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Chapter Author: Didier Blanchet, Louis-Paul Pele

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3 Social Security and Retirement in France

Didier Blanchet and Louis-Paul Pelé

Very few studies exist concerning the economic determinants of retirement age in France. Three main reasons may account for this situation. First, a common idea is that the French pension system offers little flexibility concerning choice of retirement age, with the result that little room is left for estimating economic models of retirement behavior. A second explanation is the complexity of the pension system, which renders data collection extremely difficult and discourages efforts to build systematic behavioral models. Third, age at exit from the labor force is determined not only by individual preferences and the structure of the pension system itself but more and more often by parallel systems such as preretirement schemes or specific dispositions of unemployment insurance targeted toward older workers, and the development of these schemes reflects both supply- and demand-side effects on the labor market; it may therefore appear meaningless to develop behavioral models that remain generally limited to supply-side considerations.

All these explanations are valid, but only partially. Flexibility in the choice of retirement age is not great, but still exists: in fact, the basic general regime offers the possibility of retirement between the ages of sixty and sixty-five. The problems raised by the complexity of the system can then be bypassed, in a first attempt, by concentrating on this general regime and associated complementary schemes. Finally, if it is indisputable that interactions between supply and demand factors in a context of low employment complicate the analysis of

Didier Blanchet is head of the Ecole Nationale de la Statistique et de l'Administration Economique. At the time this work was initiated, he was head of the Redistribution et Politiques Sociales division at the Institut National de la Statistique et des Etudes Economiques. Louis-Paul Pelé is a member of the Redistribution et Politiques Sociales division at the Institut National de la Statistique et des Etudes Economiques.

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retirement behavior, this implies at the same time that this analysis is particularly worthwhile. The extension of preretirement schemes in France is probably one of the major aspects of our current pension problems; it may limit the feasibility of policies aimed at raising the average retirement age, with the result that the question of the structure of incentives generated by this system is of particular importance, whatever the channels through which these incentives finally affect behavior, that is, directly through individuals or indirectly through employers.

It is with these elements in mind that we present here some results concerning the labor force participation of older workers in France and their link with the organization of the pension system. We proceed in three steps: (1) a general description of trends in labor force participation, pension levels, and pension coverage; (2) a precise description of the way pensions are computed in the basic general regime and the two most important complementary schemes; and (3) the simulation of incentives implied by these computation rules. This latter section illustrates how simple computations of future benefits help clarify the properties of pension rules. But it also shows the importance of what remains to be done to give a full explanation of labor force participation at older ages and the way that participation could be affected by future or ongoing reforms of retirement or preretirement schemes.

3.1 The Labor Market Behavior of Older Persons in France

This section is devoted to an analysis of labor force participation trends around retirement age. We first place recent developments in a long-term perspective. Then, concentrating on what has happened since 1968, we show that this period has been characterized by an acceleration of the long-run decline of the average retirement age and at the same time by the increasing complexity of the pattern of transition from activity to retirement.

3.1.1 Long-Term Trends in Labor Force Participation

We first provide figures—focusing on male workers to avoid the offsetting trends resulting, for women, from increased activity at median ages—for labor force participation since the 1920s. Figure 3.1 shows that the decline in labor force participation at older ages has been a long-term trend. It must be noted that this trend has been observed despite the fact that the French population has been aging for most of the century. But this apparent paradox can be easily explained by general economic growth. Economic progress resulted in a collective income/leisure trade-off in favor of a longer retirement period, which had no difficulty outweighing the consequences of a moderate aging process, and this trade-off was largely mediated by the development of pension schemes.

Actually, this decline in labor force participation at older ages occurred in a context of increased coverage and generosity of the pension system. Direct measures of coverage ratios are difficult to obtain: owing to the fragmentation

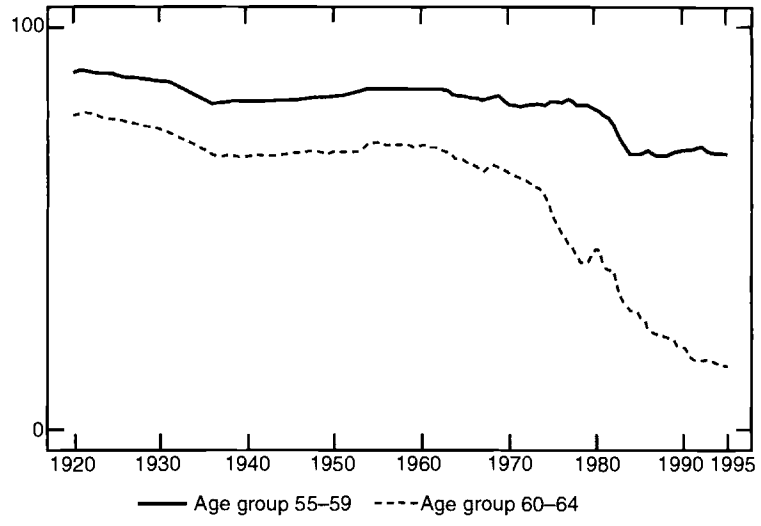

Fig. 3.1 Participation rate of older men, France, long term
Source: Marchand and Thélot (1991); Bordes and Guillemot (1994).

of the pension system in France, there are no systematic series giving numbers of beneficiaries or contributors in the whole population. Adding up series that exist for the major schemes, we nevertheless get the overall upward trend displayed in figure 3.2. In fact, since 1974, when affiliation with a pension system became mandatory, we can consider that coverage is complete. The remaining gap between total employment and the number of contributors that appears in figure 3.2, therefore, means not that some people remain uncovered but simply that they are covered by basic schemes that do not belong to the list of nine major schemes taken into account for this graph.

A similar evolution can be observed on the pensioners' side, as displayed in figure 3.3. It should be noted that the interpretation of this figure is complicated by the fact that one individual may, over his career, have been covered (successively) by more than one basic regime.[1]

Evidence of the increased generosity of the pension system is also given by the very crude computation of the ratio of total old age expenditures, divided by the number of inactive persons over age sixty, to the average net wage in the labor force, which is displayed in figure 3.4. The ratio of average benefits to average wages increased by about 60 percent between 1950 and 1974 and continued to increase after the complete generalization of coverage after 1974, for various reasons: the maturing of the systems, changes in computation rules for the main regimes, and an active policy of revaluation of benefits.

1. In 1993, the average French pensioner received benefits from 1.4 different basic schemes plus an average of 1.1 benefits derived from complementary schemes. Figure 3.3 covers beneficiaries only from the first category of regimes.

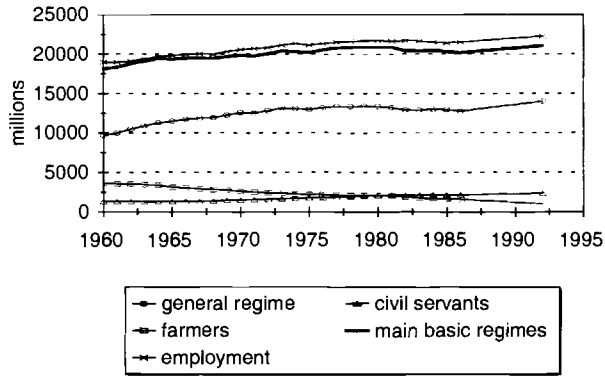

Fig. 3.2 Contributors to pension regimes

Note: In this figure, the category *main basic regimes* includes nine basic regimes, which cover almost the entire employed population. The figure also shows separate figures for three regimes: the general regime, which covers wage earners from the private sector, the regime for farmers, and the civil servants' pension scheme.

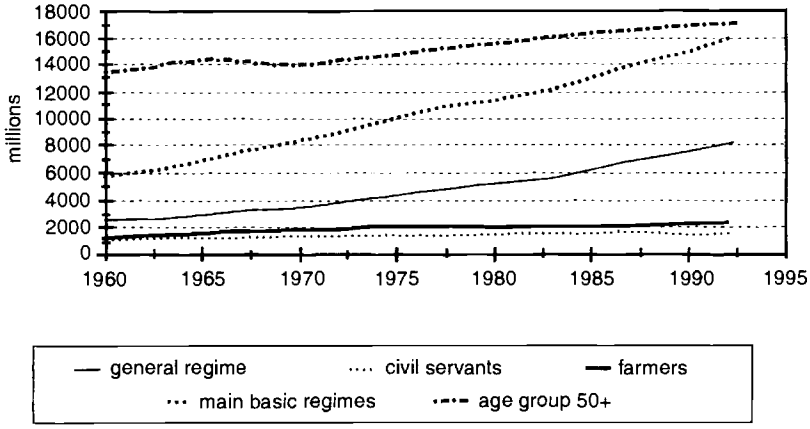

Fig. 3.3 Pensioners in the basic regimes

Note: The figure shows the number of pensioners in the different basic regimes. As in fig. 3.2 above, the total number refers to the nine basic regimes. As is discussed in the text, a retiree may receive pensions from several basic regimes (the average number of basic pensions is 1.4). Therefore, the last category shows the total number of pensions but overstates the total number of retirees.

Yet these general and progressive changes do not account for the evolution of labor force participation rates since the 1980s, which must be more narrowly linked to changes in the legal retirement age and to the extension of other forms of exit from the labor force, that is, the development of preretirement schemes.

