Health and Early Retirement: Evidence from French Data for individuals

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Volume 31, Issue 1

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Abstract

Health status during the working life plays a major role in the retirement decision. Significant links between professional paths, retirement age and retirement conditions (disability pension, inability pension, reduced-rate pension, or full rate by age) can be highlighted by logistic models regressions and a typology of the professional careers of the 1940-generation of the French Social Security insured, whose the insurance period is insufficient to fulfill the full-rate pension criterion.

1. Introduction

In France, the most main recent reform of the public and private sectors' pension schemes took place in 2003 and 2010. The main measure was an increase in legal age of retirement, in the contribution period to 41 years in 2012 (increasing to 42 years in 2020), and an alignment of the contribution period of civil servants with that of private sector workers (40 years in 2008). In this context, questions of health and in particular hard working conditions became part of the related public debate.

The current French pay-as-you-go system partially recognizes health problems. The special schemes, which cover the employees of a few public sector and major national companies (national railways, the Paris public transportation system, electricity supply, and so on), take into account the difficulty of the working conditions by allowing early retirement before 60. The Social Security pension scheme (the basic scheme), which covers all private-sector employees, takes health problems into account, but to a smaller extent. Firstly, periods of sickness and disability periods are included with periods of employment when calculating the pension. Secondly, at the end of one's working life, unfit or disabled insured workers get a full pension from the age of 60 (see Appendix A). Furthermore, in 2003, the reform reduced by half the penalty applied to the pension in the case of early retirement prior to obtaining the full-rate. This measure alleviates the financial pressures on the retirement decision for healthy, insured workers who would not qualify for disablement or disability pensions.

These measures consider health problems occurring during a professional career and their consequences. But are they sufficient to compensate for the shortening of the employment and retirement durations engendered by one's limited physical activities? The coming generations of retirees will have had less "orderly" careers than their predecessors, with more unemployment and non-working spells, so that the proportion of persons with a reduced pension will increase. One may therefore ask if, the criteria for disablement recognition correctly identify those who are unable to continue working. Is the softening of the retirement conditions well-defined for identifying this unhealthy population? The accuracy of the penalty reduction has yet to be assessed and it seems necessary to identify the individual factors determining the conditions and the choices at the end of one's working life.

Following our previous works (Barnay, 2005; Briard, 2006), this contribution focuses on the insured who retired with an insufficient insurance period to reach the full-rate (157 quarters for insured workers born in 1940). We use the Social Security pension scheme database which records all the events of a private sector worker's professional career: their wages, unemployment spells, sick leaves, periods of disability, etc. Poor health is identified throughout the career by both sick and disability leaves of absence, and at the end of working-life by the granting of disablement or disability pension benefits.

Here, we consider two possible scenarios influencing the retirement timing. In the first scenario, an administrative decision declares the worker unfit or disabled, which allows a full-rate retirement of the employee from the age of 60, without any decision being made by the worker. In the second scenario, beyond the age of 60, for employees who have not yet claimed their pension rights, there is the choice between a reduced rate pension before 65 and a full pension at 65; in that case, the worker has to carry out a labor/leisure trade-off and he is an actor in his decision.

To assess the degree of constraint on the retirement timing, particularly when one's health has suffered, we attempt to relate the retirement modes and the various events which constitute the career (episodes of wage-earning, unemployment, nonworking, sick leave, etc.).

After a brief survey of the empirical literature on the links between health and work statuses, we analyze the links between careers and retirement conditions for retirees born in 1940, distinguishing between those receiving a normal pension (reduced rate or full-rate according to the age) and those declared unfit or disabled.

Our analysis proceeds in two main steps. First, a descriptive approach based on a typological analysis characterizes a reduced number of representative careers. Next, logistic models help to explain the retirement conditions from the characteristics of the career, particularly those resulting from bad health.

2. Brief overview of literature

2.1 How can one measure health status?

The definition and measurement of health status can be problematic. Most recent studies use subjective health measurements based on self-reported assessments (Campolieti, 2002). However, these measurements suffer from significant skews: self-reported biases (sociocultural notably) (Etilé & Milcent, 2006), endogeneity biases (the health status itself can distort the quality of the answer (Bound, 1991); and comparisons between individuals are delicate due to their different value systems. Moreover, the justification's assumption, whereby an individual overrates their poor health status to justify a non-working situation, could partially explain this relationship.

