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4

Workers' Employment Rates and Pension Reforms in France
The Role of Implicit Labor Taxation

Didier Blanchet, Antoine Bozio, Simon Rabaté, and Muriel Roger

4.1 Introduction

France has experienced a clear reversal of older workers' labor force participation (LFP) and employment rates over the last 15 years. These two rates had continuously declined in the 1970s and the 1980s for the 60–64 age group, bringing employment rates at a low 10 percent for both genders. A similar drop took place for men in the 55–59 age group, more concentrated in time but very substantial: their employment rate lost 20 percentage points within only a few years around 1980. Women in this 55–59 age group have been the only exception to this general decline, due to the offsetting effect of increasing lifetime labor force attachment between successive cohorts. For all other groups, the trend toward earlier exits has reversed since the mid-2000s. We are now back to the levels of the 1970s for men in the 55–59 age group, and the labor force participation rate has almost doubled again for men and women in the 60–64 age group. It is now a little over 20 percent.

Both the initial decline and the subsequent U-turn have been addressed by a substantial body of literature. Blanchet and Pelé (1999) had emphasized the high level of implicit taxation of labor beyond the age of 60 that characterized the French pension system in the early 1990s. Subsequent reforms

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have tried to remove most of this implicit taxation, but they also modified other parameters of the retirement decision on both the supply and demand sides of the labor market: stronger requirements for reaching the pivotal age at which a "full rate" pension is obtained, lower replacement rates offered at this age, lower indexation prospects after entry into retirement, stricter control on access to early retirement routes, and reduced possibilities for firms to terminate normal labor contracts at the full-rate age. Faced with the need of evaluating the long-run impact of these reforms, several projection tools have been developed: most of them are dynamic microsimulation models, and they offer more or less sophisticated endogenizations of retirement behavior at the microlevel, either under the assumption of departures centered around the full rate or using some more structural assumptions in the spirit of Stock and Wise (1990), Mahieu and Sédillot (2000), or Mahieu and Blanchet (2004). Bachelet et al. (2011) compare messages delivered by these different ex-ante modeling approaches on reforms implemented until 2010. In parallel, with reforms beginning to produce their first observable effects, ex-post econometric evaluations start being available, generally exploiting discontinuities generated by the reforms, as in Bozio (2011) or Benallah (2011) for private-sector workers after the 2003 reform, Baraton, Beffy, and Fougère (2011) for the impact of the same reform on teachers in the public education sector, Rabaté and Rochut (2016) or Dubois and Koubi (2017) for the impact of the 2010 reform, and finally Rabaté (2017) for a more specific focus on changes that have affected mandatory retirement. To this literature can be also related empirical explorations of the so-called horizon effect by Hairault et al. (2006)—that is, the idea that changes in ages at access to retirement affect not only retirement *stricto sensu* but also general labor market behavior ahead of this retirement age.

The message that emerges from all this literature is that of a relative convergence between ex-post and ex-ante evaluations: pension reforms and associated changes in financial incentives seem to affect retirement behavior in a way that is roughly consistent with assumptions postulated by ex-ante projection models, even if some uncertainty remains about how far retirement ages can be expected to go on increasing over the next decades.

The present chapter is an addition to this literature. It essentially consists of an actualization of messages on implicit labor taxation that had been set forth by Blanchet and Pelé (1999): how did this implicit taxation change from the mid-1980s to the current period, and is this change in line with the U-shaped profile of employment rates shown in figure 4.1? The indicator is a pure financial indicator. It does not account for all other components that may affect individual decisions to retire: health, working conditions, and so on. It thus provides a partial understanding of the retirement process, a point we will emphasize in our conclusion.

The chapter will be organized as follows. Section 4.2 will detail the main changes that have affected French pension legislation since the mid-1980s.