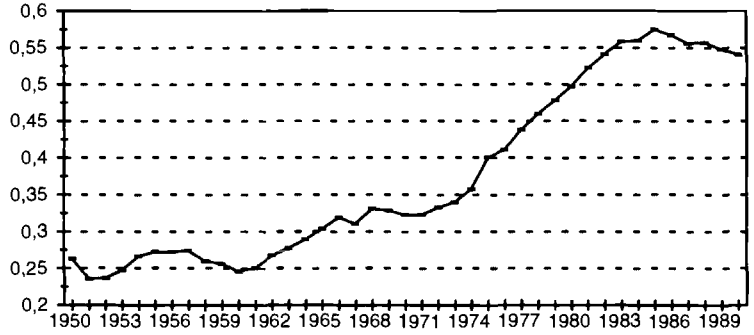

Fig. 3.4 Ratio of average old age benefit to average wage

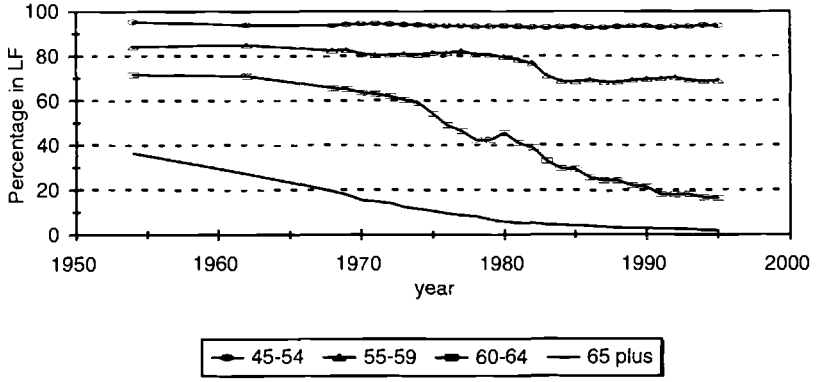

Fig. 3.5 Historical trends in the labor force participation of older men (LF = labor force)
Source: Bordes and Guillemot (1994).

3.1.2 Detailed Trends since 1960

During this period, the participation rate among workers over age fifty-five decreased by more than 50 percent, from 31.5 to 15 percent. Among workers over age sixty, it fell from 22.5 to 4.8 percent. Such dramatic decreases in the participation rates of older workers had never been observed before.

Their first consequence is that hardly any individuals over age seventy are employed. For instance, the participation rate of men between the ages of seventy and seventy-four was divided by ten between 1970 and 1995 (from 15.2 to 1.5 percent). The age group sixty-five to sixty-nine also disappeared from the labor force almost completely: rates amount to 3.7 percent for men and 2.5 percent for women, as opposed to, respectively, 30.6 and 15 percent in 1968. Second, the age group sixty to sixty-four experienced the most substantial decrease in the participation rate over the same period, from 65.7 to 16.5 percent among men (fig. 3.5) and from 32.4 to 14.6 percent among women (fig. 3.6).

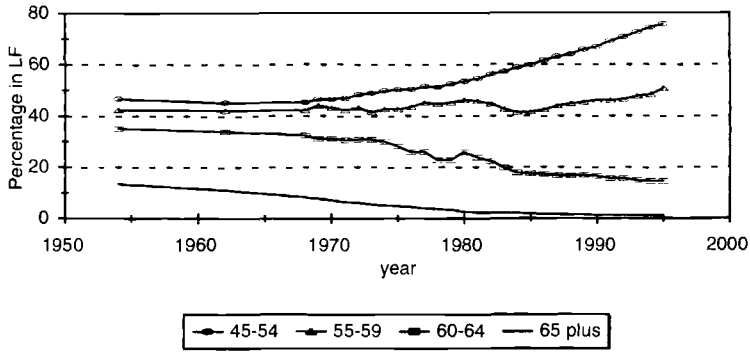

Fig. 3.6 Historical trends in the labor force participation of older women (LF = labor force)
Source: Bordes and Guillemot (1994).

Finally, the participation rate for men between the ages of fifty-five and fifty-nine decreased from 82.5 to 68.9 percent.

Rates for women have long been fluctuating, with a continuous increase in female activity at median ages counteracting the effect of earlier exit from the labor force. The second effect dominated in the age group sixty to sixty-four until recently, while the first one dominated constantly in the age group fifty-five to fifty-nine (fig. 3.6).

On the whole, the average age of people withdrawing from the labor force fell by 4.5 years between 1969 and 1993, from 62 to 58.5. Figures 3.7 and 3.8 also show the specific role played by preretirement schemes and unemployment insurance in explaining the drop among men of employment rates (not only labor force participation rates) in these age groups. They played the major role in the decline of employment between the ages of sixty and sixty-four until the mid-1980s, after which they have been taken over by the progressive application of retirement at age sixty. It was during the same period that preretirement before age sixty developed, affecting about 20 percent of the age group. Rates of preretirement have remained at this level since the end of the 1980s.

3.1.3 The Current Situation

The current situation is summarized in figures 3.9–3.12. Detailed profiles of occupation and labor force participation by age are given in figures 3.9 and 3.10. Activity and employment both start declining around age fifty-five, doing so in a quasi-linear fashion until age sixty, at which point their values are between 30 and 40 percent. They then drop rapidly, only a small portion of the population remaining at work after age sixty-two, which proportion quits the labor force very progressively until ages sixty-five to seventy.

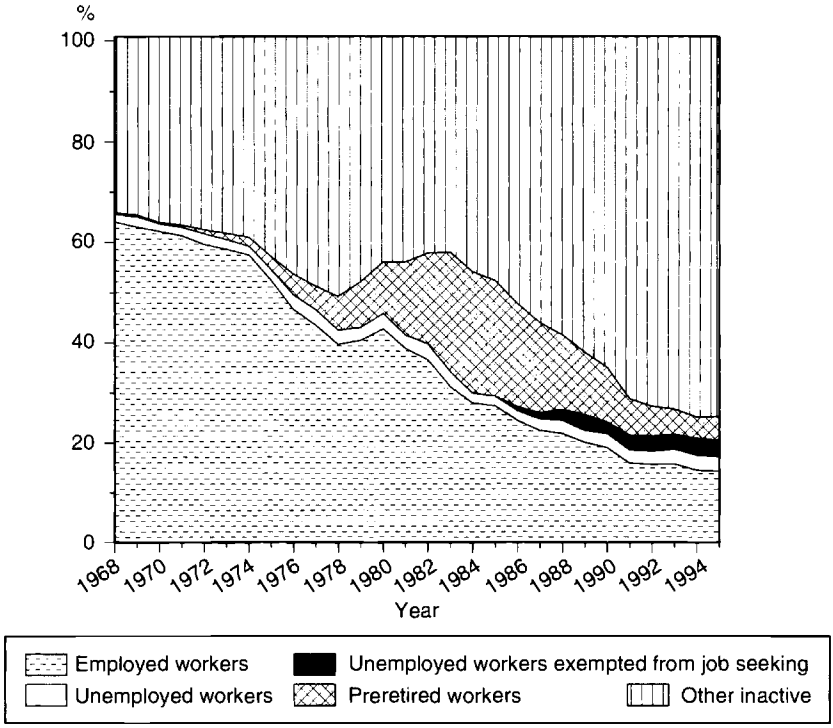

Fig. 3.7 Status of active male workers aged 60–64 from 1968 to 1995
Source: Blanchet and Marioni (1996).

Figures 3.11 and 3.12 give more details concerning the link between age and status between the ages of fifty and seventy-five. Inactive people are broken down into retired and other inactive; for men, the latter category includes a large fraction of preretired people between the ages of fifty-five and sixty. Active people are broken down into employed and unemployed, the latter category peaking at age fifty-six, then declining progressively until age sixty, with transfers from this category to the categories of retired or preretired. Parallel patterns exist for women, with the difference that a larger share can be classified as other inactive at all ages, even after the normal retirement age. It must be noted, however, that the data for these two graphs are obtained from self-declarations on the Employment Survey, the categories of which do not perfectly coincide with administrative definitions of unemployment, preretirement, or retirement.

Moving to the measurement of income resources for households whose head is retired, table 3.1 gives the distribution between work income, pension benefits, minimum old age benefits, and capital income, according to previous

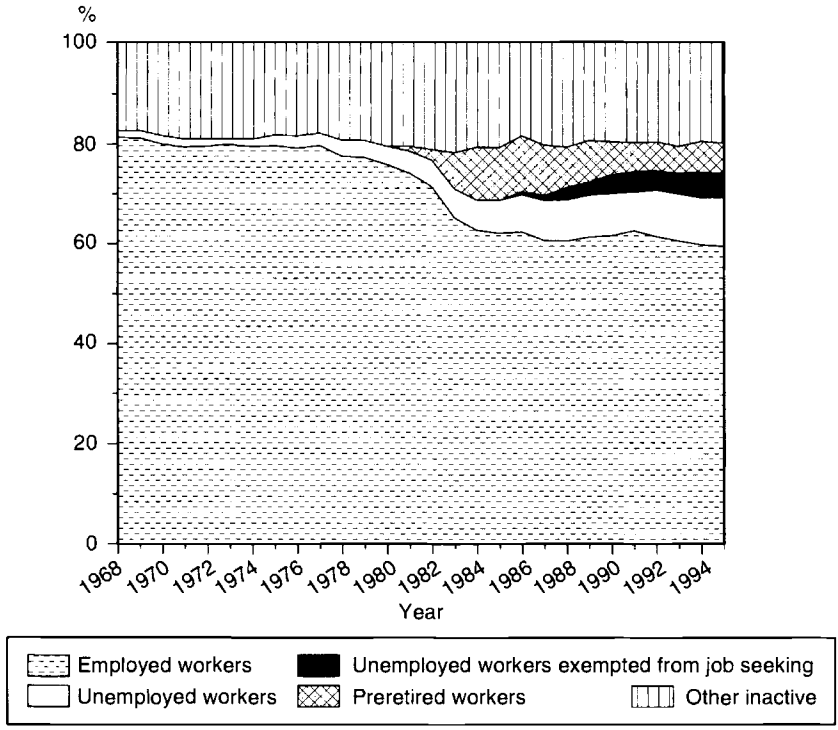

Fig. 3.8 Status of active male workers aged 55–59 from 1968 to 1995
Source: Blanchet and Marioni (1996).