Such limitations are absent in objective health measurements such as the morbidity diagnosed by general practitioners. Also, the granting of daily sick leave benefits, disability pension benefits or disablement results from a medical protocol. Disability benefits are granted after an examination by the Social Security practitioner and paid to disabled insured workers under 60 years old for a non-professional reason, and for whom the ability to work or their earnings is reduced by at least two thirds; from the age of 60, the old age pension takes over. Disablement pensions are granted by the Occupational Health Physician (OHP), who assesses the compatibility of the job with the employee's health status. But some biases remain, because the OHPs can be inclined to delay their disablement decision if it leads to a dismissal, for example when reclassification is impossible.

2.2 Health, work and retirement

The determinants of the retirement decision are often only studied through a financial prism (Gruber & Wise, 2004) and few works are interested in early retirement, before the full rate is reached (Doerpinghaus & Feldman, 2001). However, a vast empirical literature highlights /a healthy worker effect/the effect of health on labor participation. Health problems affect one's whole career. In particular, a poor health status results in early departure from the labor market (Barnay, 2005; Blanchet & Debrand, 2008; Currie & Madrian, 1999; Lindeboom, 2006; Tessier & Wolff, 2005) and less healthy workers wish to leave the labor market earlier (Rapoport, 2006).

The choice of retirement age can be modeled as a decision of labor supply and the result of a trade-off between leisure and work, and probably also between level of health status and financial constraints. But in fact, claiming a pension is not always concomitant with

withdrawal from the labor market, because two thirds of employees are no longer employed when they retire. In any case, there are many ways of permanently leaving the labor market. Hence, the impact of health status on retirement behavior has to be considered in the light of the various modes of withdrawal, such as the Job Seeking Exemption (until July 2008) or early retirements. The disablement and disability pensions are reserved for the unhealthiest people, but some unhealthy workers also stop their professional activity prematurely due to these measures (Barnay, 2009), while some others do not benefit from any allocation.

3. Method

Testing the assumption of a healthy worker effect on the labor market requires a chronology of the disease and employment episodes along the professional paths. To look for the determinants of retirement, we therefore study the whole career and proceed with two successive steps: a classification analysis of professional careers in order to define a typology, followed by an estimation using logistic models to understand the determinants of the retirement modes.

In the first step, the typological analysis allows us to summarize the heterogeneous professional careers of private sector workers, which show complex configurations, with a mixture of periods of activity and different kinds of non-working statuses (unemployment, sick leave, disability, or without an identified reason). It captures the resemblances and the disparities of professional careers by taking them globally, without any theoretical assumptions (Bry & Antoine, 2004; Fénelon, Grelet, & Houzel, 2000).

The classification analysis follows the methodology presented in Briard (2006), but it differs over the definition of the wage classes and in the addition of illustrative variables. It is performed on those insured by the Social Security pension scheme and born between 1935 and 1940. For the study, we only retain those pensioners alive on December 31st, 2005, born in 1940, and having an insufficient insurance period to reach the full-rate (157 quarters).

The method can be summarized in five points:
1. The method is derived from textual statistics (Guérin-Pace, 1998) used for the study of itineraries. It is particularly designed to better catch the time variable than methods such as the optimal matching analysis (e.g. Abbot, 1995; Dijkstra & Taris, 1995).
The career path between the ages of 15 and 59 is described, year per year, by fourteen annual exclusive statuses (e_n): (a) concerning the contributory periods: e_1: annual wage < 2nd decile of the distribution for the insured of the same generation, e_2: wage < 4th decile, e_3: wage < median, e_4: wage < 6th decile, e_5: wage < 8th decile, e_6: wage < Social Security earnings-ceiling, $e_7 \geq$ earnings-ceiling; (b) concerning the non-contributory periods: e_8: short-term unemployment (< average duration for the generation), e_9: long-term unemployment; e_{10}: sickness, maternity, employment injury (disability < 66%); e_{11}: disability; e_{12}: national service; e_{13}: quarters validated by other pension schemes; e_{14}: non-working or lack of information (expatriate or in the public service).
To be able to cluster the closest professional paths, while best preserving their evolution, the paths are described over five year periods (15-19, 20-2, etc.) using nine sequences of fourteen characters, the ith character indicating the number of times when the ith status is met. The reduction of the number of modalities is necessary to carry out the analysis. So, in an iterative way, we recode the modalities expressed by less than 1% of the insured on the basis of a more reduced number of statuses (13 then 12 then 11).

