

# **The difficulty in calibrating pension reforms: The case of the French basic scheme\***

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**(Preliminary version)**

## **Introduction**

As in many European countries, the sustainability of the French pension system is threatened by its population ageing. Hence, two types of reform have been adopted in France to secure the solvency of the pension schemes: the decrease in pensions' replacement rates and the tightening of pension eligibility conditions.

First, the 1993 pension reform has introduced two mechanisms reducing the amount of pensions: the increase in the number of earning years used in the pension calculation (from the 10 best years to the 25 best years) and the changes in the valorisation of past earnings and pensions in payment (from the average wage index to the consumer price index).

The 1993 and 2003 pension reforms have also reinforced incentives to delay retirement through two mechanisms: the increase in the length required to obtain a full pension, which implies the reduction of the pension benefit in the case of an early retirement; and the creation of the '*surcote*', which involves the increase in the pension in the case of working beyond the age of the full pension. The solvency of the French pension schemes depends largely on the effectiveness of this second reform.

The postponement of retirement age has been a long time coming. It is however still at an early stage to evaluate the incentive effects of these measures<sup>1</sup>. The first *ex-post* evaluation

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<sup>1</sup> The evaluation of the incentive effects of the French basic pension reforms raises several problems. First, the pension reforms are applied very progressively. For example, the 1993 reform will be completely applied only in 2008. Therefore identifying the impact on the retirement behaviours of the reinforcement of incentives is possible only after a certain time. Then evaluating the effectiveness of a reform before the application of another one is difficult. In addition, the effect of a reform on the retirement age requires a long time before being evaluated because of the differentiated retirement ages for the same generation.

of the 1993 reform [Bozio, 2005] highlights the relatively limited effect of the tightening of pension eligibility conditions on the retirement age. More precisely, Bozio (2005) has shown that the length of contribution can be reached without delaying the retirement. This results from existing gap between the length of contribution reported by the basic pension scheme and the actual length of contribution. The second length tends to be higher than the first one, and the gap seems to be less important when the would-be pensioners make some efforts to prove that administrative data are incomplete. The incentives to make these efforts are strengthened when pension eligibility conditions are tightened.

This effect, called ‘the disclosure effect’, raises the problem of the calibration of pension reforms owing to the underestimation of length of contribution by the pension schemes. The estimation of the actual average length of contribution per generation would provide some answer to when the 1993 and 2003 pension reforms will become effective.

This paper aims to provide an estimation of the time it would take to make the reform effective by using data from the French Labour Force Survey and the administrative and exhaustive data collected by the ‘*Caisse Nationale d’Assurance-Vieillesse*’ (the so-called CNAV).

We reconstitute the actual length of contribution of male using information reported in the French Labour Force Survey. We only focus on male whom the actual length of contribution could be better approached considering the available information. The lengths of contribution so reconstituted will be completed by information concerning the kind of retirements observed by the basic scheme (CNAV). We will not introduce any retirement behaviour model and will only suppose the stability of the distribution of pensions by kind of retirements.

This paper seeks to identify the average age of retirement per generation by making a forecast of the length contribution distribution and considering the *inertia* of the retirements’ distribution by kind of pensions. This forecast serves to provide an answer of when the age of retirement will be increasing.

The remainder of this paper is organized in three parts. The French basic pension scheme and the 1993 and 2003 reforms are covered in section 1. Section 2 presents and analyzes the data. We discuss the methodology and potential results and findings in section 3.

## 1. The French basic pension scheme of private sector

The French pension system is composed by a large number of schemes<sup>2</sup>. The French basic scheme of private sector (the so-called '*régime général*') concerns private sector wage-earning workers (about 70% of the labour force) which allows the workers to have access to a pension paid by the *Caisse Nationale d'Assurance Vieillesse* (CNAV). The pension calculation depends on some rules which have been changing in 1993 and 2003 (1.1). The calibration of these reforms has been made under particular circumstances (1.2).

### 1.1. Pension calculation

The calculation of the pension P is given as follows:

$$P = \tau * SAM * n/N,$$

where  $\tau$  is the pension rate, and SAM ('Salaire Annuel Moyen') is the reference wage. SAM is an average wage, which takes into account a certain number of earning years. The number of earning years has been drastically increasing over time: from 10 in 1993 up to 25 in 2008 (see table 1a, annex). The term  $n/N$ , named the '*coefficient de proratisation*' (prorated coefficient), is the ratio of  $n$  (i.e., the validated length of contribution measured in quarters) over  $N$  (i.e., the reference length measured in quarters). The ratio can reach 1 as a maximum value. The 1993 reform had not changed the  $N$  value whereas the 2003 did (see table 2a, annex).

$\tau$ , the pension rate which is calculated as follows:

$$\tau = 50\% * \delta * \sigma,$$

where  $\delta$  is the value of the '*décote*' and  $\sigma$  the value of the '*surcote*',

$$\delta = 1 - d * \{ \max (0 ; \min \{ (65-60) * 4 ; D-n \} \},$$

$$\sigma = 1 + s * \Sigma(n_{\text{sup}60-65})$$

The 1993 and 2003 reforms have increased the parameter  $D$ , the length of contribution required to obtain a full rate pension.  $D$  is equivalent of 150 quarters before 1993. It has been progressively increasing up to 160 quarters in 2003 until 164 quarters in 2012 (see table 2a, annex). The 2003 has also introduced a relation between  $D$  and a higher life expectancy.

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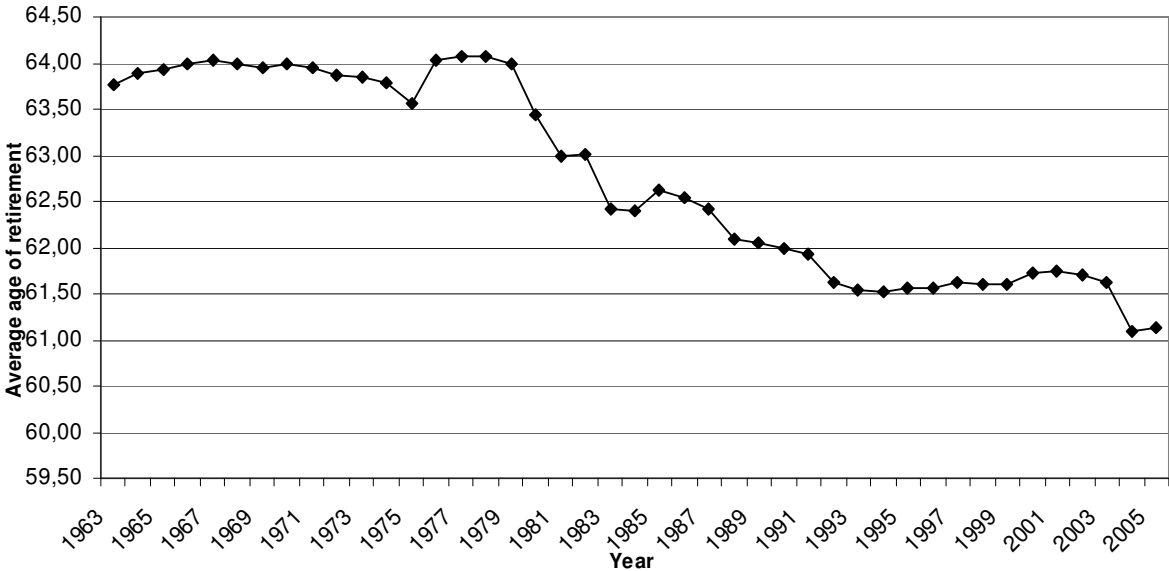
<sup>2</sup> For more details about the French pension system, see Benallah, Concialdi and Math (2003).