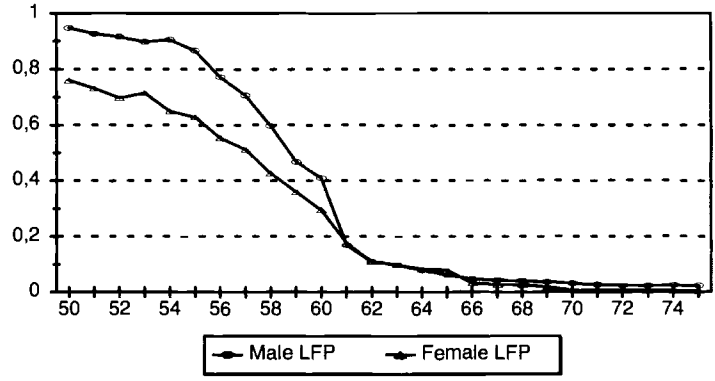

Fig. 3.9 Labor force participation (LFP) rates by age and sex
Source: Employment Survey 1996.

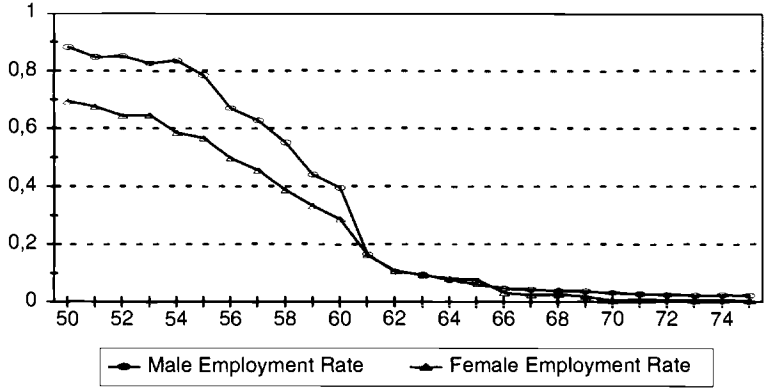

Fig. 3.10 Employment rates by age and sex
Source: Employment Survey 1996.

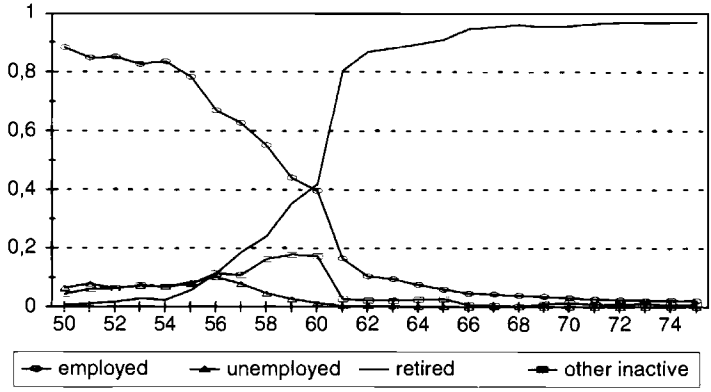

Fig. 3.11 Distribution of activities of men by age
Source: Employment Survey 1996.

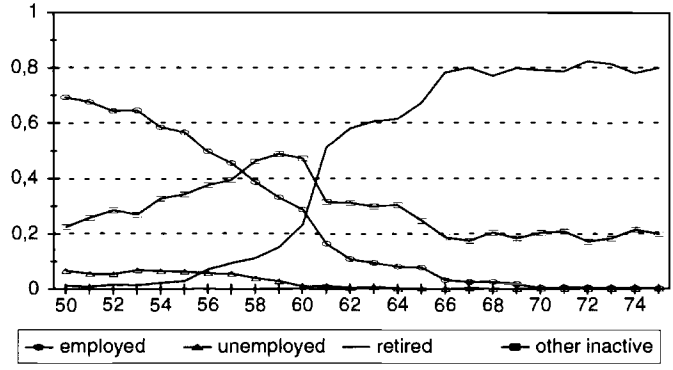

Fig. 3.12 Distribution of activities of women by age
Source: Employment Survey 1996.

Table 3.1 **Distribution of Household Income by Source (households whose head is inactive)**

	Share of Each Source in %			
	Activity Earnings	Pensions	Minimum Pension	Property Income
Total	6.1	76.2	5.3	12.4
Former status of head:				
Farmer	6.1	59.8	17.9	16.2
Independent worker	6.2	54.1	4.8	34.9
Wage earner	6.0	82.4	2.8	8.8
Other	6.9	65.5	12.1	15.5

Source: Taxable Earnings Survey 1984.

activity. Various pension income or other public subsidies constitute the major part of total income for households whose head was previously a wage earner. Capital income plays a larger role for former self-employed workers and workers from the agricultural sector, the latter also relying heavily on minimum old age benefits. In all cases, by construction (household head is retired), work income plays a minor role.

On the whole, these various income sources result in an average standard of living for retired households that is roughly equal to the average standard of living of active households. This contrasts with the situation that prevailed up to the 1970s and that led to the strong policy in favor of pension revaluation illustrated in figure 3.4 above.

3.2 Structure and Rules of Retirement Schemes

Two difficulties arise when one attempts to describe the French pension system. The first is due to its complexity, that is, the coexistence of many different regimes covering various segments of the population. We give a brief overview of the various regimes, but we then concentrate on the system that concerns the majority of the population, the combination of the basic general regime and mandatory complementary schemes organized on a socioprofessional basis (ARRCO [Association de Regimes de Retraite Complémentaires] and AGIRC [Association Générale des Institutions de Retraite des Cadres]), all of them being pay-as-you-go systems.

The second difficulty comes from the fact that the rules of these systems are not fixed but change over time. We concentrate here on the rules that prevailed at the beginning of the 1990s. Concerning the general regime, these rules essentially resulted from a reform introduced in 1983 that allowed retirement at a full rate at age sixty.

We then complete this presentation by providing information on (*a*) the system of preretirement, which, beside the rules governing normal pensions, plays

a large role in shaping labor force participation rates between the ages of fifty-five and fifty-nine, and (*b*) the reforms introduced since 1993, starting with a reform of the general regime whose consequences should progressively affect new cohorts of retirees until the first decade of the next century.

3.2.1 The Different Regimes

The French system is often considered to be complex, but its structure can nevertheless be summed up simply in the following way:

For most of the population (wage earners from the private sector), the pension relies on two pillars: (1) The first is the basic general regime, which offers benefits corresponding to the share of wages below a social security ceiling.[2] We hereafter use the term *social security* to describe this segment of the system, even if it does not exactly correspond to the French conventions.[3] In 1992, 70.5 percent of people over age sixty received a social security pension. On the contributors' side, the same year, the general regime covered 64.8 percent of the labor force. (2) The second pillar is complementary schemes, organized on a socioprofessional basis. These schemes developed between 1946 and the mid-1960s. They consist of a large number (about 180) of specific regimes, but these regimes are federated in two main organisms ensuring interregime demographic compensation: (*a*) AGIRC for executive workers and only for the fraction of their wages over the social security ceiling and (*b*) ARRCO for other workers and executives' wages below the ceiling. In 1972, contributing to a complementary scheme became compulsory. Today, complementary schemes provide 40 percent of retirement pensions for wage earners in the private sector (Join-Lambert et al. 1994, 366).

Beside this simple two-pillar structure, the complexity of the French system, in fact, is principally due to the existence of a large number of exceptions to this general rule of organization. These exceptions are the result of two factors. When social security was created in 1945, people who already benefited from more generous dispositions refused to join the new system (e.g., people belonging to the public sector). Some categories preferred, on the other hand, to adopt cheaper systems offering lower protection because they thought that a large part of their retirement needs was likely to be covered by other sources, such as professional capital for the self-employed. Beside the two-pillar system constituted by the general regime and ARRCO/AGIRC, we therefore have a multiplicity of special regimes and regimes for self-employed workers applying specific rules. For instance, there are about 120 first-pillar retirement

2. In 1994, the gross value of the social security ceiling was Fr 12,760, while the average gross wage was Fr 12,280.

3. In the French system, the term *social security* (*sécurité sociale*) is used to characterize all the basic social insurance schemes that were set up in 1945: health insurance, family allowances, work injuries, and basic pensions. The French social security system does not limit itself, as does social security in the United States, to the public pension scheme. We use *social security* here to describe the intersection of the pension field and the field of *sécurité sociale* in the French sense of the term.

schemes other than the general regime. In particular, it must be observed that civil servants are not really covered by an autonomous pension system since their pensions are paid directly through the state budget.

For all categories of people, there is, at last, a system of minimum pension (*minimum vieillesse*), which is a means-tested allowance. The size of the population benefiting from this minimum pension has regularly declined in the past, owing to the increasing maturity of normal pensions. It is now a little over 1 million, as opposed to 2.55 million in 1959 (Commissariat Général du Plan 1995).

3.2.2 Benefits and Contributions: General Regime and Complementary Schemes

We now give more details about the calculation of pensions for the general regime and complementary schemes.

