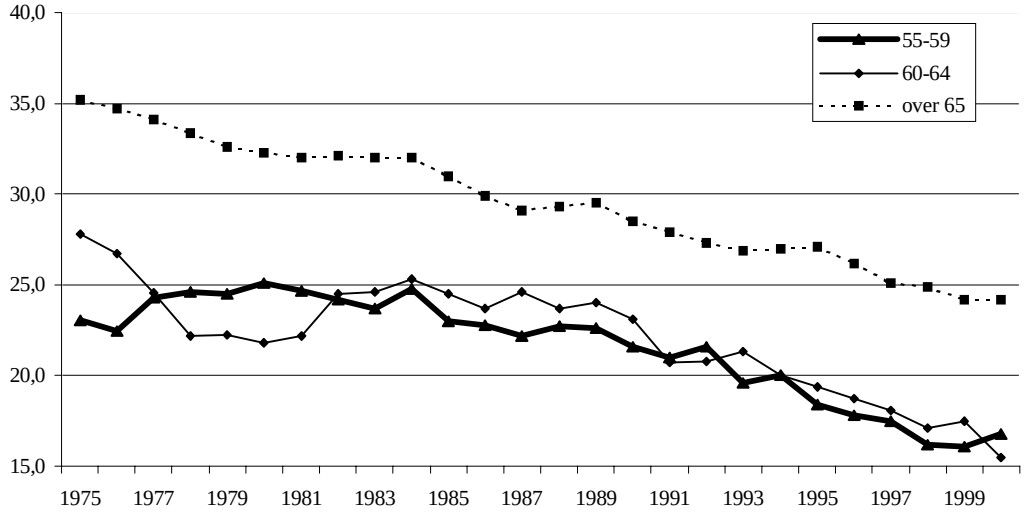
Table 3: Proportion of economically inactive men by age group and status in 2000

%	Self Employed	Private Sector Workers	Public Sector Workers
55 to 59 years old	16,2	34,7	42,5
60 to 64 years old	64,9	88,8	84,1
65 years and more	95,5	99,0	98,6

Source : Labour Force Survey March 2000

In 1975, 27% of men aged between 60 and 64 were self employed workers, compared with only 15% in 2000 (*graph 14*). Given the differences in participation rates, the reduction in the proportion of self employed workers in the population automatically affects the overall participation rate. If the respective shares of self employed and workers in private and public sector had remained at 1975 levels, but taking the participation behaviour observed in 2000, the participation rate of men in the 60-64 age group would be 3.2 points higher in 2000.

Graph 14: Share of self employed workers among men aged over 55



Conversely, the raising of qualification levels can be expected to operate in the other direction. People with the highest qualifications in fact remain economically active longer (*table 4*). Only 61% of men in the 55-59 age group not having passed the university entrance examination were economically active in March 2000, compared with 89% of those with a higher-education diploma in this age group. While for this group too participation rates decline after the age of 60, the difference is still 30 points in favour of those with a higher-education diploma. The latter are in fact less exposed to the hazards affecting ending of career. Having often entered working life at a later age, they may be induced to remain longer in order to acquire the full rate of pension.

Table 4: Participation rates by gender and level of qualification in March 2000

Age group	Diplôme CEP ou inférieur, BEPC, BEP		Bac ou bac+2		Supérieur	
%	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
55-59	61,1	48,5	71,3	58,5	89,4	75,3
60-64	12,3	12,2	16,8	14,4	43,8	37,8
65-69	1,4	0,8	3,1	1,8	7,0	2,9

Structural effects on their own give no reason to hope for a substantial rise in participation rates by the year 2020.

Participation rates vary widely according to the level of qualification. The general increase in qualification levels can therefore in the long term lead to an increase in participation rates for older workers. The proportion of people with a diploma at least equivalent to university entrance among workers aged between 40 and 50 is 30.9%, as against 26.5% for members of the labour force aged between 50 and 60 and 16.6% for those between 60 and 70 (figures for March 2000).

Participation rates by gender and age group can be estimated on the basis of the observed characteristics of the population in March 2000. In order to take account of the joint effect of diploma and status, we examined the composition of the population according to the combination of these two dimensions, for each generation. It was then possible to estimate the evolutions in participation rates for older workers stemming from composition effects alone. These estimates clearly do not constitute forecasts. They assume both that the structure in terms of qualification and status for a generation is

unchanged over time and that participation behaviour[10] by category and by age group remains identical to that observed in 2000.