The parameter  $\sigma$  has been introduced during the 2003 reform.  $n_{\text{sup}60-65}$  is the number of quarters of contribution acquired beyond the number of quarters required (D), between 60 and 65 years. This allows an increase in the pension in the case of working beyond the ‘normal’ age of retirement.

**1.2. The discussion on the reforms’ calibration**

Increasing the necessary length of contribution to obtain a full rate pension amounts to reinforcing incentives to delay retirement. This increase aims to postpone the retirement age. Until now, this postponement has not been observed (figures 1 and 2).

**Figure 1. Average age of retirement since 1963**

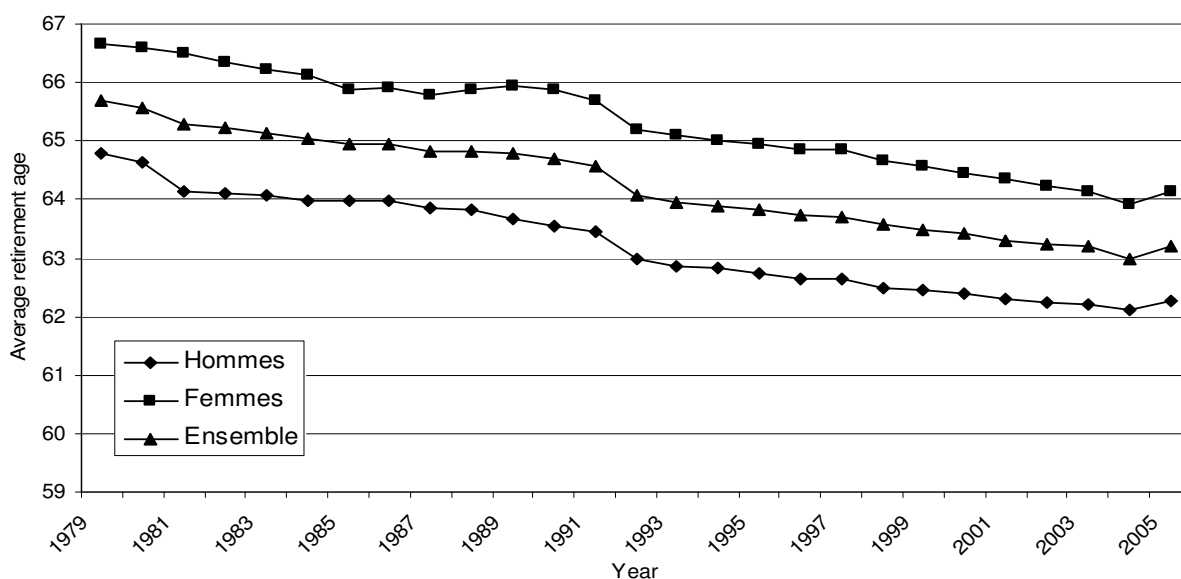


Source: Recueil de statistiques 2005, Caisse Nationale d’Assurance Vieillesse (2006).  
 Sample: All retirements, male and female.

This seeming failure could be explained by the ineffectiveness of incentive measures. Here, the apparent stability of the retirement age would be backed up with an increase in the number of pensioners having a reduced rate pension. The figure 5 shows it has not been that situation.

The temporary ineffectivity of the reforms can serve as a better explanation. The discussion preceding the reforms turned essentially on the possible rules’ changes maintaining the sustainability of the pension system. The postponement of the retirement age has been the most selected choice; however the extent of the increase in length of contribution differs from one report to another.

**Figure 2. Average age of retirement by gender since 1979**



Source: Recueil de Statistiques, Caisse Nationale d'Assurance Vieillesse.

Sample: Male and female, out of early retirements, retirements granted for disability or unfitness for work

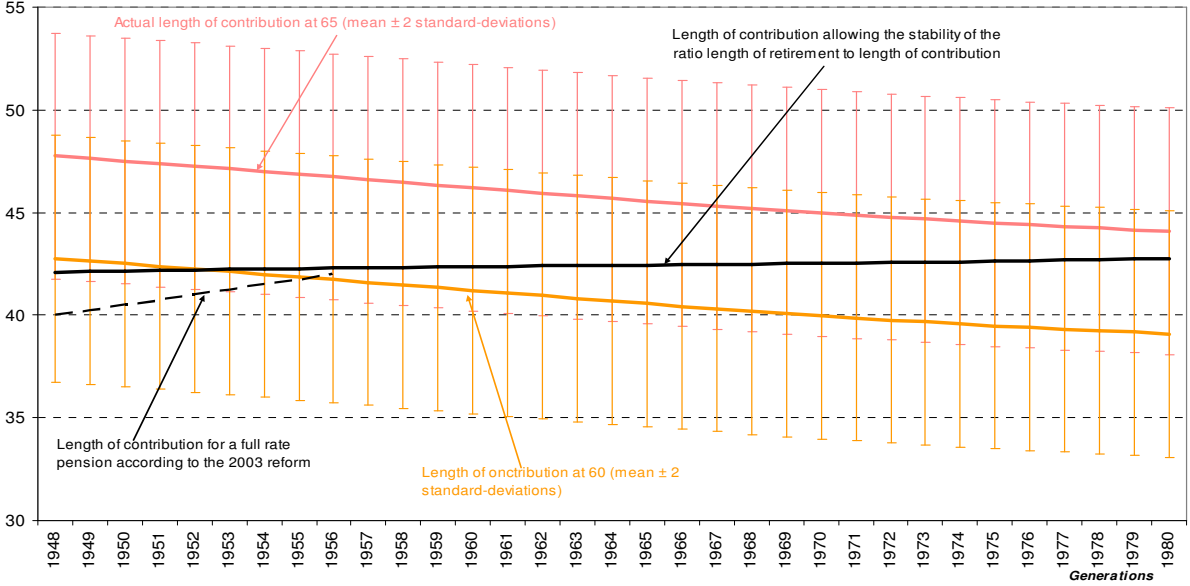
The '*Livre blanc sur les retraites*' (Commissariat Général du Plan – CGP – , 1991) has been the first report underlining the necessary tightening of eligibility conditions for a full pension. The report advocated a progressive increase in the length of contribution required to obtain a full pension. The advocated rise is up to one quarter per generation so the required length of contribution could reach 164 or 168 quarters (CGP 1991 pp.145). The 1999 CGP report, suggests a length of contribution equals to 170 quarters (CGP 1991 pp. 149). The Conseil d'Orientation des Retraites' (COR) reports suggest objective achievement in terms of retirement age. The first COR's report (2001) presents a figure (figure 11, p. 237) summarizing the extent of necessary retirement age postponement using several scenario. However, the extent of the increase in the length of contribution allowing this postponement is unclear.