Benefits from the General Regime

The general regime offers contributory benefits corresponding to the share of wages below the social security ceiling. We consider the rules that prevailed between 1983 and the beginning of the 1990s and that, until now, have been only little affected by changes introduced in 1993, whose application will be very progressive. Under these rules, the pension was computed on the basis of several criteria. It was proportional to the number of years contributed (truncated to 37.5 years) and to a reference wage, which used to be the average wage of the ten best years of the pensioner's career (past nominal wages being reevaluated at time of liquidation according to a set of retrospective coefficients). The formula was therefore

$$\text{pension} = \alpha \times \left(\frac{\text{no. of years, truncated to } 37.5}{37.5} \right) \times (\text{average wage of the 10 best years}), \tag{1}$$

the proportionality coefficient α being itself modulated. It was maximal when the pensioner left, at age sixty, with 37.5 years of contributions or more; in that case, its value was set at 50 percent, and this exactly ensured a replacement rate of the reference wage (not necessarily the last wage) equal to 50 percent. The same value of α also applied, whatever the number of years of contributions, when the individual left at age sixty-five. In all other cases, the coefficient was reduced either by 1.25 percentage point for each term missing to reach the value of 150 terms or by 1.25 percentage point for each term missing to reach age sixty-five, the formula to be used being the one that lead to the most favorable outcome.

This system means that the number of years of contributions affects the pension level in two ways, which may imply, in some cases, a very strong dependency between age at retirement and pension level. To provide a full under-

Table 3.2 **Replacement Rate Provided by the General Regime for Three Reference Cases**

Age	Number of Years of Contributions	α (%) (1)	Number of Years/37.5 (2)	Replacement Ratio (%) (1) × (2)
Individual A:				
60	25	25	.667	16.7
61	26	30	.693	20.8
62	27	35	.720	25.2
63	28	40	.747	29.9
64	29	45	.773	34.8
65	30	50	.800	40.0
Individual B:				
60	30	25	.800	20.0
61	31	30	.827	24.8
62	32	35	.853	29.9
63	33	40	.880	35.2
64	34	45	.907	40.8
65	35	50	.933	46.7
Individual C:				
60	35	37.5	.933	35.0
61	36	42.5	.960	40.8
62	37	47.5	.987	46.9
63	38	50	1.000	50.0
64	39	50	1.000	50.0
65	40	50	1.000	50.0

standing of this interaction, table 3.2 shows the consequences of this system for three reference cases with individuals arriving at age sixty with, respectively, twenty-five, thirty, and thirty-five years of contributions.

The first person must wait until age sixty-five to retire at a full rate α (50 percent). Even so, however, his pension will be reduced by the fact that he has only thirty years of contributions at this age. His replacement ratio will therefore be equal only to 30/37.5 of the maximum replacement ratio, which is equal to 50 percent. Note that, at each age under sixty, the downward adjustment of α is computed on the basis of the number of years shy of age sixty-five, rather than the number of years shy of a value of $N = 37.5$, since the rule consists in applying the most favorable of the two adjustments.

The second individual must also wait until age sixty-five to retire at the full rate α but will benefit at this age by a higher replacement rate, equal to 35/37.5 times the maximum replacement ratio of 50 percent. In this case, again, the downward adjustment before age sixty-five is based on the number of years shy of age sixty-five.

The third individual will not have to wait until age 65. He will benefit from the maximum replacement rate as soon as he reaches a cumulated number of years of contributions equal to 37.5, that is, at age 62.5. If he decided to leave

between the ages of 60 and 62.5, the downward adjustment would be computed according to the number of years shy of the total of 37.5 years of contributions, rather than the number of years shy of age 65, since the first rule is now the most generous. Note also that, for this individual, working past age 62.5 does not bring any further advantage in terms of pension level.

Some additional observations must be added to this presentation of the general regime. First, some people have been successively affiliated with different schemes, especially in older cohorts: for instance, people moving from agriculture or self-employment to the status of wage earner in industry or services. These people will collect two basic pensions, one from their initial regime and one from the general regime. The latter will be proportional to the number of years spent in this regime, according to formula (1), yet coefficient α will be evaluated taking into account the *total* number of years of contributions, whatever the regime. Reductions in α, furthermore, do not apply in certain cases: veterans, disabled workers, and female workers who have twenty-four years of contributions and have raised three children.

Formula (1) also implies that, at the time they are claimed, pensions are computed in current nominal French francs. They are then reevaluated each year on a discretionary basis. During the 1970s and early 1980s, the general policy was to overindex these pensions in order to make up for the initial gap between the standard of living of workers and that of pensioners. Since the mid-1980s, the practice has instead consisted in an indexation on prices.

Benefits from Complementary Schemes: ARRCO and AGIRC

These schemes are almost fully contributive. Pensions are computed according to a system of points. Points are accumulated during the worker's career in proportion to his contributions: the contribution rate is fixed, and one franc contributed in year t is considered equivalent to the formal buying of 1/RW points, where RW, in the system terminology, constitutes the reference wage (*salaire de référence,* which is in fact the price of one point). The pension is then equal to the total number of points accumulated over the pensioner's career, multiplied by a coefficient V (*valeur du point*), which is fixed every year.

For a pensioner who began working at time t_0 and stopped at time t_1, the formula for pension at time t can therefore be written as

$$\text{pension} = V(t) \cdot \sum_{t'=t_0}^{t_1} \frac{\tau(t')w(t')}{\text{RW}(t')}, \tag{2}$$

where $\tau(t')$ and $w(t')$ are, respectively, the contribution rate and the worker's wage at time t'. As explained above, only a fraction of the wage is taken into account for computing contributions and points accumulated each year: for nonexecutives, the wage is truncated to three social security ceilings, and contributions are collected by ARRCO; for executives, contributions are collected

Table 3.3 Current Features of Complementary Schemes (1993)

	ARRCO	AGIRC
Contractual contribution rate (% of gross wages)	5	13
Reference wage (Fr)	21.18	19.69
Value of point (Fr)	2.24	2.36

by ARRCO for the part of the wage below the ceiling and by AGIRC for the segment of the wage falling above the ceiling up to four times the ceiling.

Contribution rates, reference wages, and values of points that prevail are not the same in both schemes. Table 3.3 gives levels for 1993.

Concerning retirement age in these complementary schemes, the normal retirement age remains theoretically sixty-five, even after the 1983 reform, which introduced retirement at age sixty in the general regime. For retirement under age sixty-five, a quasi-actuarial adjustment is supposed to be applied. But, since the 1983 reform, this adjustment is not applied to people who fulfill the conditions for a basic retirement at the full rate (more than 37.5 years of contributions). The resulting extra expenditures for the complementary schemes are supported by a specific entity, financed through various contributions: the Association pour la Structure Financière. This simply means that complementary schemes have been de facto transformed in schemes where normal retirement is at age sixty, but without bearing its cost (or bearing it only in terms of forgone contributions).

Taxation, Contributions, Earnings Tests

Taxation rules differ for pensions and wages. A certain number of contributions concern *only* wage earners. Pensioners are exempted from these contributions. This is the case for contributions to unemployment insurance, at a rate of about 3.2 percent. This is also the case for contributions to pension schemes, at the following rates: for the general regime, 6.55 percent of the fraction of the wage below the social security ceiling; for complementary schemes (ARRCO and AGIRC), 2 percent of the wage below three times the social security ceiling to ARRCO for nonexecutives and 2 percent of the wage below the social security ceiling to ARRCO and 4.68 percent of the fraction of the wage between one and four times the social security ceiling to AGIRC for executives.

It must be added that, concerning complementary schemes, these basic contribution rates—which are the ones used to compute the accumulation of points and future entitlements—are now systematically affected by majoration coefficients, which are now equal to 125 percent in both regimes. This is an additional tax, meaning that points are, in fact, purchased 25 percent above their face value.

We next have contributions that concern *both wage earners and pensioners,*

Table 3.4 **Some Contribution Rates (%)**

	Employer	Employee or Protected Person	Total
General regime:			
Health:			
Workers	12.8	6.8	19.6
Pensioners	...	1.4	1.4
Preretired	...	5.5	5.5
Family	5.4	...	5.4
Old age:			
Wages below the ceiling	8.2	6.55	14.75
Full wage	1.6	...	1.6
Unemployment insurance:			
Below ceiling	5.34	3.22	8.56
From 1 to 4 times ceiling	5.47	3.86	9.34
Complementary pensions:[a]			
Executives:			
Below ceiling (ARRCO)	3 (× 1.25)	2 (× 1.25)	5 (× 1.25)
From 1 ceiling to 4 times ceiling (AGIRC)	9.36 (× 1.21)	4.68 (× 1.21)	14.04 (× 1.21)
Others (AARCO):			
Below 3 times ceiling	3 (× 1.25)	2 (× 1.25)	5 (× 1.25)

Sources: Join-Lambert et al. (1994); Legros (1995).

[a]The multiplicative coefficient refers to the concept *calling rates* (*taux d'appel*); i.e., there is a basic statutory contribution rate, but the real contribution rate is obtained after multiplication by the calling rate, which was lower than one during the first decades of existence of the system and now increases more or less regularly.

but at *different rates.* This is the case of contributions to health insurance, whose rates are 6.8 percent on wages, 1.4 percent on pensions from the general regime, and 2.4 percent on complementary pensions.

We then have taxes or contributions that are *similar for both sources of income.* These are the generalized social contribution (CSG), introduced in 1988, whose rate is now equal to 2.4 percent and whose aim is to finance a certain number of noncontributive allowances, and the personal income tax, which is progressive and whose rules are almost the same for pensions and wages (the only difference consists in a tax allowance on wages whose aim is to compensate for expenditures linked to professional activity).