The observed structure of the population makes it possible to suppose that participation rates for the over-55s may increase slightly in the next 20 years. This increase would mainly affect women, largely because of the rise in qualification levels. However the rise would be very small: at most three points for women aged between 55 and 59, and only 0.7 of a point for men in this age group.

Table 5: Participation rates estimated on the basis of qualification level and status and observed participation rates in March 2000.

En %	Men aged 55 to 59	Women aged 55 to 59	Men aged 60 to 64	Women aged 60 to 64
2000	65,8	51,9	15,5	13,5
2005	66,9	53,9	16,9	14,2
2010	66,5	54,4	17,6	15,0
2015	66,9	54,6	17,0	15,3
2020	66,5	54,9	16,8	15,3

10 As well as the mortality rate by category of diploma.

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Annex 1 : estimation of a Granger causality test between unemployment rate and participation rate.

Estimation for participation rate of men (55-59 age group)

	France	Japan	Spain	Netherlands	W Germany	United States
B1	0,35 (1,99)	0,20 (1,05)	0,66 (3,43)	0,22 (0,86)	-0,09 (-0,54)	0,15 (0,96)
B2	0,22 (1,23)	-0,02 (-0,12)	-0,20 (-1,25)	0,23 (0,91)	0,26 (1,61)	0,19 (1,34)
C1	0,06 (0,51)	0,09 (0,67)	-0,13 (-1,64)	-0,18 (-1,27)	0,01 (0,09)	0,00 (0,05)
C2	0,15 (1,38)	-0,05 (-0,36)	0,15 (1,74)	0,14 (0,98)	0,00 (0,03)	0,08 (1,50)
D	-0,28 (-3,29)	-0,23 (-2,15)	-0,31 (-3,02)	-0,24 (-1,24)	-0,41 (-2,84)	-0,38 (-3,48)
R2	0,45	0,24	0,20	0,30	0,46	0,20
DW	1,96	1,82	1,70	1,88	2,01	1,70
Test C1=C2=0	2,47	0,53	4,35	1,70	0,02	2,24
Wald (Pvalue)	(0,29)	(0,77)	(0,11)	(0,43)	(0,99)	(0,33)
Test C1=C2=D=0	5,2	6,27	17,61	2,89	8,11	14,74
Wald (Pvalue)	(0,16)	(0,10)	(5,E-04)	(0,41)	(0,04)	(2,E-03)

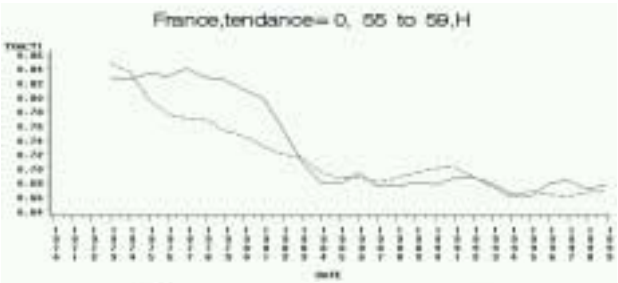
Estimation by OLS, the Student statistics are given between parentheses.
For the test, the value of the Wald statistic is given, the Pvalue is between parentheses.

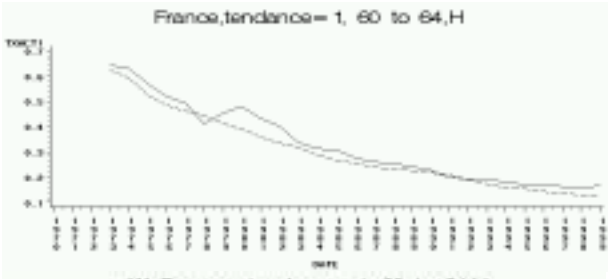
Estimation for participation rate of men (60-64 age group)