Eventually, the 1993 and 2003 reforms have progressively increased the length up to 150 and 164 quarters (see table 2a, annex). Several studies have estimated the effectiveness of incentive measures on retirement age (Pelé and Ralle [1999], Bardaji and *alii* [2002], Bozio [2005] or Debrand and Privat [2006]). But the reforms' effectivity schedule raises some issues. The lengths of contribution are widely known. The data reported by the pension administrations do not allow a well-estimation of the lengths of contribution when the lengths are higher than required. According to Bozio (2005), this means a 'disclosure effect': the would-be pensioners are more encouraged to reveal an actual information about their length of contribution when this information allows them an early retirement, *a fortiori* when the full rate pension eligibility conditions are tightened.

Cornilleau and Sterdyniak [2003] have evaluated the reforms' effectivity schedule by using an average age at exit from schooling (figure 3). They show the 1993 and 2003 reform will become effective only from the generation 1955 (which will retire after 2015).

Similarly to Cornilleau and Sterdyniak (2003), we aim to evaluate the reforms' effectivity schedule, by using both Labour Force Surveys and CNAV data.

**Figure 3. Length of contribution allowing the stability of the ratio length of retirement to length of contribution, actual length of contribution 60 and 65 and length required**



Source: Cornilleau and Sterdyniak, 2003

**2. Data**

Our purpose is to use a combination of the data available in the French Labour Force Survey (2.1) and the data reported by the pension administration (2.2).

**2.1. The French Labour Force Survey**

The French Labour Force Survey is a database putting at disposal precious information about the workforce resources. Until 2002, the French Labour Force Survey has been conducted yearly. The households have been interviewed for three consecutive years. After, it was conducted continuously; the respondents were being interviewed for six consecutive quarters<sup>3</sup>.

We do only use surveys from the year 1990 to the year 2002. We keep in our dataset the subpopulation of male born between 1940 and 1965. In order to identify male receiving a

<sup>3</sup> For more details about the French Labour Force Survey, see Goux [2003].

pension granted from the basic scheme, we exclude from our analysis freelance male workers and male state employees.

We aim to estimate the lengths of contribution of the selected individuals. Disparities in the distance from retirement are very important among them. Some of them are retired in the 2002 survey (particularly among the generation 1940). Others (generation 1965) are only 35 in the 1990 survey.

**Table 1. Population selected in the labour force survey, per generation**

Generation	Labour Force Survey of the year...													Total
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
1940	675	679	683	716	680	716	751	780	737	741	759	724	707	9,348
1941	625	627	647	649	664	689	664	690	686	661	690	679	722	8,693
1942	732	728	702	696	739	737	738	753	785	800	782	768	764	9,724
1943	726	725	758	846	854	835	789	732	721	697	743	775	755	9,956
1944	774	741	808	813	821	805	814	771	762	772	772	820	773	10,246
1945	747	798	788	817	883	855	804	796	773	789	786	803	788	10,427
1946	1,001	1,025	1,029	1,060	1,053	1,041	1,025	996	1,025	1,014	1,018	984	952	13,223
1947	1,067	1,032	1,109	1,121	1,148	1,157	1,128	1,121	1,116	1,116	1,090	1,068	986	14,259
1948	1,106	1,092	1,106	1,214	1,182	1,116	1,104	1,108	1,079	1,062	1,055	1,068	1,068	14,360
1949	1,092	1,072	1,124	1,141	1,174	1,139	1,109	1,062	1,053	1,093	1,092	1,026	1,026	14,203
1950	1,086	1,060	1,118	1,185	1,182	1,177	1,122	1,121	1,074	1,098	1,089	1,071	1,038	14,421
1951	1,109	1,144	1,100	1,114	1,074	1,086	1,110	1,093	1,044	1,035	1,068	1,038	979	13,994
1952	1,030	1,078	1,122	1,171	1,151	1,106	1,129	1,096	1,081	1,078	1,043	961	950	13,996
1953	1,041	1,021	1,053	1,133	1,136	1,101	1,103	1,071	1,034	1,035	1,038	974	971	13,711
1954	988	993	1,058	1,102	1,093	1,065	1,110	1,061	1,043	1,057	1,105	1,090	1,030	13,795
1955	989	987	983	1,086	1,116	1,114	1,083	1,058	1,041	1,012	1,037	987	963	13,456
1956	999	977	1,018	1,086	1,114	1,102	1,142	1,082	1,088	1,054	1,087	1,048	1,040	13,837
1957	1,007	1,022	999	1,076	1,085	1,117	1,145	1,115	1,094	1,084	1,037	1,019	994	13,794
1958	1,029	1,047	1,081	1,129	1,133	1,084	1,119	1,101	1,049	1,058	1,035	1,017	1,013	13,895
1959	1,066	1,026	1,059	1,141	1,212	1,168	1,143	1,104	1,142	1,140	1,096	1,051	1,061	14,409
1960	1,121	1,156	1,129	1,169	1,180	1,229	1,198	1,164	1,137	1,102	1,085	1,070	1,005	14,745
1961	1,084	1,049	1,062	1,069	1,132	1,170	1,235	1,167	1,156	1,107	1,057	980	968	14,236
1962	1,057	1,067	1,047	1,111	1,112	1,121	1,127	1,127	1,071	1,077	1,093	1,066	1,036	14,112
1963	1,058	1,068	1,108	1,183	1,225	1,180	1,162	1,174	1,151	1,174	1,130	1,137	1,087	14,837
1964	1,071	1,101	1,125	1,170	1,225	1,209	1,222	1,138	1,154	1,126	1,120	1,129	1,071	14,861
1965	1,082	1,057	1,139	1,178	1,206	1,220	1,205	1,121	1,155	1,144	1,149	1,158	1,154	14,968

Source: French Labour Force Surveys (INSEE), from 1990 to 2002.