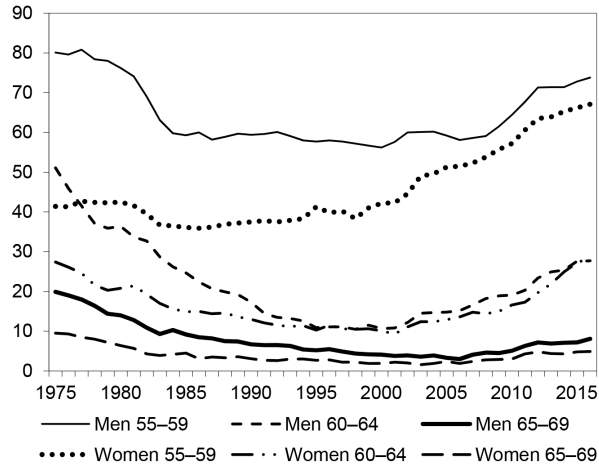


Fig. 4.1 Senior employment rates by gender and five-year age groups
Source: French Labor Force Survey

Section 4.3 will focus on the main methodological choices that have been retained for the study. Section 4.4 will present results for the case of private-sector workers: first we will focus on incentive properties of the normal pension system, and then we will examine additional incentives provided by other routes. Section 4.5 will then offer a brief examination of how incentives have changed for people working in the public sector. Section 4.6 will conclude.

4.2 The Context: A Brief Overview of the French System and Its Reforms

We document in this section the numerous reforms that have affected pension arrangements and other schemes, like early retirement or unemployment benefits, in France over the last decades.

4.2.1 Pension Reforms

Before presenting how pension rules and their reforms have shaped retirement behavior, a few words are required on the general organization of the French pension system. The core of this pension system is the *Régime général* (general regime), providing a first-pillar pension to all wage earners from the private sector. This pension scheme covers wages up to the social security ceiling, whose level is roughly equivalent to the mean wage. The principle of this general regime is to deliver a pension proportional to the number N_{rg} of years of contribution to the regime and to a reference wage W_{ref}, which is an average of wages received during the D best years of one's career, after truncation to the "social security ceiling," roughly equivalent to the average wage level.

This system entitles workers at most with a replacement rate equal to 50 percent of their reference wage. People at this level are considered to have the so-called full rate. This replacement rate thus remains rather low, and all the more so for people whose careers have ended well above the social security ceiling. Two complementary schemes provide additional pensions that raise replacement rates above this 50 percent or less ratio: respectively, the AGIRC (*Association Générale des Institutions de Retraite des Cadres*), dedicated to upper-skilled wage earners, and the ARRCO (*Association des Régimes de Retraite Complémentaires*) for all other categories of private-sector wage earners. These two schemes share a common principle: the pension they deliver is based not on the length of people's careers but on the number of points that they have accumulated over these careers through their contributions. The two basic parameters are therefore the purchasing price of these points, which determines how many points are bought a given year with contributions, and the service value of these points, which determines the amount of pension that one derives from one's accumulated account of points.

An equivalent two-pillar structure exists for self-employed people, with first-pillar pensions fully aligned on rules of the general regime and complementary pensions provided by a multiplicity of different regimes.

The last main segment of the French system is the one that applies to public-sector employees, who benefit from a single pillar-pension covering all their wages without any reference to the social security ceiling but excluding bonuses. As is the case in the general regime, the pension is proportional to the length of people's career, but the reference wage is not an average of past wages; it is equal to people's last wages or, more precisely, the wage they had over the last six months of their careers. These rules apply to the three categories of civil servants that exist in France: those employed by the central state, those employed by local authorities, and those working in the public health sector. Similar rules also apply to people who are not civil servants but work in large public or formerly public firms who have generally kept separate specific regimes (*régimes spéciaux*). A distinct feature of all these schemes is also the fact that they allow retirement much before 60—at 55 and sometimes before for some specific subcategories of workers, such as members of armed forces, the police, railway conductors, and so on.