Table 3.4 shows these different rates. In addition, it gives the rates for contributions paid by employers.

Concerning at last earnings tests in the attribution of pensions, the rules differ across regimes, but we can generally consider that they strongly discourage the continuation of activity after the claiming of the pension. Concerning the general regime, there is no formal impossibility of combining benefits with labor income, but claiming pension rights implies the interruption of the labor relation with the current employer. The only possibility is then to combine

benefits with independent work or to work for another employer, a possibility that will concern only a small minority. Furthermore, concerning complementary schemes, starting a new activity generally leads to the interruption of benefits.

3.2.3 Preretirement

Preretirement systems developed in France in several steps. We can distinguish between two main periods, before and after the lowering of the normal retirement age to sixty in 1983.

Preretirement During the 1970s

The first period was dominated by measures concerning workers between the ages of sixty and sixty-four. The first measure dates back as early as 1963, when a specific allowance (ASFNE, a special allowance from the National Fund for Employment) was created to help workers aged sixty or over who had been laid off. This allowance has been progressively replaced, starting in 1972, by a system of resource maintenance (*garanties de ressources*). It ensured that workers over age sixty who lost their jobs would receive 60–70 percent of their last income up to age sixty-five, which was then the normal retirement age. This system was extended considerably in 1983, covering up to 400,000 people, roughly one-quarter of the population in the age bracket sixty to sixty-four. Some allowances were also introduced for workers under age sixty, but only in specific sectors suffering from very large employment problems, such as the iron industry.

It is in this context that retirement at age sixty was introduced in 1983. One implication of this highly symbolic reform is that it acted primarily as a pure substitution process, normal pensioners progressively replacing people benefiting from resource maintenance programs. This explains why the reform did not produce any significant break in the evolution of activity, as can be seen by reference to figures 3.1 and 3.5 above.

This does not mean, however, that the reform was completely neutral. First, it changed considerably the nature and the reversibility of the protection that was offered: there was a shift from a kind of unemployment insurance to a quasi-universal pension system. Second, this change created a further impulse to a lowering of activity rates before age sixty. The introduction of retirement at age sixty was initially expected to eliminate the necessity of any form of preretirement. But, in the face of a still rising rate of unemployment, and in a period of rapid industrial reconversion, it quickly became apparent that it would be necessary to reintroduce some form of special safety net for workers younger than the normal retirement age.

Preretirement since 1983

In the second period, preretirement developed along two lines, in proportions that have varied over time and that reflect the fluctuating desire of the state to control the process. The first measure taken was the reactivation of the

ASFNE: people who are entitled to such benefits have left their firms under specific conditions resulting from negotiations between the firm and the state. The second measure, which implies much less control, consists in specific dispositions of the French system of unemployment insurance. Under the common rule, people falling into unemployment are entitled to compensation for a limited period of time; since 1992, this compensation decreases with the duration of unemployment. But these rules do not apply to people who lose their jobs after a certain age (fifty-seven until mid-1993, now fifty-eight), who can benefit from full compensation until they are able to take the normal pension at the full rate. This system is not officially described as preretirement, and it differs from a pension system in that people are eligible to receive benefits under it only if they have been laid off by their employer.

It must be noted that the coexistence of these two systems generates problems for the measurement of labor force participation rates for these age groups: Truly preretired people are naturally counted as inactive. However, those collecting unemployment insurance can be considered both as active and, since they are generally exempt from actively seeking jobs, as inactive (according to international conventions). The situation is even more ambiguous when labor force status is self-declared, as was the case for some of the statistics given in section 3.1 above.

3.2.4 Recent or Ongoing Reforms

A reform of the general regime was enacted in 1993 the main features of which are the following: (*a*) After liquidation, pensions will be indexed on prices instead of on either net or gross wages. This measure will have the effect of reducing the relative standard of living of older pensioners. In fact, this measure essentially establishes as official what had become the standard practice over the last decade. Nevertheless, in the case of rapid increases of net wages (high productivity growth), some occasional and discretionary reindexation could be introduced (*clause de rendez vous*). (*b*) Retirement at age sixty will remain possible, but, in order to receive the full rate, the number of years of contributions will be raised from 37.5 under the current rule to 40 in 2003. (*c*) The reference wage used in the formula (1) above will progressively be computed on a greater number of years, from the best ten years initially to the best twenty-five years in 2008.

No similar reform has been applied, at this stage, to any of the special regimes. The attempted extension of these new rules—now suspended—to some of these regimes was in fact one of the reasons behind the controversy that arose in November 1995 over the Juppé Plan.

Measures to reform complementary schemes have so far consisted mainly in increasing contractual rates (a policy that has the drawback of increasing future rights), in increasing calling rates (this policy does not have the same drawback: it generates receipts without generating new rights), and in moderat-

ing the value of the point. Certain noncontributory advantages were also reduced. But a different policy, increasing the reference wage, is now being implemented. This policy amounts to reducing future benefits without changing the current level of contributions. It is equivalent to an anticipation of future reductions of the value of the point.

3.3 Retirement Incentives

Is behavior consistent with the incentives generated by the pension system and especially with the incentives generated in 1983 by the introduction of retirement at age sixty? We look first at the informal evidence given by hazard rates derived from the profiles given in section 3.1 and from other sources. We then move to more formal computations of social security entitlements at different ages. Given the difficulty of dealing with special regimes, we limit ourselves to the "normal" case of a worker affiliated with the general regime and compulsory complementary schemes of the ARRCO/AGIRC group.

3.3.1 Informal Evidence

Figures 3.13–3.16 reveal patterns of behavior that seem qualitatively consistent with the main features of the pension systems that have just been described. Figure 3.13 and 3.14 give, for men and women, rates of exit from the labor force directly derived from the labor force participation rates used in figure 3.9 above. These transition rates have been computed using two successive realizations of this survey, in 1995 and 1996. They show that exits from the labor force occur continuously between the ages of fifty-five and sixty, when they can be attributed to preretirement schemes, then peak with entry into normal retirement at age sixty. There are residual exits after age sixty, probably people who are not eligible to retire at the full rate at age sixty; the

Fig. 3.13 Hazard rate out of the labor force for men
Source: Employment Survey 1995, 1996.

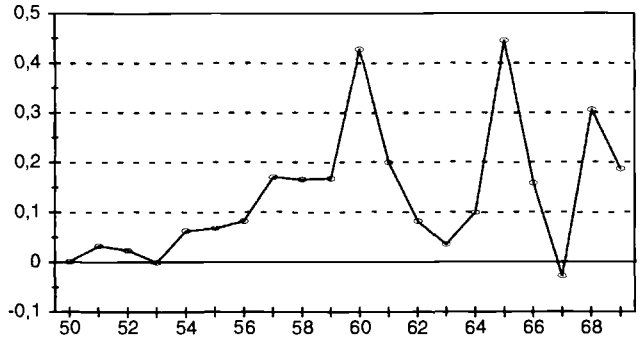

Fig. 3.14 Hazard rate out of the labor force for women
Source: Employment Survey 1995, 1996.

relative importance of such cases is apparently greater for women, who, owing to shorter careers, are less likely to arrive at age sixty with 37.5 years of past contributions and who are then forced to wait until age sixty-five to retire.

Figure 3.15 gives more details concerning the link between age and the probability of claiming one's benefits, rather than exit from the labor force. The data are derived from a panel of pensioners established in 1986 by SESI (the statistical office of the French Ministry of Social Affairs). Data for five cohorts of pensioners, born in 1906, 1912, 1918, 1922, and 1926, were collected directly from pension funds. The ages at which these successive cohorts entered normal retirement are available. This sample allows us to assess the effect of the 1983 reform. Before 1983, some workers could retire from the labor force at age sixty, but most had to make due with preretirement schemes, and the age at which they claimed benefits from the general regime remained equal to sixty-five—hence the predominant peak at sixty-five for the 1912 cohort. The 1983 reform, which lowered the normal retirement age to sixty, made these preretirement schemes pointless, and workers began claiming benefits from the general regime at age sixty. Hence, the age at which benefits were claimed decreased, with a progressive shift to a situation where the predominant spike is at age sixty, after a transition period characterized by bimodal profiles.

Figure 3.15 relies on the distribution of retirement age within each cohort. From these data, we can compute hazard rates giving, at each age, the instantaneous probability of retiring. Figure 3.16 shows hazard rate profiles within the same four cohorts. Here again, the ages of sixty and sixty-five play a specific role. The spike at age sixty-five remains high over time, with retirement occurring then for at least 70 percent of workers still working at this age. If the 1983 reform did not change this behavior, it strongly increased the probability of claiming at age sixty, the corresponding hazard rate rising from about 10 percent in the 1912 cohort to 40 percent in the 1926 cohort. Thus, after the