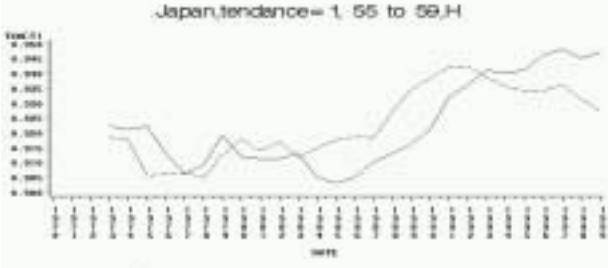
	France	Japan	Spain	Netherlands	W Germany	United States
B1	0,20 (1,14)	-0,16 (-0,90)	0,15 (0,83)	0,19 (0,74)	0,21 (1,19)	0,37 (1,89)
B2	-0,07 (-0,41)	0,22 (1,19)	-0,01 (-0,04)	0,14 (0,55)	0,16 (1,14)	0,18 (0,92)
C1	-0,11 (-0,59)	0,08 (0,55)	0,03 (0,40)	-0,04 (-0,18)	-0,01 (-0,18)	-0,02 (-0,32)
C2	-1,E-05 (0,E+00)	-0,10 (-0,71)	-0,01 (-0,15)	0,01 (0,03)	0,02 (0,31)	0,03 (0,49)
D	-0,48 (-3,24)	-0,22 (-1,67)	-0,41 (-3,60)	-0,26 (-1,45)	-0,38 (-2,75)	-0,18 (-1,82)
R2	0,26	0,38	0,32	0,11	0,66	0,40
DW	1,83	1,92	1,92	1,80	1,86	1,81
TEST C1=C2=0	0,35	0,89	0,16	0,04	0,15	0,35
Wald (Pvalue)	(0,84)	(0,64)	(0,92)	(0,98)	(0,93)	(0,84)
TEST C1=C2=D=0	15,99	8,29	16,70	2,60	27,96	5,20
Wald (Pvalue)	(1,E-03)	(0,04)	(8,E-04)	(0,46)	(1,E-04)	(0,16)

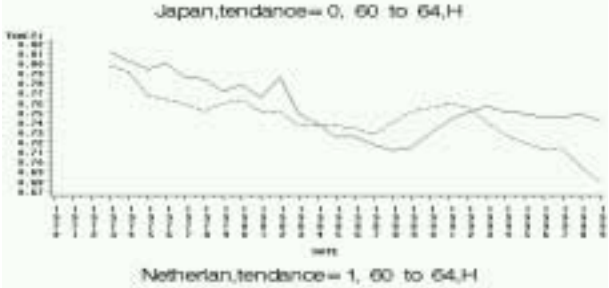
Estimation by OLS, the Student statistics are given between parentheses.
For the test, the value of the Wald statistic is given, the Pvalue is between parentheses.

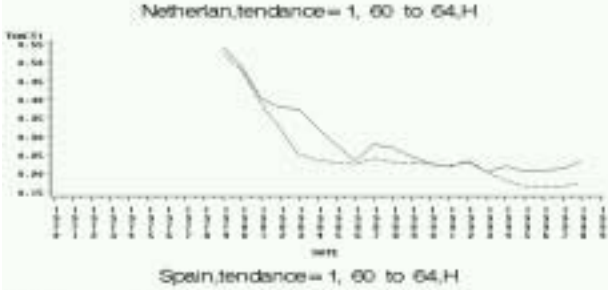
Annex 2 : estimated and observed participation rate by the long term relation, by age group.