Sample: Male, nor freelance workers and state employees.

Estimating lengths of contribution for male requires minimal information: the generation (identified by the year of birth), the age at exit from schooling (as a proxy of the age at entry in the labour force), and the situation in the labour market (in order to exclude male freelance workers and male state employees). The length of contribution is measured as the difference (in terms of years) between the age of retirement and at exit from schooling<sup>4</sup>. We consider that unemployment has no consequences on the validation of contribution quarters. Indeed, a large part of unemployment or illness periods are considered for the validation of contribution quarters. On the other hand, the inactivity periods are not validated. These periods are more frequent for female workers. It is then more hazardous to reconstitute their lengths of contribution. That is the reason why we exclude female from our analysis which limit us dealing with half the issue.

Finally, we have a significant sample to conduct our statistical analysis. The distribution of this sample per generation and by survey is displayed in table 1.

The proportion is about a thousand males by survey and per generation. It appears that the proportion varies from 8,693 for 1941 generation to 14,968 for 1965 generation. This variation is partially due to the fluctuations in the sample selection but mostly due to some variation explained by demographic shocks, particularly the fertility and the immigration fluctuations.

In the French Labour Force Survey, the households can be weighted, so that our sample can be representative of metropolitan France. The table 2 shows the results of this weighting. We use this sample to make our projection.

**Table 2. Weighted population selected, by generation**

<b>Generation</b>	<b>1940</b>	<b>1941</b>	<b>1942</b>	<b>1943</b>	<b>1944</b>	<b>1945</b>	<b>1946</b>	<b>1947</b>	<b>1948</b>	<b>1949</b>	<b>1950</b>	<b>1951</b>	<b>1952</b>
Population	230.5	216.8	243.7	251.7	259.1	264.7	332.6	357.4	358.9	356.8	362.5	349.9	350.8
<b>Generation</b>	<b>1953</b>	<b>1954</b>	<b>1955</b>	<b>1956</b>	<b>1957</b>	<b>1958</b>	<b>1959</b>	<b>1960</b>	<b>1961</b>	<b>1962</b>	<b>1963</b>	<b>1964</b>	<b>1965</b>
Population	345.7	345.3	340.3	346.3	347.7	348.0	364.3	374.2	360.9	361.1	378.9	381.2	389.8

Units: in thousands.

Source: French Labour Force Surveys (INSEE), from 1990 to 2002.

Sample: Male, nor freelance workers and state employees.

## 2.2. The administrative data

The current paper relies on the analysis of information from Labour Force survey related to the administrative data collected by the Caisse Nationale d'Assurance-Vieillesse.

The data consists of all retirements registered by the CNAV during the year 2005. These retirements include generations from 1925 to 1950. The repartition per generation is described

<sup>4</sup> Several studies use the age at exit from schooling as a proxy of the age at entry in the labour force (see Hairault and *alii* [2004] and Buffeteau and Godefroy [2005]).



in table 3. This exhaustive file provides precise information about the career development, the earnings, the pensions and some individual characteristics.

The average age of retirement is 61.2. It was 61.4 in 2004. The seeming decrease of the retirement age is partly due to the 2003 reform that has offered the possibility to retire before the age 60 for all people having begun their career very soon. The age is different for male and female (respectively 60.7 and 61.8).

**Table 3. Population retired in 2005**

<b>Generation</b>	<b>1925</b>	<b>1926</b>	<b>1927</b>	<b>1928</b>	<b>1929</b>	<b>1930</b>	<b>1931</b>	<b>1932</b>	<b>1933</b>	<b>1934</b>	<b>1935</b>	<b>1936</b>	<b>1937</b>
Population	87	122	117	151	172	241	255	299	427	474	688	922	1,236
<b>Generation</b>	<b>1938</b>	<b>1939</b>	<b>1940</b>	<b>1941</b>	<b>1942</b>	<b>1943</b>	<b>1944</b>	<b>1945</b>	<b>1946</b>	<b>1947</b>	<b>1948</b>	<b>1949</b>	<b>1950</b>
Population	1,932	9,786	31,559	6,957	9,074	12,373	36,569	143,921	21,353	19,800	25,334	12,268	106

Source: CNAV data.

Sample: Male having validated at least 16 quarters in the basic scheme.

There are different types of retirements as shown in table 4. The major part of retirements concerns pensions granted at 60 with a full rate pension (32% of retirements registered in 2005). Disability pensions or pensions for unfitness for work represent 13% of retirements.

**Table 4. Retirements by kind of pensions (in %)**

<b>Unfit for work and Disability</b>	<b>Reduced pensions</b>	<b>Early retirement</b>	<b>Full pension at 60</b>	<b>Full pension at 61-64</b>	<b>Full pension at 65</b>	<b>Full pension after 65</b>
13	5	20	32	15	10	5

Source: 2005 CNAV data.

Sample: Male having validated at least 16 quarters in the basic scheme.

We will use this repartition related to the sample selected in the Labour Force Survey to make the forecast of lengths of contribution (we consider this repartition will be steady, as it was during the last 20 years – see figure 1a, annex –). Before, we had to select a sample comparable to the ‘nor freelance workers and nor state employees’ selected in the Labour Force Survey. In the administrative database, many pensioners have validated only a small part of their contribution quarters in the basic scheme. So they mainly receive a pension granted by another scheme. In order to exclude these individuals, we have selected male having validated at least 16 quarters of contribution in the basic scheme.