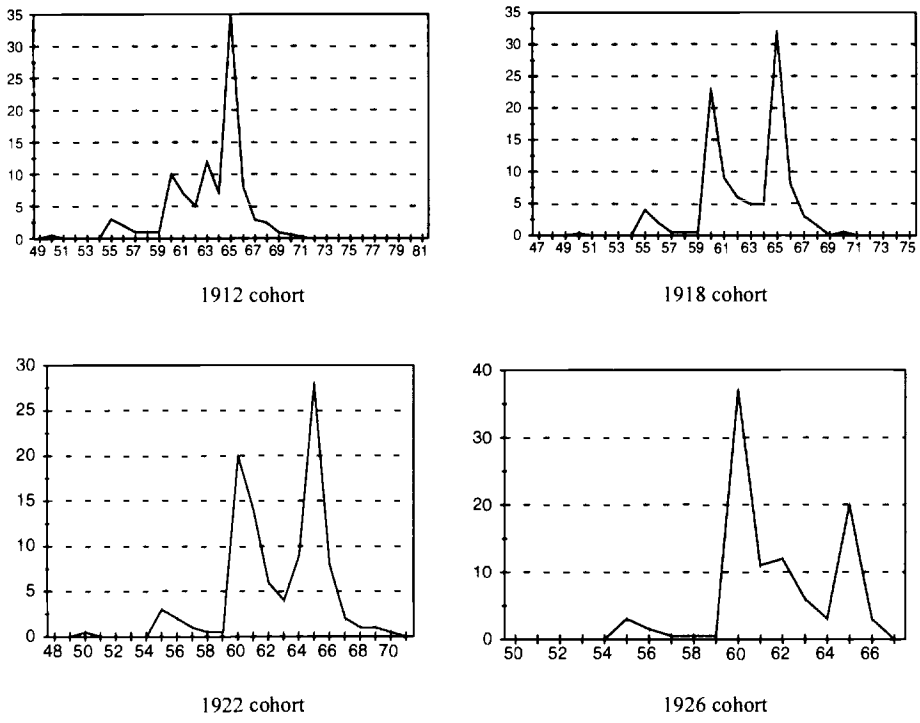

Fig. 3.15 Age of entry into normal retirement within four cohorts (percentage retiring at each age)
Source: Dangerfield (1994).

reform, fewer workers stay in the labor force until age sixty-five, even though sixty-five remains the upper bound of the retirement age. More people are eligible to receive a full pension and therefore retire before age sixty-five, notably at age sixty.

3.3.2 Simulation Modeling

Our analysis focuses on workers' entitlements from social security (including mandatory complementary schemes). Precisely, social security wealth (SSW) is defined as the weighted sum of future pensions and contributions, all terms being discounted from the time of evaluation by both a discount rate for time preference and the worker's survival probability at each date. All computations are supposed to apply to a worker aged fifty-five years. Thus, probabilities are defined conditionally on survival at age fifty-five. All amounts are evaluated at this age, which allows comparisons of social security wealth at different dates. The detailed formula for social security wealth is given in the appendix.

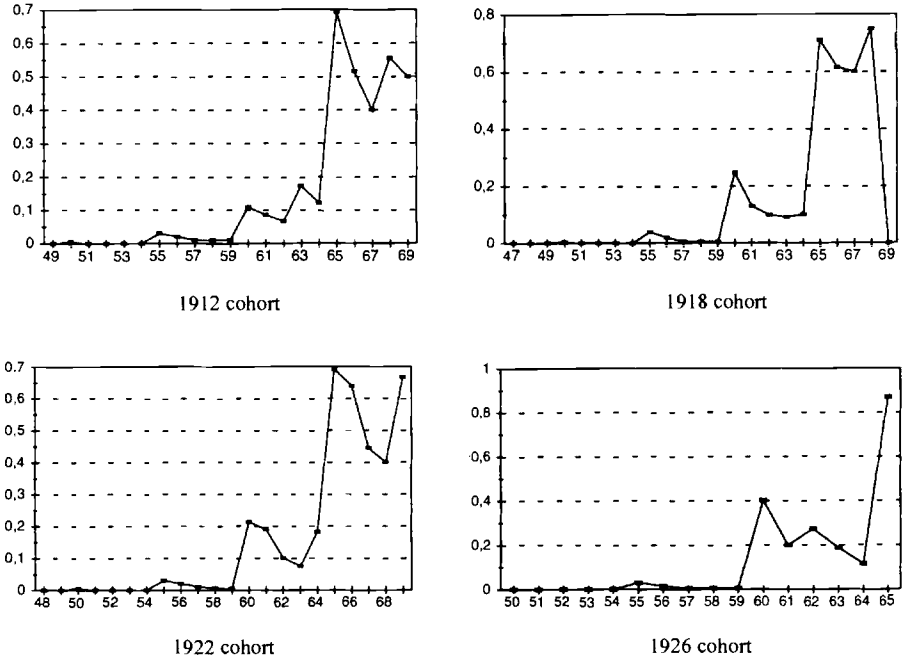

Fig. 3.16 Hazard rates into normal retirement within four cohorts
Source: Dangerfield (1994).
Note: These hazard rates are calculated from distribution data contained in fig. 3.15 above.

Several elements enter the calculation of social security wealth. In order to determine the level of pensions, we follow the rules of the general regime to compute benefits for the worker and his survivor. Here, computations are run only on a yearly basis (not a monthly one). Each year, pensions are revised according to the price index (up to 1982, they used to be indexed on the mean gross wage, which was more favorable). We follow standard assumptions about the future values of price and wage growth. We use specific sex-cohort-age life tables to adjust for survival prospects. We subtract contributions[4] to social security and complementary schemes while the worker is still working.

In France, receiving a pension from the general regime requires that one stop working for one's current employer; the result is that we can assume that the age at exit from the labor force cannot be higher than the age at which a pension is claimed. Can it be lower? Two cases must be considered: (*a*) For people retiring after age sixty, we assume that the two ages exactly coincide.

4. We consider here contributions from both the worker and the employer since, whatever their origin, contributions entail a decrease in present earnings in order to obtain entitlements to future pensions.

As in the United States, these decisions are not systematically the best insofar as, if the worker is not entitled to a pension at the full rate at an early age, he may increase his entitlements simply by waiting to retire. Nevertheless, empirically, most workers are entitled to a pension at the full rate at the time of retirement, and there is therefore no profit in postponing claiming benefits. (*b*) On the contrary, we assume that people leaving work before age sixty delay claiming their pension until age sixty. Since sixty is the youngest age at which a pension can be claimed, at least under the general regime, this is the only reasonable assumption that can be made.

We run our computations for different types of worker. In the base case, we consider a worker from the 1930 cohort and reconstitute his earnings history as follows. From empirical data, we evaluate the median wage of male workers from the 1930 cohort between 1967 and 1994. We complete this profile backward according to the mean wage index. From the data, we get a profile up to age sixty-four. But, owing to a rapid decrease in the participation rate, a nonnegligible selection bias[5] affects the estimation of the median wage after age fifty-five. For this reason, we follow the correction suggested in Diamond and Gruber (chap. 11 in this volume), assuming that earnings stay constant in real terms from age fifty-one on.

In the base case, the real discount rate for time preference is set to 3 percent. The worker's wife was born in 1933. We assume that she did not work during her life and that she cannot therefore claim a pension in her own right. As a survivor, she is entitled to a pension that amounts to slightly over 50 percent of her husband's.

Besides social security wealth, we can compute other indicators varying with the retirement age. First, we calculate replacement rates, after the deduction of social contributions and income taxes. To take into account taxes on income, we must make assumptions about household composition since, in France, the level at which taxes are levied depends on the number of dependents. We consider the simple situation of a "fiscal household" with no children, the family comprising either a single worker or a couple.

We then compute accrual values, defined as the difference between the values of social security wealth in two following years. We describe below the different factors accounting for the change in social security wealth between two years. We compare this accrual to the value of social security wealth by computing the accrual rate. Finally, in order to measure incentives to retire, we compare the accrual value to the earnings of the last year of work: the opposite

5. Contrary to what is observed in the United States, the earnings profile observed in France after age sixty does not decline but increases. Two reasons may explain this fact. First, there are few part-time workers at this age since everyone is eligible to receive a pension, at least a minimum pension from the welfare state, and getting this pension implies stopping work. Second, in the framework of an earnings-leisure trade-off, incentives to continue working after age sixty are strong for high-earnings workers.

Table 3.5 Base-Case Incentive Calculations

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	792,068	...	...	...
55	...	886,083	94,015	.12	−.91
56	...	986,531	100,447	.11	−.97
57	...	1,034,081	47,551	.05	−.46
58	...	1,029,771	−4,310	.00	.04
59	.92	1,024,586	−5,185	−.01	.05
60	.91	954,881	−69,705	−.07	.67
61	.92	892,339	−62,542	−.07	.60
62	.91	826,880	−65,459	−.07	.63
63	.92	768,327	−58,552	−.07	.56
64	.92	710,313	−58,014	−.08	.56
65	.93	656,799	−53,514	−.08	.52
66	.94	607,337	−49,461	−.08	.48
67	.95	559,482	−47,855	−.08	.46
68	.96	513,035	−46,447	−.08	.45
69	.96	468,382	−44,652	−.09	.43

value of the ratio is called the tax/subsidy rate. When the tax/subsidy rate is positive, working one more year entails a decline in social security wealth, which somehow represents a tax on last year's earnings.

Results for the different cases are presented in sections 3.3.3 and 3.3.4 below.

3.3.3 Base-Case Results

Table 3.5 gives figures for the base case. Each row corresponds to the last year of work, ranging from age fifty-four to age sixty-nine. If, at the end of this last year of work, the individual is younger than sixty, we assume that he waits until age sixty to claim his pension (sixty is the minimum retirement age). In other cases, retirement is assumed to start just after the end of the last year worked.