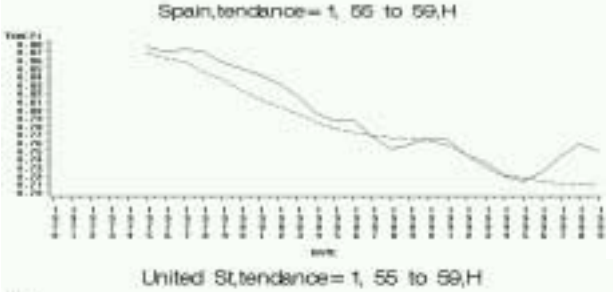


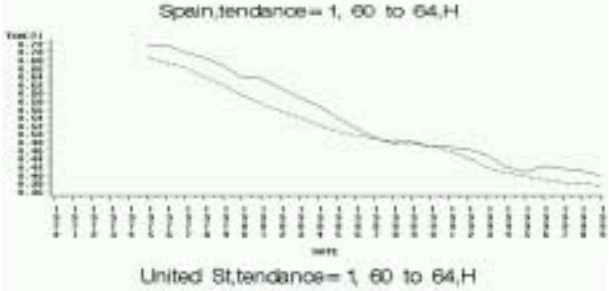


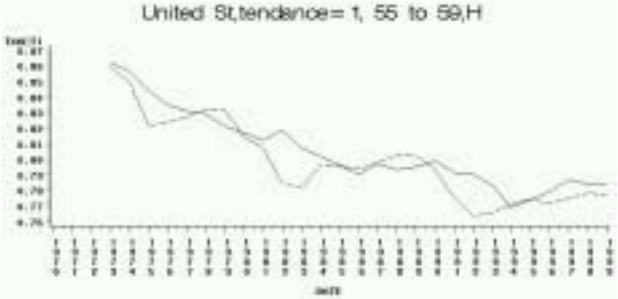


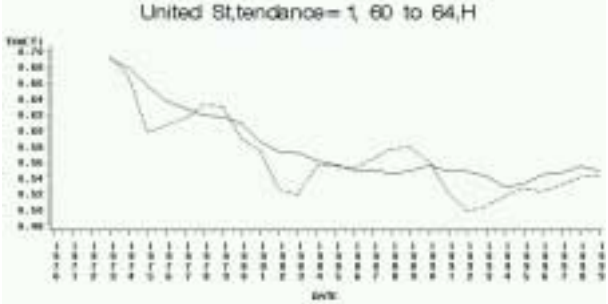












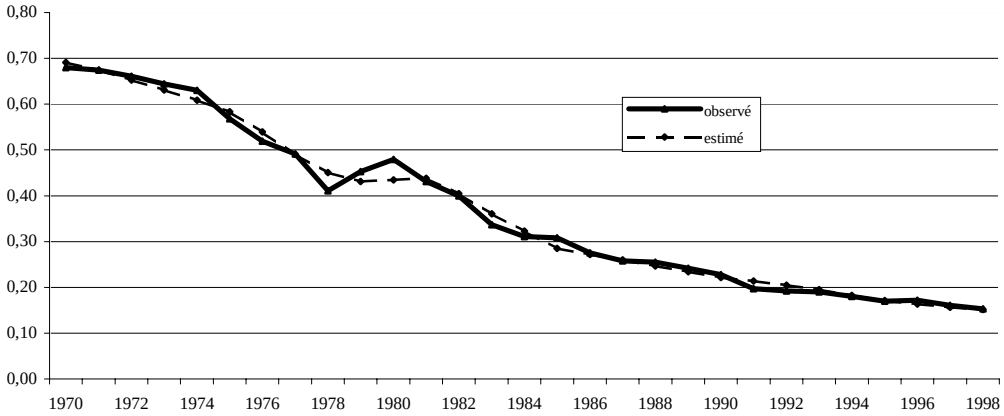
Annex 3 : estimations by ONLLS of participation rates for men and women (60-64 age group).

	Men	Women
initial rate: tx0	0,81	0,39
	(13,35)	(7,72)
final rate: tx1	0,12	0,14
	(3,89)	(7,73)
A	-1,58	-1,38
	(-3,99)	(-1,61)
B	0,16	0,13
	(6,49)	(3,07)
Period dummy 1983-1999		-0,02
		(-2,07)
Average age of 60-64 age group	-0,12	-0,05
	(-4,09)	(-3,44)
ratio of early retirees (60-64 age group)	-0,33	-0,17
	(-1,59)	(-1,81)
R2	0,99	0,99
Durbin Watson	1,81	1,74