### 3. Methodology and Results

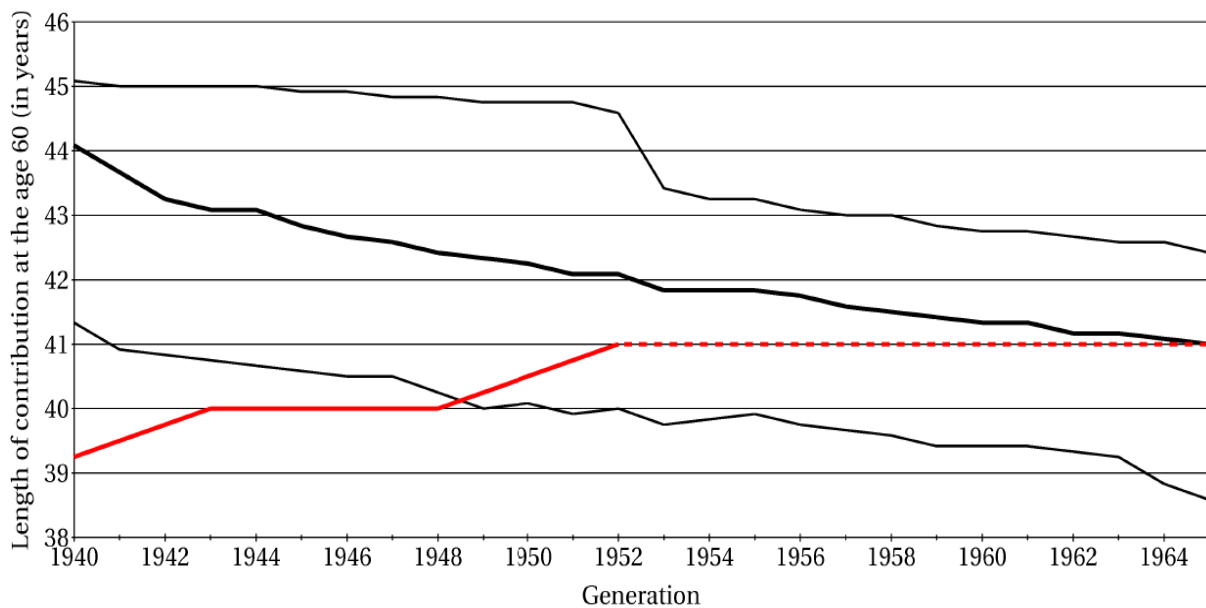
Our paper consists of two kinds of work: an estimation of the male's lengths of contribution for generations 1940 to 1965 (3.1) and a projection of the average age of retirement of these generations (3.2).

#### 3.1. A distribution of the male's lengths of contribution by generation

By using the age at exit from schooling as a measure of the length of contribution, we consider the highest level of this length. However, this measure remains imperfect. On the one hand, it includes unemployment or inactivity periods that we can't quantify using our data. On the other hand it excludes all individuals whom age is not reported. Finally, according to the information reported, some people did never study. Therefore, we have been considering an age at exit from schooling at 14 and 16. This hypothesis raises an issue regarding the foreigners who 'have never studied' and have begun working in France late.

Considering the limits of our exercise, we have estimated the lengths of contribution at 60 by generation (figure 4). The figure 4 shows high lengths of contribution at 60. The median length of the generation 1940 is 44 but then starts decreasing. This decrease is apparently more important for the generations 1946-1953. Then, the median length slows down for the next generations. The median length decreases by 4 quarters in the first 4 generations at first; then in the next 8 generations; and in the last 13 generations.

**Figure 4. Lowest quartile, mediane and highest quartile of the male's length of contribution at 60, by generation**



Source: Labour Force Surveys from 1990 to 2002.

Sample: Male, nor freelance workers and state employees.

The figure 4 also shows the decrease is not steady across generations. The highest quartile of the length of contribution is not going down at first. The decrease occurs for generations born after 1952 for which the minimal legal age at exit from schooling has been fixed at 16.

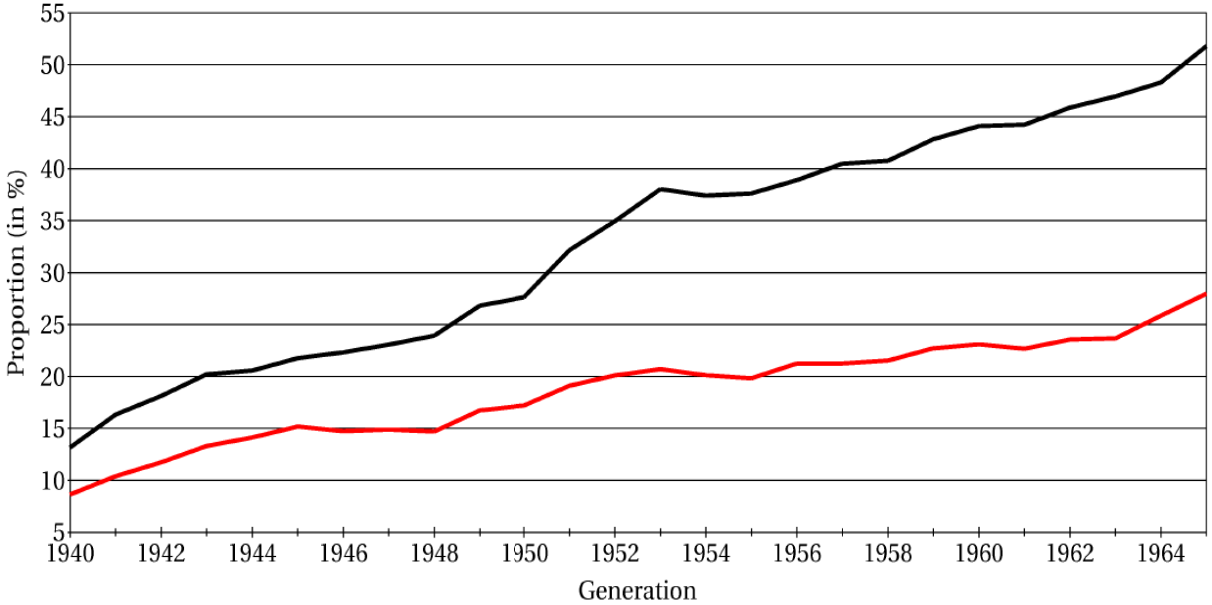
So we have an important proportion of male, born in 1940's, starting working in their early youth. For the next generations, the highest quartile and the median evolve at the same rhythm: the lengthening of the studies' duration has been evolving steadily for low and medium level of studies.

However, the lowest quartile evolves irregularly. It decreases at slow rate from the 1949 to the 1955 generations.

The red line (see figure 4) shows the length of contribution required to obtain a full rate pension. This length has no restricting impact for the first generations. As long, we can observe a scissors effect: the median length of contribution is decreasing; while the median length required is increasing. This scissors effect would mean a postponement of retirement.