2. At the end of the coding phase, professional careers are described by nine qualitative variables and are subjected to a Multiple Correspondence Analysis (MCA). Then, the twenty main factors of the MCA become the active variables of a mixed classification, which chains a non-hierarchical algorithm of the k-means —iterated three times with the selection of the stable forms— and a hierarchical ascending classification.

3. The optimal number of clusters is determined by the three statistical criteria (R^2 semi-partial, pseudo T^2, pseudo F), which give information about the loss of homogeneity caused by the reduction of the number of clusters.

4. A stratification is then made in order to use the available information in a heterogeneous way according to the generations. Basically, we identify the recipients of the Old-age pension for parents living at home (OPLH), introduced in 1972, and the insured for whom the pension calculation reveals a salaried activity in the public service or as an expatriate, which are rarely registered in the insured's account before their retirement.

5. Finally, to stabilize the final partition, a discriminant analysis is performed, connecting the ten clusters previously defined with the descriptive variables of professional careers (for each of nine five-years periods, fourteen variables counting the expression of a state in the initial list).

The individual accounts are managed by the National old-age pension fund (Cnav). They include all the necessary data for the calculation of the pension: annual contributory wages (under the earnings-ceiling), periods of unemployment, of illness, maternity or occupational injury, and periods of disability benefits. This administrative database does not suffer from self-reported biases like self-reported data. To avoid endogeneity and measurement skews, studies using self-reported measurements use different health measures. Using an administrative health measurement, endogeneity could result from the professional conditions of benefit allocation or the job conditions. However, its main disadvantage is that it mentions interruptions in a career only if they allowed the validation of an "assimilated period" (AP), i.e. a quarter considered equivalent to a quarter of insurance. In particular, periods of illness are only mentioned if the insured worker was contributing to the Social Security pension scheme during his sick leave, which lasted at least 60 days.

In a second step, to better explain the retirement conditions, we perform logistic regressions. We consider explanatory variables such as sex, marital status, and country of residence at retirement, and descriptors of the professional path such as the number of years with a salaried occupation, with AP-disability, AP-sickness, and AP-unemployment (see Table 4A). We exclude the variable "number of years of non-working" (except unemployment, sickness or disability) for obvious reasons of multicollinearity.

4. Results and discussion

The classification analysis identifies ten clusters of strongly differentiated professional careers (see Appendix B). It appears that some insured workers have to cope with health problems; some of them interrupt their professional careers and\or are granted a disablement or disability pension, while others meet health and financial difficulties.
These disparities of career paths result in differences in retirement behaviors and retirement conditions, as shown in Table 1. A third of employees with an incomplete career wait until 65

to claim their pension rights, 39% retire at 60 because of disablement or disability (respectively 34% and 5%), while 27% claim their rights between 60 and 64 and get a reduced-rate pension. The retirement conditions are strongly gender differentiated. Women retire at 65 (or beyond) more frequently than men (41% *vs.* 21%), more often at 60 with a disablement pension (35% *vs.* 32%) and less often retire with a reduced rate (19.6% *vs.* 40.2%). These differences are particularly high in the clusters 2, 6, and 9 in which the full-rate is acquired by the age (at 65), four or six times more often for women than for men. Other clusters are characterized by early retirements because of health problems: 45% of the insured in Cluster 5, "housewives with low wages", and 38% of the insured in Cluster 2, "non-working young", benefit from a disablement pension. Finally, retirement with a disability pension concerns 90% of Cluster 10, the "disabled young", and 21% of Cluster 3, the "unstable".

Table 1
Retirement Conditions by Cluster and by Sex (in %)

Clusters	Disablement	Disability	Reduced rate	Full rate by age	Total
1: Precarious	33.9	2.7	24.1	39.3	35,9
2: Non-working young	37.8	0.0	31.9	30.4	15.2
3: Unstable	31.6	21.2	12.6	34.7	13.4
4: Self-employed	33.3	0.1	28.8	37.8	12.4
5: Recipients of OPLH	44.9	1.4	21.1	32.6	11.1
6: Multipensioned of the public sector and expatriates	22.7	0.6	70.7	6.0	5.6
7: Late employed	27.0	13.2	17.5	42.3	3.0
8: Stable, high wages	15.7	6.4	38.6	39.3	2.2
9: Stable, shortened career	23.1	15.4	43.6	17.9	0.6
10: Disabled young	12.1	87.9	0.0	0.0	0.5
Total	33.9	5.1	26.7	34.3	100.0