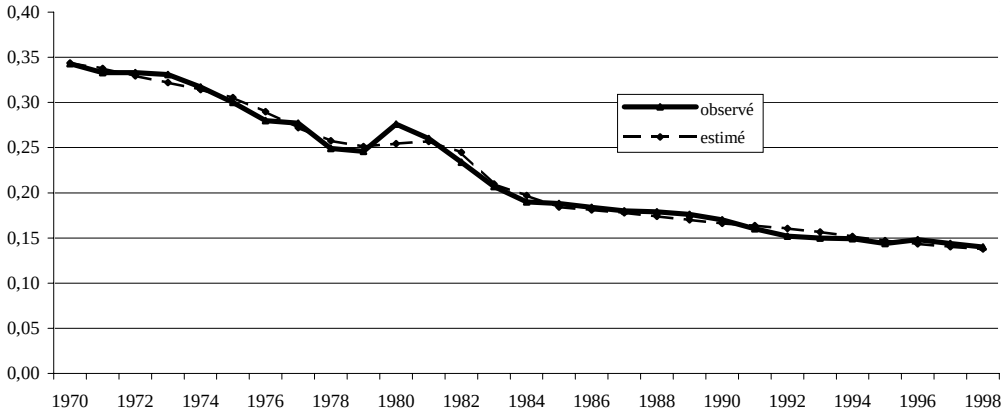
Reading : estimation by the ordinary non linear least squares of the equation :

$txact_t = tend_t + c*(agmoy_t^{60-64} - 62) + d*txprer_t^{60-64} + e*ind_{83} + f*txcho_t + u_t$, where $tend_t$ is a logistic trend. The participation rate for men of 60-64 age group is described by a logistic trend. Its estimated initial rate is 0,81 and the estimated final rate is 0,12. When the ratio of early retirees is higher by one point, the participation rate of the men of this age group is reduced by 0,33.

Graph : observed and estimated participation rate for men of the 60-64 age group.



Graph : observed and estimated participation rate for women of the 60-64 age group.



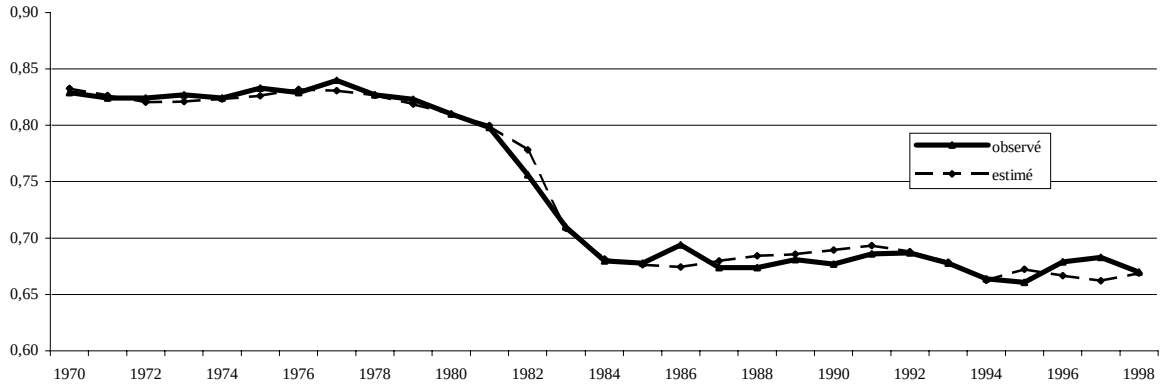
Annex 3 a : estimations by OLS and VI method of participation rates for men (55-59 age group).