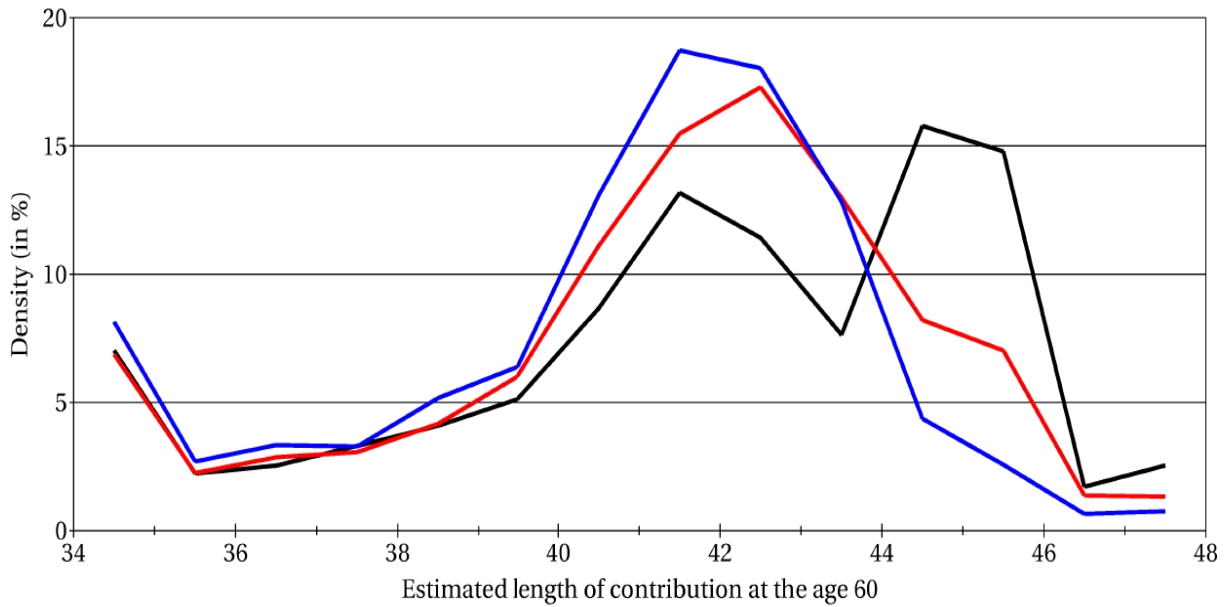
The figures 5, 6 and 7 show precisely the distribution of lengths of contribution.

**Figure 5. Proportion of a generation having not obtained the “full rate” at 60 (black line) and at 62 (red line)**



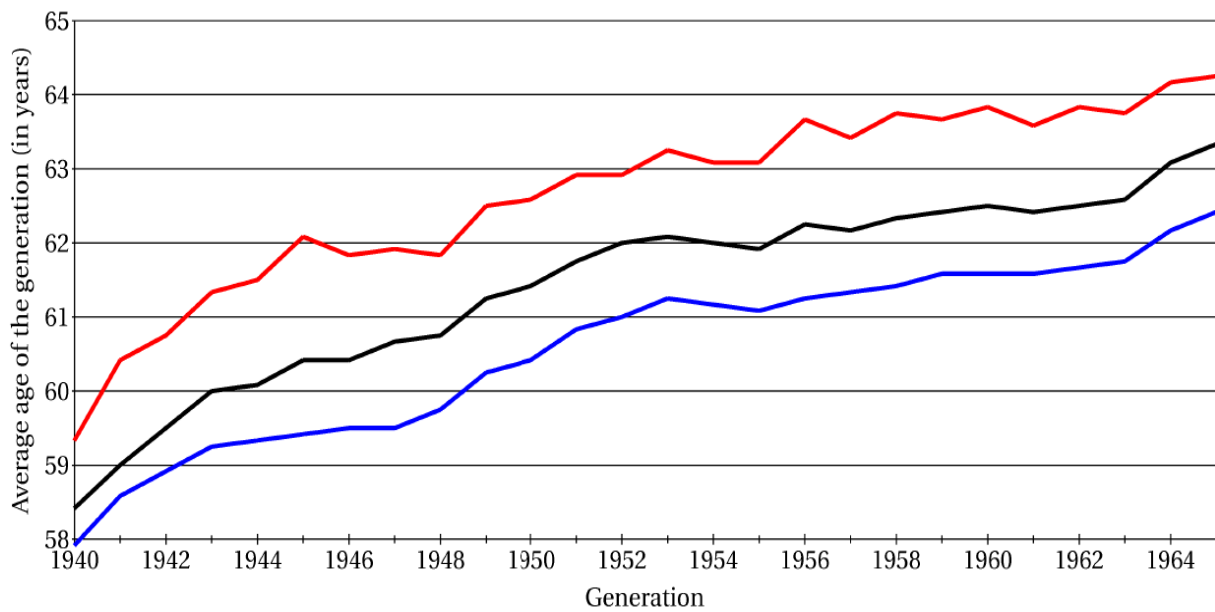
Source: Labour Force Surveys from 1990 to 2002.  
 Sample: Male, nor freelance workers and state employees.

**Figure 6. Distribution of an estimated length of contribution at 60 for the male of the generations 1950 (black line), 1955 (red line) and 1960 (blue line)**



Source: Labour Force Surveys from 1990 to 2002.  
 Sample: Male, nor freelance workers and state employees.

**Figure 7. Average age at wich 75% (blue line), 80% (black line) and 85% (red line) of the generation obtain the length of contribution required to have a full pension, by generation**



Source: Labour Force Surveys from 1990 to 2002.  
 Sample: Weighted male, nor freelance workers and state employees.

### 3.2. Projection of retirements

The Labour Force Surveys and CNAV data are linked as follows: retirement behaviours, as described in the table 4, are related to the estimation of the generations' size, as shown in the table 3. The distribution of the retirements is then given by generation (see table 5).

**Table 5. Kind of retirements in 2005 for male, per generation**

Generation	1938 and less	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948 and more
Age	67 and more	66	65	64	63	62	61	60	59	58	57 and less
Unfit for work			331 ε %	750 ε %	1,093 ε %	1,435 ε %	4,137 1 %	15,102 5 %			
Disabled							2,020 1 %	17,748 6 %			
Reduced rate			268 ε %	439 ε %	734 ε %	1,180 ε %	3,941 1 %	9,144 3 %			
Early retirement									20,858 5 %	19,334 5 %	37,055 9 %
Retirement after the age 65	4,779 2 %	7,982 3 %	25,058 9 %								
Full rate pension at the ages 60-64				5,140 2 %	6,544 2 %	8,929 3 %	24,406 8 %	95,087 31 %			

Sources: CNAV and labour force surveys.

Sample: Male having validated at least 16 quarters at the basic scheme, *i.e.* 314,498 individuals.

We identify the population concerned by the different types of retirement in the labour force surveys (potential population in the table 6) according to the distribution given from the 2005 CNAV data (target in the table 6). The retirement rate by generation is thus the percentage of the potential population selected in order to reach the target. It is a random and sequential selection. Indeed, the individuals selected are not chosen according to their individual characteristics (except for the eligibility to the kind of retirement). Otherwise, the individuals not selected in the sequence are automatically transferred in the next sequence. The retirement rates stay the same throughout the simulation.