Clusters	Disablement		Disability		Reduced rate		Full rate by age		Total
	M	W	M	W	M	W	M	W	
1: Precarious	32.9	34.3	1.9	3.0	48.5	14.2	16.7	48.5	35.9
2: Non-working young	36.5	38.3	.0	.0	57.0	21.5	6.5	40.2	15.2
3: Unstable	32.8	30.5	22.8	19.7	9.8	15.1	34.8	34.6	13.4
4: Self-employed	38.0	30.1	.3	.0	30.4	27.7	31.3	42.2	12.4
5: Recipients of OPLH	66.7	44.8	.0	1.5	.0	21.2	33.3	32.6	11.1
6: Multipensioned of the public sector and expatriates	19.5	31.3	.8	.0	76.6	55.2	3.1	13.5	5.6
7: Late employed	29.9	23.2	15.9	9.8	8.4	29.3	45.8	37.8	3.0
8: Stable, high wages	18.4	8.1	5.8	8.1	40.8	32.4	35.0	51.4	2.2
9: Stable, shortened career	27.3	.0	18.2	.0	42.4	50.0	12.1	50.0	.6

10: Disabled young	15.8	7.1	84.2	92.9	.0	.0	.0	.0	.5
Total	31.5	35.2	7.0	4.1	40.2	19.6	21.4	41.1	100.0

Source: CNAV, 1940 generation, those insured by the Social Security pension scheme with an incomplete career.
Note: 32.9% of 'precarious men' claimed a disablement pension.

Most studies which use an individual chronological data analysis followed by an econometrical analysis, aim to study the individual determinants of/factors influencing the trajectories (e.g., McVicar & Anyadike-Danes, 2002). Our approach is different, in the sense that the professional path is not the dependent variable, but one of the explanatory variables of the retirement conditions. The professional careers are taken as a whole with all their complexity by the classification analysis. Belonging to a cluster is a "composite" variable of "simple" variables such as the individual features (sex, marital situation, country of residence); the explanatory elements of the retirement conditions will be sought among these variables.

By their nature, the retirement conditions are linked to age criteria. As indicated in the Table 2, we observe that 80% of the recipients of a disablement pension and the totality of the recipients of a disability pension liquidate their pension rights at 60, and 83% of the insured claim their pension rights for a reduced rate at the same age.

Table 2
Conditions and Age of Retirement

Age	Disablement	Disability	Reduced rate	Full rate by age	Total
60	79.7%	100%	82.9%	-	54.3%
61	8.1%	-	7.4%	-	4.7%
62	5.4%	-	6.1%	-	3.4%
63	4.7%	-	2.6%	-	2.3%
64	2.1%	-	1.0%	-	1.0%
65	.1%	-	-	100%	34.3%
N	*2 116*	*319*	*1 669*	*2 139*	*6 243*
%	34%	5%	27%	34%	100%

Source: CNAV, 1940 generation, those insured by the Social security pension scheme with an incomplete career.

Further, the age and the retirement conditions depend heavily upon the careers, as shown in Table 3. On average, employees retire at 61.9 year of age. As expected, the "disabled young" (Cluster 10) claim their pension rights at 60. On the other hand, the precarious, self-employed workers, late employees and stable ones with high wages (Clusters 1, 4, 7 and 8) claim their pension rights at least two years later than the disabled young.

Table 3
Average Age of Retirement, by Cluster

	N	Age	
		mean	std-dev.
1: Precarious	2,240	62.2	2.36
2: Non-working young	948	61.7	2.25
3: Unstable	836	61.9	2.34
4: Self-employees	775	62.2	2.34
5: Recipients of OPLH	691	61.9	2.30
6: Multipensioned of the public sector and expatriates	352	60.5	1.29
7: Late employed	189	62.4	2.37
8: Stable with high wages	140	62.2	2.34
9: Stable with shortened career	39	61.0	1.93
10: Disabled young	33	60.0	.0
Total	6,243	61.9	2.32

As we have already noted, information about health status is captured both during the working life by AP-illness and AP-disability and at retirement by the granting of disablement or disability pensions. However, the explanatory power of the variable "number of AP-illnesses" is limited for the female population, because it includes maternity leaves (a quarter is validated for the leave for a childbirth if the mother was insured at the time by the Social Security pension scheme).

At 60 years of age, insured workers with incomplete career paths can go through two successive episodes.