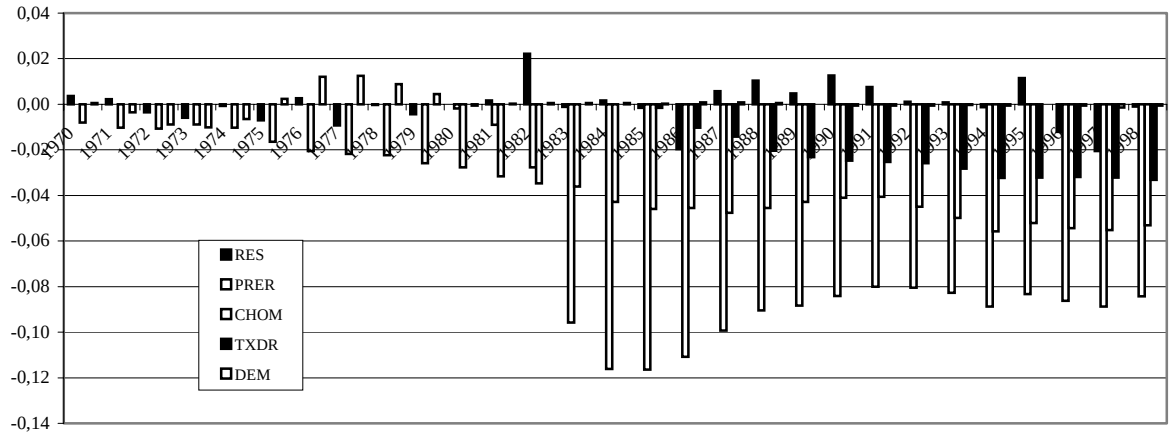
	MCO	VI 1	VI 2
Intercept	0,84 (124,67)	0,84 (114,50)	0,84 (84,41)
Ratio of early retirees (55-59 age group)	-1,24 (-10,91)	-1,27 (-8,99)	-1,36 (-8,92)
Ratio of those relieved of the obligation to seek work	-0,32 (-4,16)	-0,33 (-3,83)	-0,34 (-3,50)
Unemployment rate	-0,44 (-2,85)	-0,41 (-2,31)	-0,32 (-1,49)
Average age of the 55-59 age group - 57	-0,03 (-2,31)	-0,03 (-2,13)	-0,03 (-1,68)
R2	0,98	0,98	0,98
Durbin Watson	1,71	1,74	1,76
Regression of the ratio of the early retirees on the instruments : Wald Statistic obtained by a Holly-Sargan procedure		R2=0,92 ; F=71,25 W=0,13	R2=0,93 ; F=52,45 W=2,80
Regression of the ratio of the those relieved of the obligation to seek work on the instruments : Wald Statistic obtained by a Holly-Sargan procedure		R2=0,93 ; F=82,13 W=0,00	R2=0,95 ; F=68,74 W=0,03

VI 1 : the instruments are a temporal trend, the unemployment rate and the demographic weight of the age group (5 lags).

VI 2 : the instruments are the cost per head of early retirement, a temporal trend, the unemployment rate and the demographic weight of the age group (5 lags).

Graphs : observed and estimated participation rate for men of the 55-59 age group (OLS) and contribution of the variables (except intercept)to the level of the participation rate.





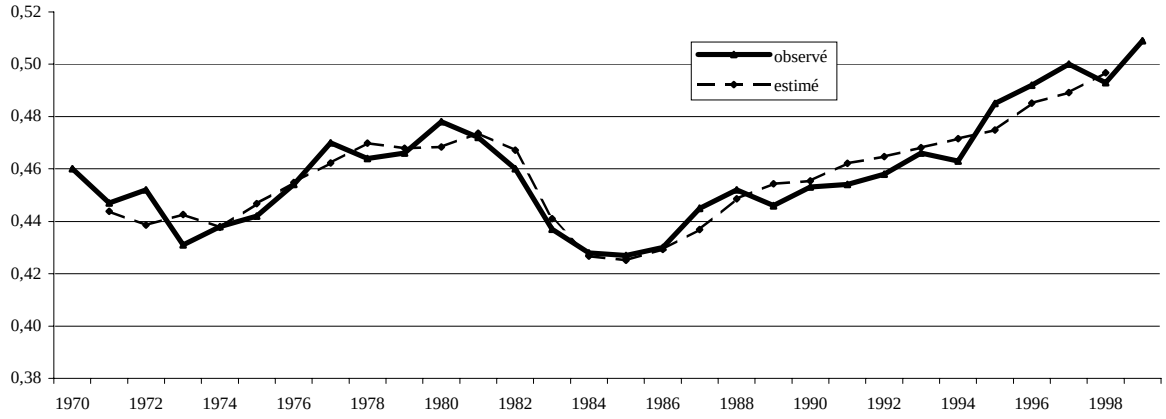
Annex 3 b : estimations by OLS and VI method of participation rates for women (55-59 age group).