**Table 6. Calculation of retirement rates**

<b>Kind of retirements</b>	<b>Proportion of the generation</b>		<b>Rate</b>
	<b>Potential</b>	<b>Target</b>	
Early retirement at the age 57	36	9	25
Early retirement at the age 58	29	5	17
Early retirement at the age 59	40	6	15
Retirement for disability or unfitness for work at the age 60	93	11	12
Full pension at the age 60	61	32	53
Reduced rate pension at the age 60	19	3	16
Retirement for disability or unfitness for work at the age 61	49	2	4
Full pension at the age 61	27	8	31
Reduced rate pension after the age 60	19	2	11
Full rate pension at the age 62	9	3	32
Full rate pension at the age 63	6	2	34
Full rate pension at the age 64	4	2	56
Retirement at the age 65	15	10	63
Retirement at the age 66	5	3	56
Retirement at the age 68	2	2	100

Units: In % of the generation and in % of the potential population for the retirement rate.

Source: authors' calculations (from the CNAV data and the labour force surveys).

The distribution of simulated retirements by kind of pensions and generation is given in table 7. The proportion of male early retired (at 57, 58 or 59) would significantly decrease through generations. This decrease is due to the diminution of the potential population because of the increase in the age at exit from schooling.

The potential population of disabled and unfit for work retiring at 60 would increase. This result corroborates Bozio's results regarding the growing proportion of pensions granted for disability or unfitness for work: *"The probability to have disability pensions or pensions for unfitness rises by as much as 13 to 15 % when the individual is constrained by the reform"*.

The two retirement age 'peaks' would evolve in opposite direction. More precisely, the proportion of a generation retiring at 60 with a full pension would decrease from 32% to 21% by 10 generations. Conversely, the retirement at 65 with a full pension would concern 26% of the generation 1955 while it only concerned 10% of the 1945 generation.

**Table 7. Simulated retirements, by kind of retirements and generation**

Kind of retirements	Generation 19...																		
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Early retirement at 57												9	9	9	8	7	5	5	4
Early retirement at 58											5	5	5	4	4	4	3	2	2
Early retirement at 59										6	5	5	4	4	4	4	4	3	3
Retirement for disability or unfitness for work at 60									11	10	10	10	10	10	10	10	11	11	11
Full pension at 60									32	29	26	26	24	23	21	20	21	21	21
Reduced pension at 60									3	3	3	3	4	4	4	5	5	5	5
Retirement for disability or unfitness for work at 61									2	2	2	2	2	2	2	2	2	2	2
Full pension at 61									8	7	6	6	5	5	4	4	4	4	4
Reduced pension after 60									2	2	2	2	2	3	3	3	3	4	4
Full pension at 62								3	5	4	4	3	3	3	2	2	2	1	1
Full pension at 63						2	2	3	2	2	1	1	1	1	1	1	1	1	1
Full pension at 64					2	2	2	3	2	2	1	1	1	1	ε	ε	ε	ε	ε
Retirement at 65				10	11	13	13	17	17	17	17	18	19	21	22	24	26	26	26
Retirement at 66			3	3	4	4	4	5	5	5	6	6	6	7	7	8	8	8	
Retirement at 68	2	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6			

Units: in % of the concerned generation.

Source: authors' calculations (from the CNAV data and the labour force surveys).

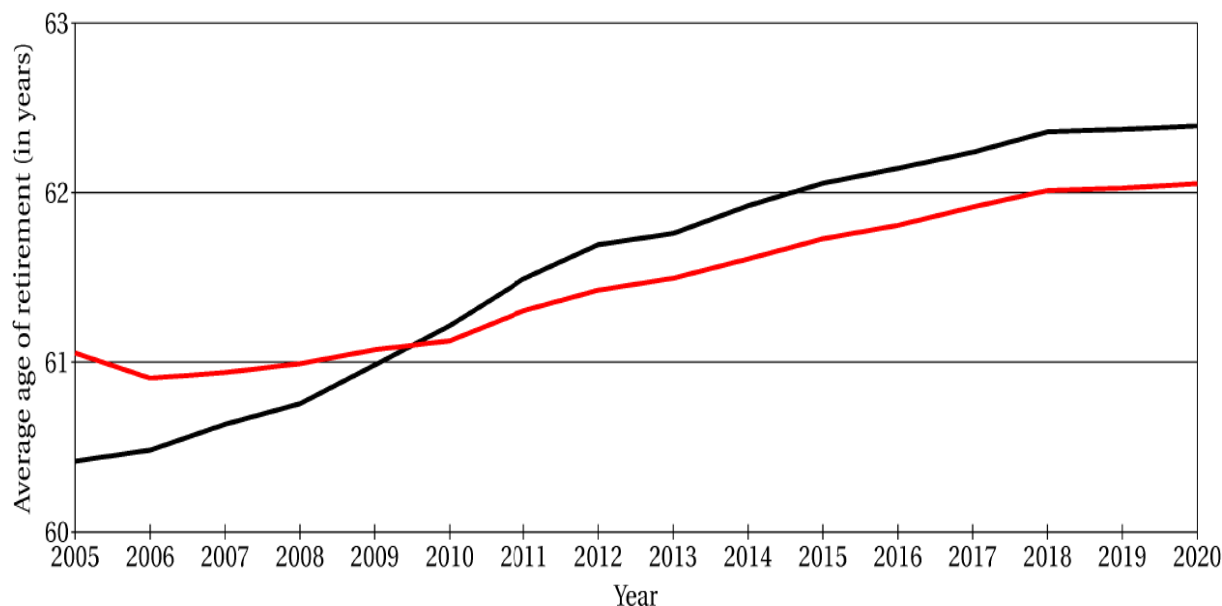
Using this repartition of retirements, we have simulated an average age of retirement by generation (figure 9) and the number of retirements per year from 2005 (figure 10).

The average retirement age would increase from 2006 under the effect of the decrease of early retirements. But a rise due to the reinforcement of incentives to delay retirement would only appear in 2010.

After 2010 and without early retirements, the age of retirement would regularly increase up to 62. Considering early retirements, the average age of retirement would exceed 62 from 2014.

The impact of early retirements also appears in the figure 10. Without early retirements, the number of pensions that will be paid by the CNAV would increase by 100,000 from 2005 to 2020. The early retirements smooth the number of retirements. The rise would be by 65,000, from 315,000 retirements in 2005 up to 380,000 retirements in 2020.