The first episode concerns the insured who suffer from serious health problems. It leads to being unfit to work and/or a retirement at the earliest possible time, before 65. If the workers are declared unfit for work or disabled, they benefit from a full rate pension from 60.

The second episode concerns the insured whose health status is relatively unchanged. They have to choose between claiming their rights for a reduced rate pension or waiting until the age of 65 to benefit from a full one. Other criteria than health status intervene in this choice, such as financial means or the standard factors of the labor supply such as the marital status (e.g. Coile, 2005; Henkens & van Solinge 2002; Sédillot & Walraët, 2002).

Both episodes can be analyzed with two logistic regressions to understand the impact of health status on the retirement conditions, summarized in three modalities: retirement for reasons of disablement or disability, retirement at a reduced rate, and retirement at the full-rate according to age.

Table 4A
General Statistics

	Mean	Standard deviation	Min	Max
Retirement age	61.94	2.32	60	65
Number of years with AP-disability	.39	2.15	0	34
Number of years with AP-sickness	1.08	1.71	0	14
Number of years with AP-unemployment	1.41	2.85	0	22
Number of years with a salaried occupation	22.36	37.98	0	146

Table 4B

	N	%
Sex (y = "men")	2,158	34.6 %
Country of residence at retirement (y = "France")	5,295	84.8 %
Marital status (y = "Married")	4,388	70.3 %

Table 5

Estimation for the two Episodes (Odd-Ratios)

	Episode 1			Episode 2		
	Unfit or disabled *vs* Reduced rate or full rate by age			Reduced rate *vs* Full rate by age		
	M	W	Total	M	W	Total
Women (ref: men)			0.69*** (0.07)			0.59*** (0.10)
Number of years with AP-disability	2.33*** (0.15)	14.35*** (0.68)	3.53*** (0.17)	0.76^{NS} (0.81)	0.00^{NS} (148)	0.47^{NS} (0,60)
Number of years with AP-sickness	1.33*** (0.15)	1.17*** (0.02)	1.22*** (0.02)	.89^{NS} (0.03)	1.18*** (0.03)	1.12*** (0.03)
Number of years with AP-unemployment	0.96* (0.02)	.99^{NS} (0.02)	.98* (0.01)	.73*** (0.04)	0.89*** (0.02)	0.82*** (0.02)
Number of years with a salaried occupation	0.99^{NS} (0.00)	0.97*** (0.00)	0.98*** (0.00)	0.99^{NS} (0.00)	1.01^{NS} (0.00)	1.00^{NS} (0.00)
Married (ref: others)	0.57*** (0.12)	0.95^{NS} (0.07)	.82* (0.06)	1.32^{NS} (0.19)	1.28* (0.09)	1.34*** (0.09)
Country of residence at retirement : France (ref: others)	3.89*** (0.12)	2.13*** (0.20)	3.75*** (0.10)	0.04*** (0.22)	0.34*** (0.20)	0.10*** (0.14)
N	*2 158*	*4 085*	*6 243*	*1 328*	*2 480*	*3 808*
N (yᵢ=1)	*830*	*1,605*	*2,435*	*867*	*802*	*1 669*
Quality of the model						
Max. of likelihood concordance	539*** 77%	423*** 63%	911*** 68%	708*** 89%	95*** 61%	1 067*** 76%

* 5%, ** 0.1% et *** 0.001%; NS: not significant *(standard-errors)*.
Source: CNAV, 1940 generation, those insured by the Social security pension scheme with an incomplete career.
Note: AP = "assimilated period": one quarter of insurance validated for one quarter of disability, for 60 days of sickness leave, or 50 days of unemployment.
The first episode concerns the whole population and explains the probability of benefiting from disability or disablement pensions from 60 years old *(N=6,243)*.
The second episode only applies to individuals who are going to end their professional activity with a reduced or full-rate pension *(N=3,808)*.

In episode 1, in the case of a very bad health status, we cannot refer to the standard framework of the labor supply. Indeed, we can suppose that the "preference for leisure" is high and that the withdrawal from the labor market is imposed. This hypothesis seems confirm for the male population, as the number of years with a salaried occupation which can approximate the individual incomes in this first stage has no impact on the decision.

The more a career is marked by periods of disability, the greater the probability of benefiting from disability or disablement: for men, it is 2.3 times greater, other things being equal. For women, the correlation is so strong (99% of women with an AP-disability receive a disability or disablement pension) that the associated odd-ratio is superior to 14. There is thus a threshold effect in the gravity of the health status, beyond which the agent no longer arbitrates in their retirement decision.