Table 3.5 first shows replacement rates that appear to be very high (more than 90 percent). This finding is consistent with empirical observations from various surveys, and the high rates result from several factors. First, benefits include (mandatory) complementary pensions; thus, replacement rates can exceed the 50 percent full rate from the general regime. Second, pensions bear fewer social security taxes than do wages (about 20 percent on wages as opposed to less than 5 percent on pensions). Third, income taxes are progressive, and subtracting income taxes therefore raises the replacement ratio. The combination of all these factors eventually leads to a situation where after-tax pensions are very close to after-tax wages. Besides, in this base case, the worker is entitled to a full-rate pension from the general regime at age sixty; that is

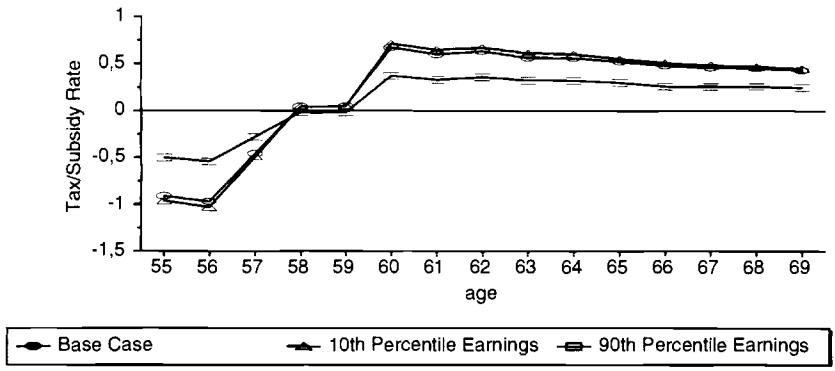

Fig. 3.17 Tax/subsidy rate across earnings profiles

why the replacement rate is already very high at this age and then slowly increases with complementary pensions.

If we turn to social security wealth and its variations with age, we must refer to the interplay between age at claiming and the number of years of contributions, which was already illustrated in table 3.2 above.[6] In the base case, workers are assumed to have contributed since age twenty. This implies the following dependency between age at exit from the labor force and social security wealth: (*a*) Between the ages of 55 and 57.5, one more year of contributions has two positive effects: it increases the coefficient α by 5 percentage points,[7] and it increases parameter N (number of years of contributions) by about one-thirty-fifth, or 3 percent. This increases the future level of the pension by an amount that is roughly 6–7 percent of the average wage. Multiplied by the length of retirement, which is roughly twenty years, this implies an accrual of social security wealth of more than 100 percent of the wage, which easily dominates the loss that results from the fact that the individual will pay one more year of contributions. This results in the large "subsidy" observed in the last column and depicted in figure 3.17. (*b*) At the ages of fifty-eight and fifty-nine, working one more year does not bring any new entitlements to the general regime and only a few more entitlements to complementary schemes. It does not change the length of the retirement period, but it costs one more year of contributions. The result is a slight decrease in social security wealth and a moderate implicit taxation of labor. (*c*) The picture is the same after age sixty: almost no new entitlements and one more year of contributions, but with the

6. Remember that three elements enter into the computation of the basic pension: the average wage over the ten best years; the rate α (from 25 to 50 percent, when age rises from sixty to sixty-five or when the number of years of contributions increases from 32.5 to 37.5); and the ratio of the number of years of contributions over 37.5. The full rate is defined as α being equal to 50 percent.

7. Last year of work at age fifty-seven increases α by only 2.5 percent because the full rate is obtained at age 57.5, after 37.5 years of contributions.

difference that delaying exit from the labor force now reduces the duration of retirement. Therefore, one more year of work reduces social security wealth not only by the amount of contributions but also by the value of forgone pension. This loss in social security wealth induces an implicit taxation of labor, whose rate tends toward the order of magnitude of the replacement ratio.[8]

What is the consistency between the results of these computations and actual labor force participation rates, reported earlier? Taken literally, these theoretical computations would suggest that the optimal age at departure is fifty-eight years. But actual hazard rates show that real behavior differs in various ways: either people leave earlier than this age or later.

Leaving the work force earlier than age fifty-eight is sometimes the result of incentives under specific regimes where very early retirement is possible, but in most cases it can also be explained by the importance of preretirement schemes or the specific rules applying to unemployment benefits at later ages. As explained earlier, workers who are laid off before age sixty can benefit, under specific conditions, from preretirement schemes or unemployment insurance until they are eligible to receive a full-rate social security pension (at at least age sixty). Years spent in one of these schemes are validated as years contributing to the basic regime; therefore, pension entitlements increase even if the worker is no longer active. In terms of future pensions, workers are not penalized.

Table 3.6 illustrates the consequences of this latter possibility for an individual who, between his exit from employment and his access to a pension from the general regime at the full rate, would receive unemployment benefits, this implying, of course, that his exit from employment results from being laid off and is not voluntary.[9] This table shows an apparent incentive to leave the labor force between the ages of fifty-six and fifty-seven. Of course, this applies only to those individuals who are fired at this age, and the decision to fire an employee is made by the employer, not the employee. In order to explain the low activity rates beyond this age, we must therefore assume that employers also derive benefits from these early exits. But this additional condition is probably fulfilled since these early exits offer employers a convenient means of solving the problem of excess labor capacity at low social cost.[10]

8. Nevertheless, the tax/subsidy rate differs from the replacement ratio (pensions/wage) for several reasons. First, the loss includes contributions in addition to forgone pensions. Then, we relate this loss to the gross wage since all taxation rates apply to the gross wage (referring to the net wage would yield higher tax/subsidy rates). Finally, in the computation of social security wealth, values are affected by the survival probability of the worker, which makes the absolute value of the accrual decrease with age, contrary to the replacement rate.

9. The coverage of preretirement schemes was very briefly extended, around 1980, to those voluntarily leaving a job, but this resulted in an explosion of preretirement expenditures, and the scheme was quickly abandoned.

10. This induces a potential risk of collusion between employers and employees, and some specific measures have been introduced to try to prevent it. For example, firms are asked to make additional contributions to unemployment insurance for people fired after a given age (Delalande contribution, after the measure's creator). Ex ante control is exerted by the state over other forms

Table 3.6 **Incentive Calculations—Unemployment Benefits between Work and Retirement**

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	1,065,913	...	...	...
55	...	1,100,430	34,516	.03	−.33
56	...	1,143,812	43,383	.04	−.42
57	...	1,136,666	−7,146	−.01	.07
58	...	1,079,952	−56,713	−.05	.55
59	.93	1,024,586	−55,366	−.05	.53
60	.92	954,881	−69,705	−.07	.67
61	.93	892,339	−62,542	−.07	.60
62	.92	826,880	−65,459	−.07	.63
63	.93	768,327	−58,552	−.07	.56
64	.93	710,313	−58,014	−.08	.56
65	.94	656,799	−53,514	−.08	.52
66	.95	607,337	−49,461	−.08	.48
67	.96	559,482	−47,855	−.08	.46
68	.96	513,035	−46,447	−.08	.45
69	.96	468,382	−44,652	−.09	.43

On the other hand, those who neither benefit nor suffer from these provisions generally leave the workforce after age fifty-eight and generally at age sixty (see the hazard rates shown in fig. 3.13 above). This is due to the fact that sixty remains the minimum age at which normal pension benefits can be claimed. What the results outlined above show means only that, from the point of view of the ratio of benefits to contributions, it would be optimal to stop contributing at age fifty-eight and then start receiving benefits at age sixty. But this would mean no source of income at all between the ages of fifty-eight and sixty, a solution that can be ruled out a priori for individuals who, generally, are liquidity constrained and cannot consider the possibility of having no income source for two years.

Is there an alternative way to compute social security accrual rates that would be more consistent with this behavior? One possibility would be to forbid any lag between interruption of activity and the claiming of pension rights. For people leaving the workforce before age sixty, this would imply social security wealth equal to zero (and even less than zero after subtracting contributions) since these people would receive no pension at all. This way of computing social security wealth has not been used here because the results would have been both trivial and unrealistic: an individual who would be forced to

of preretirement (FNE), the attribution of these kinds of preretirement benefits being conditional on the existence of a social plan prepared by the firm including some compensatory measures: e.g., firms must commit to recruiting a certain number of young workers or to employing middle-aged workers for a certain duration, and so on.

leave the workforce before age sixty will, of course, whatever his liquidity constraint, wait until age sixty to claim his pension.

3.3.4 Other Cases

Tables 3.7–3.10 show variations from the base case. Whatever the situation, we observe both the importance of the rate of the pension and high values for replacement rates.

In the case of a single worker (table 3.7), the level of social security wealth is smaller than in the base case, simply because there are no survivor benefits. Besides, although pensions and wages are the same as in the base case, replacement rates are slightly different because income taxes depend on the number of people in the household. However, incentives to retire are the same, with a maximum social security wealth for the last year of work at age fifty-seven and a high tax on wages for work beyond age sixty.

Table 3.8 and figure 3.17 above present the results of a wage profile at the tenth percentile of the wage distribution. Replacement rates are slightly higher than in the base case. The results for social security wealth and the tax/subsidy rate are similar to previous results, with positive accrual as long as the level of pensions increases, a small decrease at ages fifty-eight and fifty-nine, and then a huge decrease after age sixty resulting from forgone benefits.