We shall focus here on the reforms of the general regime and of the public-sector pension scheme, as their rules structure pension entitlements for a large majority of the population. The major reforms took place in 1983, 1993, 2003, 2010, and 2014 and are described in table 4.1.

Until the 1980s, all pension reforms in France aimed at increasing benefit levels and favoring early retirement. Then, starting in the 1990s, the French pension system underwent a series of new reforms going in the opposite direction, reducing benefits or increasing ages at which benefits could be claimed.

Table 4.1 **Main rules in the general regime and public-sector employees, before and after reforms**

	General regime					Public-sector employees		
	Before the 1993 reform	1993 reform	2003 reform	2010 reform	2014 reform	Before the 2003 reform	2003 reform	2010 and 2014 reforms
First age at which retirement is possible	60	No change		Increased to 62 years between cohorts 1951 and 1956	No change	55 or 60 years, depending on categories	No change	Similar to the general regime
Full-rate condition	60 or more with at least $N = 37.5$ years of contribution, or 65 without any condition on N	Duration condition raised from 37.5 years to 40 years (in 2003)	Duration condition raised to 41 (between 2008 and 2012) and to be increased to 41.75 years in 2020 and then indexed on life expectancy	No change in the duration condition. Shift to 67 or the unconditional full-rate age	Duration condition raised to 43 (for cohort 1973)	37.5 years	Duration condition raised to 41 (in 2008) and then moving as in the general regime	
Pension level at the full rate	If $N = 37.5$, 50 percent of the average of wages, truncated to the SS ceiling, over the 10 best years of one's career. If $N < 37.5$, this amount is prorated	The period over which past wages are averaged is increased from 10 to 25 years (by one year per year between cohorts 1933 and 1948)	No change			75 percent of the last wage	No change	
Penalty for retirement before the NRA	Prorating effect plus a reduction of 10 percent for each missing year	No change	Additional reduction reduced to 5 percent per missing year	No change		Only the prorating effect	Prorating effect plus a reduction of 5 percent for each missing year	
Bonification for retirement after the NRA	None	No change	3 percent for each year of postponement, increased to 5 percent in 2005	No change		None	3 percent for each year of postponement, increased to 5 percent in 2005	

The last significant reform increasing generosity occurred in 1983. This reform lowered the normal retirement age (NRA) from 65 to 60. However, it did so in a way that deserves precise explanation. Before 1983, the NRA for private-sector employees was 65. Retiring earlier was possible, as the early retirement age (ERA) was already equal to 60, but with a very strong penalty lowering the replacement rate by 5 percentage points per year of anticipation—that is, for instance, a 10 percent reduction of one's pension level if retiring at 64 rather than 65 and a replacement rate of 25 percent only if retiring at 60 instead of 65. The novelty of the 1983 reform has been to withdraw this penalty, but not in a fully unconditional way: a length-of-career condition was introduced requiring at least 37.5 years of contribution. Given that most male workers were fulfilling this condition (but not all female workers), it de facto offered to them full-rate benefits at the ERA, hence closing the practical gap between the early and normal retirement ages. Yet the two notions remained distinct, and people not reaching the 37.5 years condition remained exposed to the 10 percent penalty per year if failing to reach either this condition or the age of 65. In other words, the reform did not fully lower the NRA to 60. It did so only for one part of the population, with the side consequence of having complexified the structure of French pension rules, where three rather than two pivotal ages now coexist: the ERA, still equal to 60; an SEA (statutory eligibility age) of 65, systematically entitling one to a full-rate pension no matter the length of one's career; and the intermediate FRA (full-rate age), which is no longer an age *stricto sensu*, as it basically corresponds to a length-of-career condition.