If the health status does not justify the granting of these kinds of benefits, the employee has to make a choice under constraint, without the social coverage from which he could benefit during the first episode. Having been disabled has no impact on the probability of claiming a pension at a reduced rate rather than at the one. The healthy worker effect from this proxy thus seems determinant for early retirement during the first episode at 60. Disability affects the unhealthiest workers and in fact this health status's indicator strongly selects the individuals, particularly women. During the first episode, the predominance of the health motive could also explain the eviction/replacement of the periods of unemployment by the periods of disablement or disability as relevant explanatory variables. Unemployment is barely or not at all significant there, but it intervenes during the second episode by influencing a retirement decision at 65. Doubtless, two categories of workers are concerned: on the one hand, healthy insured workers who have been through periods of unemployment and who are encouraged to work longer, and on the other hand, insured workers who are unemployed at the end of their working lives and are exempted from seeking employment as long as they cannot reach the full rate.

Living in France multiplies by about 3.5 the probability of claiming a disablement or disability pension, which may be because unhealthy workers have little inclination to emigrate, particularly when they are about to request their pension rights from the French pension scheme. Furthermore, those living abroad at the end of their working life sometimes have no way to bring attention to their poor health. This hypothesis could explain their greater inclination to retire early to get the full rate. However, the gap remains small and other factors must be considered: the access to information, the continuation of a professional activity abroad not recognized by the French Social Security pension scheme, the difference of health level, and so on.

The marital situation seems to play a protective role on the labor market for men: being married decreases their probability of claiming a disablement or disability pension by 43%, although it does not affect their choice between retirement at a reduced rate and retirement at 65. Conversely, for women, being married only affects the choice of an early retirement at a reduced rate.

Generally, women retire later than men. In 2006, 23% of them claimed their rights for the Social Security pension scheme at 65 or older, against only 13% of men. When considering retirees with an incomplete career, born in 1940, these disparities between men's and women's behaviors still remain after taking into account periods of interruption in their careers, marital status and the country of residence. In particular, if the health status does not justify recognition of the disablement or the disability, women retire at 65 (or later) twice as frequently as men. This higher inclination of women to claim their pensions at full-rate could be explained by a life expectancy effect: they incorporate into their retirement behavior their favorable life expectancy, and the resultant risk of widowhood and need to support

themselves.[2] Women are likely go on working if they are healthy, but they may also put off claiming their rights if their financial situations allow it; savings or their spouses' incomes are then a means to finance the transition between an early withdrawal from the labor force and the first payment of the pension. Only the health status approximated by the number of sick leaves seems able to explain a departure before the age of 65. Additional analyses should therefore be performed to determine which part of this indicator/parameter is connected to the health status rather than maternity.

In order to refine the understanding of the choice between the reduced and the full rates, we carry out regressions on the three largest clusters: precarious, non-working young and instable.

Table 6
Estimation of the Probability of Obtaining a Reduced Rate vs. Full Rate for Three Clusters (Odd Ratios)

	Episode 2		
	Reduced rate *vs* Full rate by age		
	Cluster 1 "Precarious"	Cluster 2 "Non-working young"	Cluster 3 "Unstable"
Women (ref: men)	0.47***	0.19***	2.73***
	(0.21)	(0.34)	(0.30)
Number of years with AP-disability [#]	0.50^{NS}	#	#
	(0.83)		
Number of years with AP-sickness	1.22**	1.15^{NS}	1.02^{NS}
	(0.05)	(0.09)	(0.07)
Number of years with AP-unemployment	0.84**	1.00^{NS}	0.89*
	(0.04)	(0.13)	(0.03)
Number of years with a salaried occupation	1.02*	1.13***	1.04^{NS}
	(0.00)	(0.01)	(0.00)
Married (ref: others)	1.24^{NS}	2.64**	2.21*
	(0.16)	(0.25)	(0.30)
Country of residence at retirement : France (ref: others)	0.03**	0.12***	0.07***
	(0.29)	(0.31)	(0.53)
N	1 420	590	395
N (y_i=1)	540	302	105
Quality of the model			
Max. of likelihood	649***	248***	76***
concordance	83%	82%	77%

* 5%, ** 0.1% et *** 0.001%; NS: not significant *(standard-errors)*.
# Lack of data
Source: CNAV, 1940 generation, those insured by the Social security pension with an incomplete   career.
AP = "assimilated period": one quarter of insurance validated for one quarter of disability, for 60 days of sickness leave, or 50 days of unemployment.