In table 3.9, and again in figure 3.17 above, we examine the case of a worker at the ninetieth percentile of the wage distribution. Replacement rates are much lower than in the base case because of the high level of wages. Wages taken into account in the computation of pensions are capped, in the basic general regime (by the social security ceiling) as well as in complementary schemes

Table 3.7 **Incentive Calculations—Single Worker**

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	666,801	...	...	...
55	...	740,221	73,420	.11	−.71
56	...	817,607	77,386	.10	−.75
57	...	851,928	34,321	.04	−.33
58	...	841,109	−10,819	−.01	.10
59	.92	830,107	−11,002	−.01	.11
60	.91	756,702	−73,405	−.09	.71
61	.93	688,481	−68,221	−.09	.66
62	.92	621,819	−66,662	−.10	.64
63	.93	559,498	−62,321	−.10	.60
64	.93	498,909	−60,589	−.11	.58
65	.94	441,338	−57,571	−.12	.56
66	.94	388,614	−52,724	−.12	.51
67	.95	337,712	−50,901	−.13	.49
68	.96	288,461	−49,252	−.15	.48
69	.96	241,174	−47,287	−.16	.46

Table 3.8 **Incentive Calculations—Tenth Percentile Wage**

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	. . .	527,363	. . .	. . .	. . .
55	. . .	589,645	62,282	.12	−.96
56	. . .	656,541	66,896	.11	−1.03
57	. . .	688,575	32,033	.05	−.49
58	. . .	685,953	−2,622	.00	.04
59	.97	682,757	−3,196	.00	.05
60	.96	636,651	−46,106	−.07	.71
61	.97	594,697	−41,954	−.07	.65
62	.96	551,248	−43,449	−.07	.67
63	.97	511,754	−39,494	−.07	.61
64	.97	473,039	−38,715	−.08	.60
65	.98	437,188	−35,851	−.08	.55
66	.98	404,200	−32,988	−.08	.51
67	.99	372,531	−31,669	−.08	.49
68	1.00	342,151	−30,380	−.08	.47
69	1.00	313,030	−29,121	−.09	.45

Table 3.9 **Incentive Calculations—Ninetieth Percentile Wage**

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	. . .	1,128,847	. . .	. . .	. . .
55	. . .	1,239,107	116,260	.10	−.50
56	. . .	1,365,077	125,970	.10	−.54
57	. . .	1,430,006	64,929	.05	−.28
58	. . .	1,435,511	5,505	.00	−.02
59	.61	1,440,303	4,792	.00	−.02
60	.61	1,353,627	−86,676	−.06	.37
61	.62	1,275,728	−77,899	−.06	.33
62	.62	1,192,814	−82,914	−.06	.36
63	.63	1,119,002	−73,812	−.06	.32
64	.63	1,045,122	−73,879	−.07	.32
65	.64	976,418	−68,704	−.07	.30
66	.65	915,054	−61,364	−.06	.26
67	.66	854,800	−60,254	−.07	.26
68	.67	795,283	−59,517	−.07	.26
69	.68	737,552	−57,732	−.07	.25

(by a higher ceiling). For this reason, even in after-tax values, pensions amount to less than 70 percent of wages. However, incentives show the same profile as in the base case.

The next case again stresses that incentives to go on working are strong until the worker is entitled to a full-rate pension. Table 3.10 describes results for a

Table 3.10 **Incentive Calculations—Incomplete Earnings History**

Last Year of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	. . .	460,363	. . .	. . .	. . .
55	. . .	461,053	690	.00	−.01
56	. . .	463,250	2,197	.00	−.02
57	. . .	464,443	1,193	.00	−.01
58	. . .	504,618	40,175	.09	−.39
59	.58	586,050	81,432	.16	−.79
60	.65	626,648	40,598	.07	−.39
61	.74	665,157	38,509	.06	−.37
62	.81	693,905	28,748	.04	−.28
63	.86	681,341	−12,564	−.02	.12
64	.86	627,596	−53,745	−.08	.52
65	.88	577,934	−49,662	−.08	.48
66	.88	532,095	−45,839	−.08	.44
67	.89	487,866	−44,228	−.08	.43
68	.90	445,182	−42,684	−.09	.41
69	.91	404,001	−41,181	−.09	.40

worker with an incomplete earnings history. We suppose that the worker began to work at age 26 and is therefore not entitled to a full pension at age 60. Before age 58.5, the rate of the pension—not available before age 60—is 25 percent. Between the ages of 58.5 and 63.5, the rate increases by 5 percent per year,[11] from 25 to 50 percent, but, for each year of work after age 60, the worker forgoes one year of benefits. Thus, the accrual rate is positive at ages 58 and 59, remains positive between the ages of 60 and 62 (although smaller than before), becomes negative at age 63 because of the limited increase in the rate (2.5 percent), and remains negative later. In this case, the relatively small increase in the pension induced by work at age 63 does not offset the loss of one year's pension and thus leads to a decrease in social security wealth. Therefore, the maximum value of social security wealth is obtained for a last year of work at age 62, that is, for leaving the workforce at age 63, before reaching eligibility for the full rate, which is obtained at age 63.5. In fact, if computations were made on a quarterly basis, we would observe that social security wealth reaches its maximum right at age 63.5: here again, there are strong incentives not to retire at a reduced rate, even if delaying after age 60 implies giving up some pension. Finally, after reaching the full rate, we observe, as in previous cases, a heavy tax on work.

As for the replacement rate, values increase quickly up to the full rate, then keep going up slowly. Values are lower than in the base case because of the

11. As above, work at ages 58 and 63 induces only a 2.5 percent increase in the pension rate since the rate rises only after age 58.5 (32.5 years of contributions) and reaches its maximum at age 63.5 (37.5 years of contributions).

shorter career: the worker accumulated fewer points for complementary schemes. Nevertheless, the replacement rate eventually reaches 90 percent.

In all cases, we get similar results across the board. Rules of retirement schemes imply that social security wealth is maximized when the pension is obtained at the full rate. Early retirement at a reduced rate implies a reduction in social security wealth, which means that the system is not actuarially fair. The evidence is particularly clear in the case of an incomplete earnings history, where, between the ages of sixty and sixty-two, when it is possible immediately to claim a pension, it is still profitable to delay retirement in order to increase the pension level. On the other hand, beyond the full rate, further work entails a decrease in social security wealth, which acts as a tax on earnings.

3.4 Conclusion

There is little doubt that the question of knowing what determines age at retirement in France and what may drive its future evolution is particularly important. France has labor force participation rates at older ages that are among the lowest among similar developed countries, and, like all these countries, France is faced with the prospect of a rapidly aging population during the first half of the next century, a problem whose partial solution may lie in an increase in the retirement age.

This paper provides a partial explanation of current labor force participation rates in France. The age at which benefits are claimed is roughly consistent because of the conjunction of two elements: the possibility of retiring, under certain conditions, and receiving a full pension at age sixty and the fact that a majority of people are presently able to do so.

Although we did not attempt to make any projections, these kinds of computations may prove useful in assessing the effect of future changes in these two elements. The first change is that, over the next decade, future cohorts will face a progressive strengthening of the conditions that must be fulfilled in order to take full retirement at age sixty, following the implementation of the Balladur reform of 1993. The second change is that these cohorts will be characterized by new patterns of labor force participation over their whole life cycles, and especially a later age at entry into the labor force, that will make it harder to meet these conditions. These two changes will interact cumulatively to lower the probability of being able to retire at age sixty. We did not attempt to simulate this aspect because to do so would involve a full projection of labor histories at the individual level,[12] but it is clear that it is along the lines explored here that such simulations should be developed.

On the other hand, it remains true that the simulation of labor force participation around age sixty goes further than the computation of incentives pro-

12. A long-run dynamic micro-simulation model is currently being developed to deal with this question, but the results remain too preliminary to be included here.

vided by the single pension system. Interaction with unemployment insurance, preretirement schemes, the general situation of the labor market, and the behavior of firms are other aspects of a complex problem that deserve specific treatment and that were touched on here only briefly.

Appendix

We first present a general formula to evaluate social security wealth (SSW), defined as the present discounted value of social security benefits for a worker of age a_0 and considering retirement at age r, denoted SSW(a_0, r). We use the following notation:

a_0 = worker's age at evaluation of SSW;
r = age at retirement;
max age = maximum potential age;
δ = age difference between the worker and his spouse ($\delta > 0$ when the spouse is younger);
$p(a)$ = probability of worker's survival at age a conditional on survival at age a_0;
$q(a_f)$ = probability of spouse's survival at age a_f conditional on survival when the worker is a_0;
$B(a)$ = amount of retirement benefits at age a conditional on retirement at age r;
$C(a)$ = amount of contribution at age a to social security and complementary schemes (depends only on the wage at age a);
$R(a_f/a)$ = amount of survivor benefits at spouse's age a_f conditionally to end of worker's activity at age a; and
ρ = discount rate.

We decompose SSW into three elements:

PB(a_0, r) = present value at age a_0 of future benefits if retirement occurs at age r;
SSC(a_0, r) = present value at age a_0 of social security contributions until retirement at age r; and
SuB(a_0, r) = present value at age a_0 of survivor benefits if the worker retires at age r.

$$\mathrm{PB}(a_0, r) = \sum_{a=r}^{a=\max \text{ age}} p(a)B(a)\frac{1}{(1+\rho)^{a-a_0}},$$

$$\mathrm{SSC}(a_0, r) = \sum_{a-a_0}^{a=r-1} p(a)C(a)\frac{1}{(1+\rho)^{a-a_0}},$$

$$\mathrm{SuB}(a_0, r) = \sum_{a-a_0}^{a=r-1} [p(a) - p(a+1)]\frac{1}{(1+\rho)^{a+1-a_0}} \times \left[\sum_{a_f=a+1-\delta}^{a_f=\max \text{ age}} R(a_f/a)q(a_f)\frac{1}{(1+\rho)^{a_f-(a+1-\delta)}}\right]$$

$$+ \sum_{a=r}^{a=\max age} [p(a) - p(a+1)] \frac{1}{(1+\rho)^{a+1-a_0}}$$

$$\times \left[\sum_{a_f=a+1-\delta}^{a_f=\max age} R(a_f/r - 1) q(a_f) \frac{1}{(1+\rho)^{a_f-(a+1-\delta)}} \right],$$

$$SSW(a_0, r) = PB(a_0, r) + SuB(a_0, r) - SSC(a_0, r).$$

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