The 1993 reform started reverting the trend toward more generous pensions. It did so for private-sector workers only, in two ways. The first instrument was the reduction of pension levels at the full rate: instead of being computed based on the 10 best years of one's career, as it used to be for people born until 1933, the average of past earnings that enters the benefit formula started being progressively computed over a longer period: up to 25 years for people born 1948 or after. This change was coupled with the application of a less generous revalorization rule for these past earnings, with reevaluation according to past wage growth being replaced by reevaluation based on past inflation only. The second instrument was a strengthening of the conditions required to get the full pension: the contribution years have been progressively increased from 37.5 to 40 years by one quarter each year from cohort 1933 to cohort 1943, with the expected effect of reincreasing the number of people unable to get a full-rate pension at the ERA, hence reopening the gap between the ERA and the FRA.

The 2003 reform extended the 1993 reform in several ways. For public-sector employees, the condition for a full-rate pension had remained at its pre-1993 value of 37.5 years of contribution, and they only incurred a small penalty for retiring before this full rate, the one automatically resulting from

the proportionality between the pension level and the number of years of contribution. As a first step, the 2003 reform changed this length-of-career condition for these public-sector employees, raising it to 40 years, and it introduced a penalty of −5 percent per missing year of contribution. The penalty applying to private-sector employees was symmetrically aligned on this new value of 5 percent, as its initial level of 10 percent was much stronger than requested for actuarial neutrality. The condition for obtaining the full rate was then made more stringent for both categories of workers: starting in 2008, it has been increased from 40 to 41.5 years, and the reform introduced a mechanism linking further increases of this parameter to changes in life expectancy. Symmetrical to the move toward actuarial and homogenous penalization of early exits, the reform also introduced a new bonus for years of postponement beyond the full rate, initially equal to 3 percent and then further increased to 5 percent per year of postponement.

The 2003 reform also led to the revision of one important aspect of the French employment legislation; otherwise the implementation of bonuses for postponing beyond the full rate would have remained purely theoretical. Until the 2003 reform, the full-rate age corresponded to the normal end of the contract between the employer and the employee. A separation occurring before this age at the initiative of the employer was a layoff, with associated obligations for the employer: the need for administrative authorization, payment of dismissal indemnities, and the risk of contestation of this dismissal in professional courts. No such obligation existed once the full rate was attained: the employer could legally request the employee to claim her pension benefits without any further obligations vis-à-vis this employee. The FRA therefore corresponded to a de facto mandatory retirement age, not in the sense that it was illegal to work beyond that age, but in the sense that most wage earners in the private sector had no real choice to work later than this age. The 2003 reform suppressed this disposition of the French employment legislation, reintroducing a clear distinction between the FRA and the mandatory retirement age. The latter was first fixed to 65 and then raised to 70 in 2009.

Lastly and opposite to the general trend toward later retirement, the 2003 reform opened new derogatory possibilities for early retirement through the pension scheme itself (and not through separate early retirement schemes) under the label of *carrières longues* but was limited to a very targeted population: workers who had started working (and contributing) very early, at age 14, 15, or 16. These workers were offered the possibility to retire with the full rate as soon as 56, 57, or 58, depending on additional conditions on contribution length.

This 2003 reform had, however, still left aside some specific categories of public-sector employees: those of large public firms benefiting from "special schemes" (railways, public transportation, gas and electricity, etc.). These