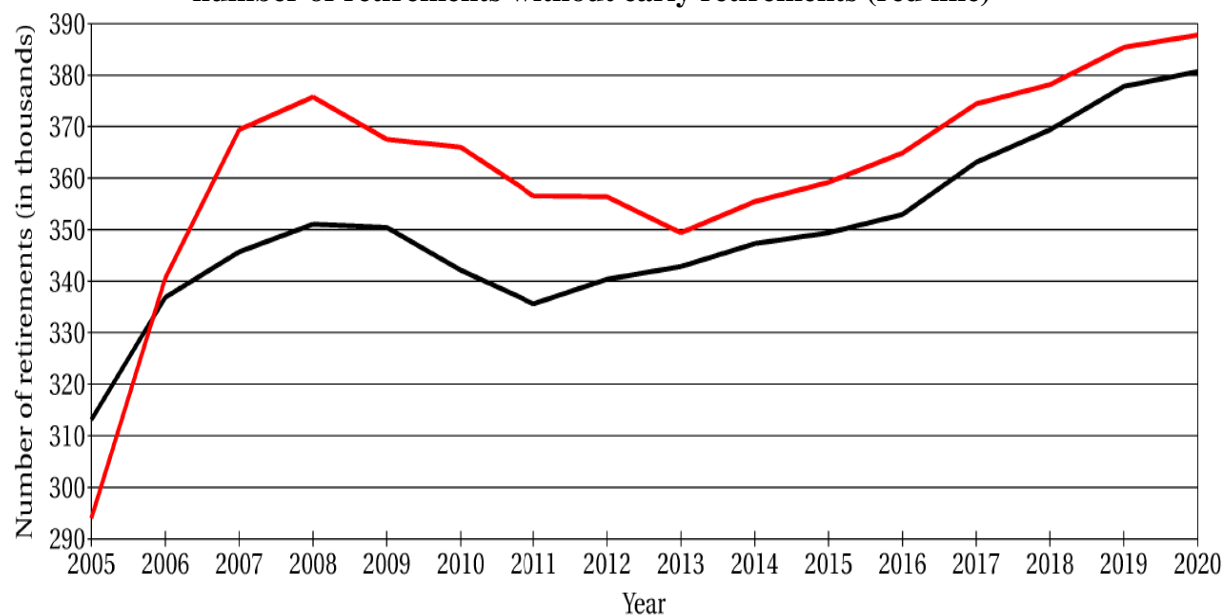
**Figure 8. Simulated male's average age of retirement in the basic scheme (black line), average age without early retirements (red line)**



Sources: CNAV data and labour force surveys.

Sample: Male having validated at least 16 quarters at the basic scheme.

**Figure 9. Simulated number of male's retirements in the basic scheme (black line), and number of retirements without early retirements (red line)**



Sources: CNAV data and labour force surveys.

Sample: Male having validated at least 16 quarters at the basic scheme.



## **Conclusion**

In this preliminary paper, we have simulated the evolution of the lengths of contribution per generation. The current paper aims to compare the different lengths per generation with the one required in order to know how 1993 and 2003 reforms will become effective.

Our results show that the length of contribution required would be higher than the median one from the generation 1965. The retirement age would decrease under the effect of incentive measures only from 2010.

However this work faces several limits. First, as we have only been dealing with a male sample, the current results remain restrictive. Otherwise the calculated lengths of contribution might be overestimated. Indeed, the impact of unemployment and inactivity periods on contribution lengths, which would become more frequent, is underestimated.

Finally, we have considered the repartition of retirements per kind of pensions as steady over the time. This raises an important issue: the retirements depend on the individual characteristics. We have forecasted the lengths of contribution and retirements without considering these characteristics. More precisely, the proportion of people who would retire with a reduced pension could significantly evolve, particularly under the effect of pension reforms. Our coming works will deal with the analysis of this evolution. This analysis will allow a better knowledge on the effectiveness of incentive measures

## ANNEX

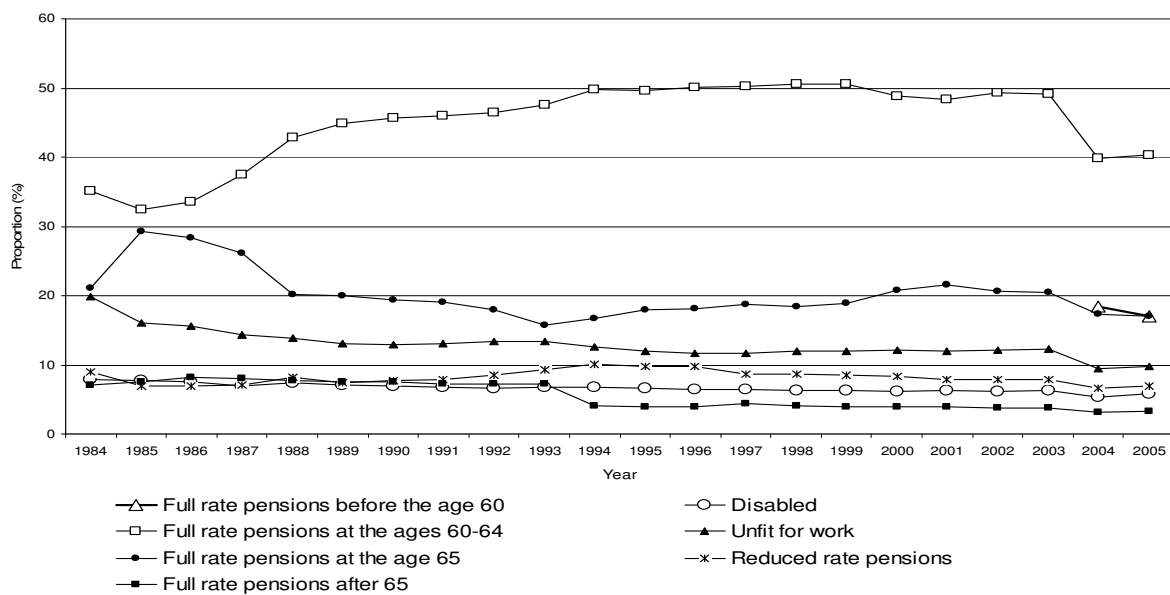
**Table 1a. Number of earning years considered for the SAM calculation**

<b>Year of Birth</b>	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
<b>Number of earning years</b>	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

**Table 2a. Full rate pension eligibility conditions after the 1993 and 2003 reforms.**

Year of birth	Number of quarters required for a full pension (D)	Reference length (N, in quarters)
<b>After the 1993 reform</b>		
<b>1934</b>	151	150
<b>1935</b>	152	150
<b>1936</b>	153	150
<b>1937</b>	154	150
<b>1938</b>	155	150
<b>1939</b>	156	150
<b>1940</b>	157	150
<b>1941</b>	158	150
<b>1942</b>	159	150
<b>1943</b>	160	150
<b>After the 2003 reform</b>		
<b>1944</b>	160	152
<b>1945</b>	160	154
<b>1946</b>	160	156
<b>1947</b>	160	158
<b>1948</b>	160	160
<b>1949</b>	161	161
<b>1950</b>	162	162
<b>1951</b>	163	163
<b>1952</b>	164	164

**Figure 1a. Repartition of retirements by kind of pensions, since 1984**



Source: Recueil de statistiques 2005, Caisse Nationale d'Assurance Vieillesse (2006).  
 Sample: All retirements, male and female.

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