The results of these regressions are showed in the Table 6. They confirm the impact of the vagaries of a career path on retirement behavior revealed above. They also allow us to underline how different careers —here summarized in a typology— lead to different models of retirement behavior.

For the precarious and the unstable, the more unemployment has affected the career, the later the retirement, while, for the precarious, having known periods of sickness tends to increase the probability of obtaining a full rate by age pension. A woman who has pursued a "precarious" career (Cluster 1) or, even more, a "non-working young" career (Cluster 2), tends to postpone her retirement in comparison with a man. Most of those in the 'precarious' cluster have low wages, lower than the second decile of the wage distribution of the 1940-generation insured at the same age. So, after an intermittent and low-paid working life, if the pension is their only income, their financial safety is certainly badly insured. Postponing their retirement allows them to expect a higher pension. The non-working young population is likely to be in a different situation. Their early withdrawal from the labor force could be explained by the existence of additional incomes (professional activity outside the private sector, spouse's incomes, capital returns) of which we have no knowledge. Like the precarious, non-working young tend to put off their retirement, but once married, they can be less assertive in their decision. The joint decision model could then be determinant.[3]

This ambivalence when making decisions seems to disappear for the insured with erratic career paths (Cluster 3): being a woman who is married is a combination which tends to bring forward the retirement date. In the same way that these women would have privileged their family lives over their professional lives when they had children (less than a quarter of them are active between 25 and 31), they would have been able to make their retirements coincide with their spouses'. Nevertheless, in the absence of data on the professional status of the spouse, the patrimony or the incomes of the household, these assertions remain guesses.

5. Conclusion

This article attempted to understand the retirement behavior of those insured by the Social Security pension scheme, born in 1940 and who claimed their rights without reaching the required insurance period for the full rate. By beginning with an exploratory analysis then moving onto explanatory analyses —a classification analysis based on the CNAV's individual accounts, followed by logistic regressions— we were able to identify some of the links between professional career and age of retirement, notably the impact of health status on retirement conditions: departure conforming with the disablement or disability, or the choice between a reduced rate pension and a full pension at 65. Careers influence the conditions and the age of retirement. Even when we consider homogeneous populations in terms of their career path profiles, health is an important factor in retirement planning and health shocks tend to increase the propensity to retire earlier. Periods of sick leave and disability, which reveal (sometimes extremely) bad health, are added to the factors of vulnerability on the labor market: unemployment, non-working and low wages.

We analyzed the retirement conditions through two episodes based on two different lines of reasoning. The first is based on the healthy worker effect and the physical impossibility of pursuing a professional activity. Retirement conforming with the disablement or the disability then depends on a medical examination. These results underline the essential roles that continued employment and retirement policies play in the number of years spent healthy and at work. In order to decrease the number of recipients of disability and disablement pensions, it should be possible to invest in health at work during the entire career so that health shocks are avoided. Such a measure would aid/take some pressure off public health insurance

finances and the PAYG system in France, and increase the employment rate before the age of 60, under favorable labor market conditions.

Those who do not benefit from these specific conditions of premature departure move into the second episode —the choice between a reduced rate pension between 60 and 65 or a full-rate from 65. In that case, the decision corresponds more to a classic work / leisure trade-off. Household incomes and the marital status can then play an essential role. Women, who often have lower incomes than their spouses, as a result seem to be more inclined to delay applying for their pension rights. However, they seem to bring forward their retirement dates when they give greater priority to their family lives.

The professional typology highlights very frail populations, such as the recipients of the Old-age-pension-for-parents-living-at-home, which is predominantly a population of mothers. It seems necessary to maintain, or even better to increase, the Assimilated Period designed to compensate women for their children's education.

Data on financial resources, the gravity of the health status, working conditions and the nature of jobs would certainly afford other significant elements for studying the determinants of the departure at a reduced rate. This would allow progress on the link between physical difficulty of work and age of retirement. This relation is crucial for the correct adjustment of the Social Security pension scheme parameters, as workers must not be encouraged to retire prematurely and unnecessarily, which would weigh down financial expenses, but must also not be prevented from retiring early when justified by their health status.