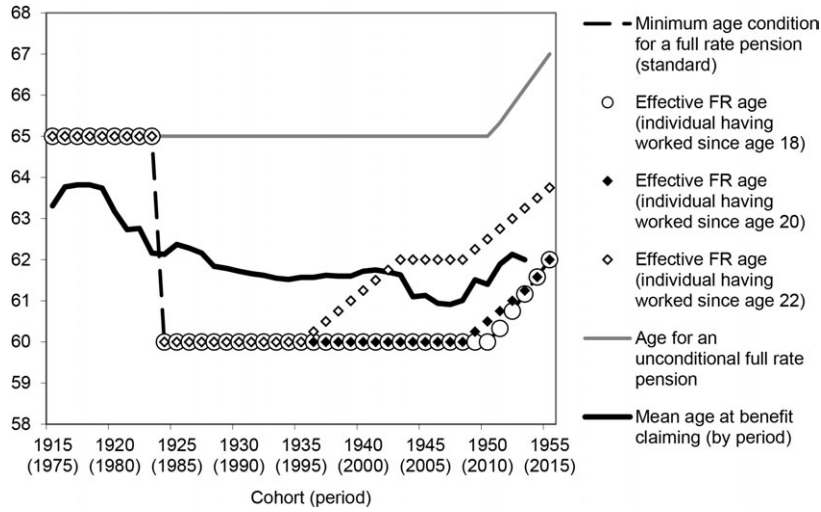


Fig. 4.2 Typical eligibility ages by cohort, private-sector employees

schemes were aligned on common rules in 2007 (contribution length, penalty for early retirement, etc.) even if pay compensation had to be offered to soothe opposition to this change.

The 2010 reform then affected all categories of workers, from both the public and private sectors. It consisted of an increase in the ERA and in the SEA. In other words, it shifted the age bracket within which people are expected to choose their retirement age, from 60–65 to 62–67. For public-sector workers who still benefited from different reference ages (i.e., the police, prison officers, or nurses), the increase was similar, with the ERA shifted from 55 to 57 and the SEA from 60 to 62.

In 2014, the last pension reform was introduced, which again strengthened the condition for full-rate benefits, increasing it from 41.5 years to 43 years. At the same time, the *carrières longues* rule was extended to include workers who started working before age 20, allowing some of them to also retire at 60, before the new ERA of 62.

Figure 4.2 tries to summarize the most salient of all these changes with time-series profiles of representative eligibility or effective retirement ages for private-sector employees. The age required for getting an "unconditional" full-rate pension has been equal to 65 over most of the period and has been increased to 67 years by the 2010 reform. Ages for accessing the full rate have had an evolution that depends on the N of years of contribution, here converted into a condition on age at entry into the labor force, assuming uninterrupted careers afterward, with three values for this age at entry: 18, 20, and 22. We see here the potential for an explanation of the U-shaped profile of labor force participation over time, with a drop of this age from 65

to 60 for all three cases in 1983 and then a reincrease due to the succession of reforms, initially affecting people having started working relatively late but spreading to the other cases at the end of the period, due in particular to the increase of the minimum age to 62. The last line in black on the graph shows how effective retirement behavior has resulted from a mix of these changing conditions and also of other derogatory rules not reported on the graph. For instance, before 1984, the effective age of benefit claiming was already much lower than 65, as several possibilities existed to leave with a full rate before this age. Then, over the recent period, the incentive effect of the 2003, 2010, and 2014 reforms has been dampened by the derogatory possibilities offered by the *carriers longues* system.

4.2.2 Other Schemes: Early Retirement Schemes, Unemployment, and Disability

To understand the trends in older workers' labor market participation, the description of the normal retirement pathway must be completed by a description of the possibilities offered by other exit routes. Three main pathways can be distinguished: (a) early retirement schemes (*préretraites*—i.e., state-sponsored schemes offering transitory benefits before access to normal retirement), (b) unemployment insurance, and (c) the invalidity/disability route.

Since this latter route is relatively marginal in the French case, we limit ourselves to a very brief description of its characteristics. Before the ERA, the *pension d'invalidité* is for individuals with a disability rate of over two-thirds. Workers can also be on long-term sickness leaves. After the ERA, people may be eligible for the *pension d'inaptitude* for a disability rate of over one-half. These people are treated as full-rate pensioners even if they do not fulfill conditions for the full rate. No significant reform of this system took place during the period under study.