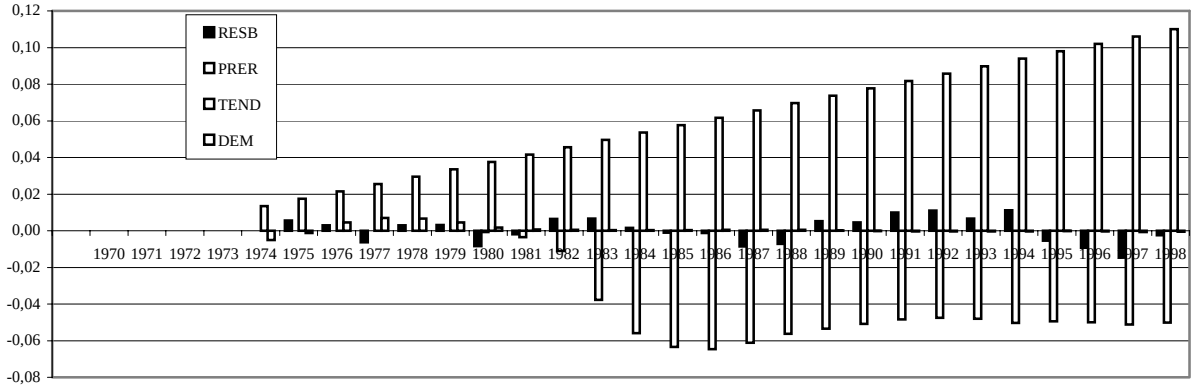
	MCO	**VI 1**	**VI 2**
Intercept	0,25	0,22	0,27
	(4,84)	(3,52)	(4,75)
Ratio of early retirees (55-59 age group)	-0,43	-0,34	-0,46
	(-4,70)	(-2,84)	(-4,22)
Temporal trend	$2*10^{-3}$	$2*10^{-3}$	$3*10^{-3}$
	(5,33)	(3,51)	(5,03)
Average age of the age group - 57	-0,01	-0,01	-0,02
	(-1,40)	(-1,53)	(-2,47)
AR term	0,42	0,49	0,36
	(3,52)	(3,54)	(2,73)
R2	0,89	0,88	0,91
Durbin Watson	1,99	2,10	1,44
Regression of the ratio of the early retirees on the instruments : Wald Statistic obtained by a Holly-Sargan procedure		R2=0,93 ; F=62,52 W=1,57	R2=0,93 ; F=42,25 W=0,04

VI 1 : the instruments are a temporal trend, the unemployment rate and the demographic weight of the age group (5 lags).

VI 2 : the instruments are the cost per head of early retirement, a temporal trend, the unemployment rate and the demographic weight of the age group (5 lags).

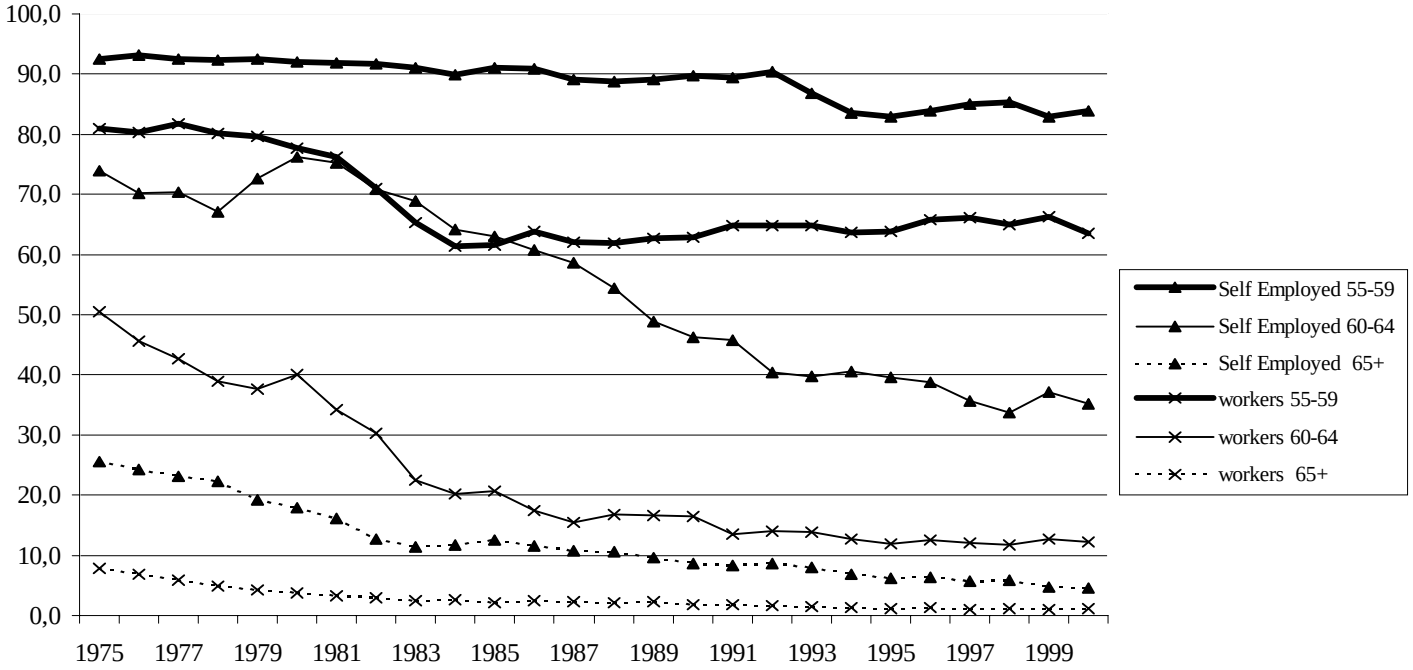
Graphs : observed and estimated participation rate for women of the 55-59 age group (OLS) and contribution of the variables (except intercept)to the level of the participation rate.