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Appendices

Appendix A. Retirement conditions in the French Social Security pension scheme

For this study, four retirement conditions for pension rights are distinguished:

1. The disablement pension: the insured is declared unfit for work; their pension is calculated at the full-rate, whatever their age and insurance period.

2. The disability pension: at 60, unless the insured person works in a profession and wishes to continue, the pension is calculated at the full rate.

3. The reduced rate pension: the insured claims his pension rights before the age of 65 but does not have a sufficient insurance period (157 quarters for the 1940 generation).

4. The full-rate pension according to age: the insured claims his pension rights at the age of at least 65, his pension is then calculated at the full-rate, independently of his insurance period.

The other retirement conditions are not considered in this paper for two reasons: they only concern insured workers with a long insurance period (the case of the normal pension with the full-rate before 65); or they are granted to specific populations (war veterans, deportee, etc.).

Appendix B. Ten clusters of professional careers

Cluster by decreasing number of insured:

Cluster 1: "The precarious" (35.9% of the population; 28.9% men, 71.1% women)
The careers are split, the wage-earning rate in the private-sector does not exceed 45% and the wages are for the most part lower than the 2nd decile.

Cluster 2: "The non-working young" (15.2% of the population; 29.2% men, 70.8% women)
The careers are short, pursued only in the private-sector, and concentrated at the beginning of working life: the maximum rate of wage-earners (46%) is reached at the age of 19.

Cluster 3: "The unstable" (13.4% of the population; 47.8% men, 52.2% women)
The careers are precarious and split. In most, two thirds of the insured are employed and the second part of the working life is marked by periods of sickness (from 6% to 11% from the age of 45), of unemployment (more than 10% from 40, and more than a quarter of the population after 45) or of disability (more than 10% of the population from 54). For more than two thirds of the employees, the wages are lower than the median wage.

Cluster 4: "The self-employed" (12.4% of the population; 40.4% men, 59.6% women)
The careers are long, begun in the private-sector, then pursued in a sector covered by another old-age scheme than that of the public service or one abroad. The employment rate exceeds 90% between 40 and 51 years of age. The wages are very low, mainly lower than the 2nd decile after the age of 40.

Cluster 5: "The recipients of the Old-age-pension-for-parents-living-at-home" (11.1% of the population; .4% men, 99.6% women)
The careers are typically those of mothers with several children and modest incomes: the private-sector career is short, with breaks at the births of the children, then restarting around 35-40 years of age. The insured workers in this cluster benefit from the OPLH for at least seven years. Their wages are very low, lower than the 2nd decile of the wage distribution of their generation, which may be a sign of part-time or seasonal activities, or temping.

Cluster 6: "The multipensioned of the public sector and expatriates" (5.6% of the population; 72.7% men, 27.3% women)
The careers are long, pursued for the main part in the public service or as expatriates, for at least nineteen years. The private-sector wage-earning rate remains low, always lower than 40%. The wages are mostly very low, lower than the 2nd decile after the age of 40.

Cluster 7: "Late employed" (3.0% of the population; 56.6% men, 43.4% women)
The careers begin relatively late: the private-sector wage-earning rate only reaches 50% at the age of 30, but it exceeds 80% from 38 to 51. Careers are continuous although their ends are marked by sickness, disability or unemployment. The wages are mainly lower than the 6th decile and at most nine years are paid over the median wage before the age of 40.

Cluster 8: "Stable employees with high wages" (2.2% of the population; 73.6% men, 26.4% women)
The careers are relatively continuous and the private-sector wage-earning rate remains higher than 50% from the age of 27 to 57. The end of the career is however marked by sickness, disability or unemployment. The wages are stable, and mostly superior to the 8th decile from 30 years old on, even reaching the earnings-ceiling.

Cluster 9: "Stable employees with a shortened career" (.6% of the population; 84.6% men, 15.4% women)
The careers are continuous, the private-sector wage-earning rate exceeds 80% from 25 to 47 years of age, but the end of the working-life is marked by sickness, disability or

unemployment. At least ten years are paid over the median wage before the age of 40. The wages can reach the 8th decile from the age of 30, but they stay below the earnings-ceiling.

Cluster 10: "Disabled young" (.5% of the population; 57.6% men, 42.4% women) The private-sector career is prematurely interrupted by periods of sickness (from 25 to 40 years, at least 10% of the workforce of the cluster are concerned). More half of the insured of the cluster are recognized as having a disability after the age of 35 years, and more than 85% after 50 years.