Early retirement schemes and unemployment insurance have played a more important role during the period under review. Their main features over the last decades are given in table 4.2. This table shows that early retirement schemes were developed first, initially targeted toward the 60–64 age group and very specific sectors, under the name of *Garantie de ressources*. The first of these early retirement schemes were introduced in the early 1970s. During this first stage, early retirement was considered exceptional. However, in the face of declining labor demand and rising unemployment, the program was extended on a larger scale. The *Garantie de ressources*, initially limited to layoffs in 1972, was extended in 1977 to people having voluntarily left their job (*Garantie de Ressources Démission*, GRD). The replacement rate was 70 percent of the previous gross wage, thus higher than a full-rate pension on the general regime (not considering complementary schemes).

At the same period, the *Allocation Spécifique du Fonds National pour*

Table 4.2 **Main characteristics of anticipated retirement schemes developed since 1972**

	1972	1977	1982	1983	1985	1992	1996	1997	1999	2000	2004	2011	2017	Age groups covered
Preretirement schemes (private sector)														
Garantie de ressources licenciement (Resource guarantee—layoff)	x	x	x											60–64
Garantie de Ressources demission (Resource guarantee—resignation)		x	x											60–64
Allocation Spécifique du Fonds National pour l'Emploi (ASFNE) (Specific allowance for the national employment fund)		x	x	x	x	x	x	x	x	x	x	x		>56
Contrat de solidarité preretraite démission (Solidarity contract—resignation)			x	x										>55
Contrat de solidarité preretraite progressive (Solidarity contract—progressive retirement)			x	x										>55
Preretraites Progressives (PRP) (Progressive preretirement)						x	x	x	x	x	x			>55
Allocation de remplacement pour l'emploi (ARPE) (Replacement allowance for employment)							x	x	x	x				>58
Cessation anticipée de certains travailleurs salariés (CATS) (Anticipated cessation for specific categories of wage earners)										x	x	x	x	>55
Cessation anticipée d'activité des travailleurs de l'amiante (CAATA) (Anticipated cessation for workers exposed to asbestos)										x	x	x	x	>50
Preretirement schemes (public sector)														
Congé de fin d'activité (CFA) (End-of-career leave)									x	x	x			
Specific dispositions of unemployment insurance toward older workers														
Dispense de recherche d'emploi (DRE) (Exemption from seeking employment)					x	x	x	x	x	x	x			>57.5

Note: "x" corresponds to periods when schemes have been effective.

Source: Updated from Burricand and Roth (2000)

l'Emploi (ASFNE) was created, whose eligibility was extended in the 1980s to wage earners older than 55, together with the *Contrat de solidarité préretraite démission* (CSPRD), a scheme that offered a replacement rate of 70 percent to wage earners with more than 10 years of contributions who had resigned, hence similar to the GRD. However, this CSPRD scheme remained relatively short lived and closed in 1983; this was also the case for the associated "*Contrat de solidarité préretraite progressive*," a scheme allowing "part-time preretirement." In the meantime, the normal retirement age had been decreased to 60 in 1983, and with this decrease, early retirement schemes were planned to lose importance. Yet this took place only progressively. The *Garantie de Ressources* was gradually suppressed and the ASFNE was first restricted to wage earners older than 57 in 1994, before being definitely suppressed only in 2011.

Some new alternative schemes were created in compensation but were more specifically targeted: the *Allocation de remplacement pour l'emploi* (ARPE) and the *Congé de fin d'activité* (CFA) schemes created in the mid-1990s were targeted to wage earners older than 58 in the private and the public sectors, respectively. Employers using the ARPE had to replace early retirees with younger workers under age 26. Both were then suppressed in 2003 and replaced by two new and still more focused schemes, the *Cessation anticipée de certains travailleurs salariés* (CATS) and the *Cessation anticipée d'activité des travailleurs de l'amiante* (CAATA). The CATS was targeted to workers with especially hard work conditions (at least 15 years on an assembly line or with night work) and the CAATA scheme to workers exposed to asbestos.