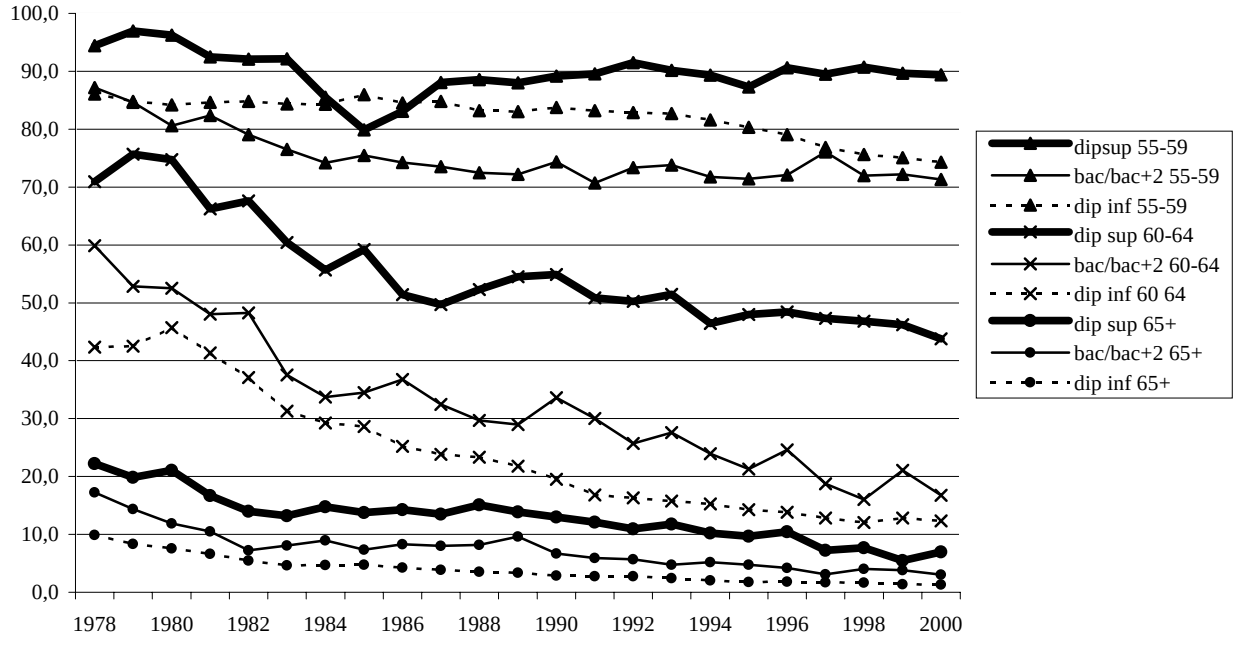


Annex 4 : Participation rates by age group and qualification level

Graph : changes in the participation rates for men by status and age group from 1975 to 2000.



Graph : Changes in the participation rates for men by qualification level and age group from 1978 to 1999.



Graph : changes in the participation rates for men by status and age group from 1975 to 2000.