The resulting expansion and contraction of numbers in preretirement for the 60–64 and 55–59 age groups can be observed in figure 4.3. The total stock of people benefiting from this *Garantie de ressources* grew rapidly between 1974 and 1983, where it amounted to about 7 percent of the 55–64 population. This growth explains the strong decline in employment rates between ages 60 and 64 shown in figure 4.1. This also explains why the introduction of retirement at age 60 in 1983 did not show up in figure 4.1 in the form of a sudden drop of employment rates in the 60–64 age bracket: to a large extent, this reform essentially consisted of a transformation of preretired people into "normal" retirees. The stock of these *Garanties de ressources* then mechanically declined during the first half of the 1980s.

This drop in the *Garantie de ressources* was initially compensated by the expansion of the ASFNE and other schemes applying to people in the 55–59 age bracket. But this expansion stopped in the mid-1990s, and these schemes have now almost disappeared, leaving room for two other routes, also represented in figure 4.3. The first one is the unemployment insurance route. This essentially took place through the creation of the *Dispense de recherche d'emploi* (DRE) that was introduced in 1984. In the 1990s, DREs became numerically more important than early retirees. The system consists

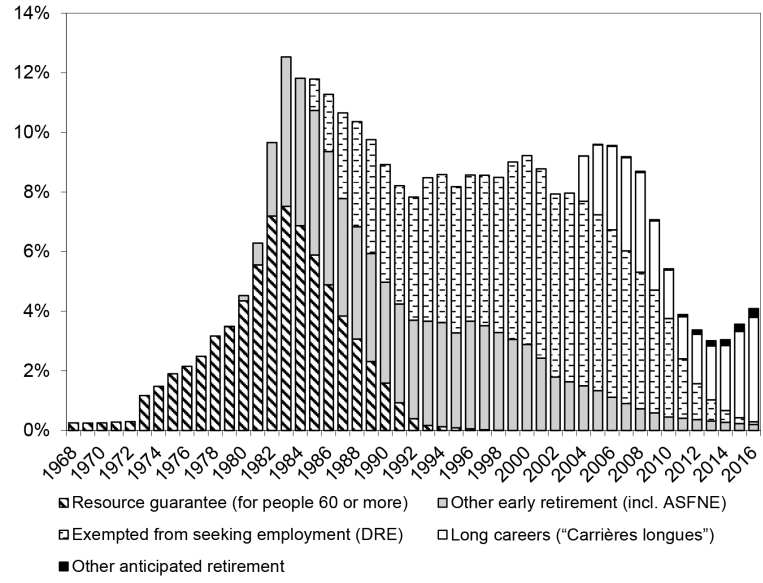


Fig. 4.3 Population in preretirement schemes (in percentage of total 55–64 population)

Source: DARES, Tableau de bord de l'activité des seniors et des politiques d'emploi (2017)

of exempting unemployed people from the active job search past a certain age: 55 at its creation. There were many changes, mostly decreases, in the eligibility age between 1984 and 2009 before a gradual increase to 60 in 2011. The DRE program was suppressed in 2012. The DRE did not give additional unemployment benefits, yet combined with the possibility to keep full unemployment benefits without any degressivity until being entitled to a full-rate pension, DRE has de facto acted as an early retirement scheme.

What ultimately took over after the suppression of the DRE has been the development of the *Carrières longues* system described earlier, which lies somewhat in between early retirement and normal retirement: it is part of the normal retirement system, but with very strong selectivity rules targeted to people having started contribution very early.

To sum up, the development of specific rules for older unemployed people in the national system of unemployment insurance and in early retirement scheme seems to explain a large part of the decline in employment rates in the 55–59 age bracket that occurred during the early 1980s. It was then followed by a period of tighter regulation of these routes, sometimes compensated by the creation of new ones but generally more focused. Until the early 2000s, the impact of all these policies has just been to maintain a relative status quo in terms of numbers of beneficiaries. This period corresponds to the bottom

part of the U-shaped profile of labor force participation for men aged 55 to 59 shown in figure 4.1. The situation reversed much more significantly during the 2000s, first with the progressive extinction of early retirement schemes, of which only two very limited forms still subsist, and second with the extinction of the DREs, definitely suppressed in 2011, with a stock of beneficiaries progressively declining to zero. For some time, the resulting downward trend has been compensated by the development of the *Carrières longues* system, but this has not been enough to offset the other changes.

4.3 Key Components of the Benefit Calculator

After this first inventory of how social security rules have changed in France since the early 1980s, the rest of the chapter will be devoted to translating these rules into the common formalism of financial incentives to retire in order to allow comparison with other countries. Several measures of these incentives to retire have been proposed in the literature. We focus here on the so-called tax rate that implicitly applies to wages if one decides to postpone retirement by one year: it computes by how much discounted social security wealth (SSW) is reduced or eventually increased when choosing to work one year longer, expressed as a percentage of the current wage, with SSW being defined as the discounted sum of pension benefits over one's expected retirement period. This indicator is a pure financial indicator. It does not account for all other components that may be determinants for individuals' choices to retire: health, working conditions, and so on.

Computing these tax rates requires several conventional choices and inputs. Conventional choices are necessary to define what kind of decision is going to be modeled and for whom. Inputs will consist of data necessary to feed the pension simulator—essentially career profiles but also survival probabilities for the computation of cumulated benefits and weights to be applied to the various exit routes.

4.3.1 Basic Conventional Choices

Retirement behavior has two dimensions that ideally deserve separate modeling: one is benefit claiming and the other is exit from employment. The two decisions fully coincide for people directly moving from their last paid job into full retirement. In practice, benefit claiming can occur after or before this exit from the labor force. In France, however, despite increasing possibilities to combine paid activity with the perception of pension benefits, working after having claimed one's benefits remains a relatively marginal phenomenon that will not be addressed here. On the other hand, the end of people's paid careers very often occurs well before their access to normal retirement. In 2012, only two people out of three were still employed when claiming their pension benefits (Govillot 2013). This discrepancy generally

results from temporary transitions through one of the various alternative early routes that have been described above: early retirement benefits, unemployment insurance benefits, or disability benefits.

To deal with these alternative routes, we model the fact of definitely leaving the labor force, whatever the chosen route k, rather than the fact of claiming for normal pension benefits. At a given age a and for a given route k, two cases will have to be considered.

The first one is when this route is already opened at age a. In this case, the computation is straightforward: the SSW accrual combines the negative effect of foregoing one year of benefits (a "perception duration effect") and the fact that, in case of postponement, the level of this benefit is likely to be higher (a "benefit level effect"). In the plausible case where the first effect dominates, the route under consideration will create an incentive to withdraw: in other words, this route is associated with an implicit taxation of labor.

But we also have to compute the incentive properties of routes that are not yet opened to the individual. Let's consider, for instance, an individual who has not reached the ERA associated with the normal retirement system. For this person, leaving the labor force with the plan to benefit later from this normal route is an option: the choice is between doing so at the current age a and waiting until the ERA to claim social security benefits or working one more year, generally implying higher entitlements, but for a retirement period that will also start at the ERA—that is, of exactly the same length. As a result, we expect to measure for this person a positive incentive to remain at work or, equivalently, a negative implicit taxation of labor (a subsidy). After that, if this person is still at work when reaching the ERA, we will turn again at this age to a computation that will combine the negative effect of receiving the benefit for one year less and the increment to the level of the benefit resulting from a longer career.

This convention for computing incentives before the eligibility age ignores what is certainly the strongest determinant for staying at work until the ERA for those who do not benefit from any other early retirement possibility: the loss of wage income and the fact of having to wait until the ERA without any resources. Ignoring this dimension is the consequence of focusing only on the SSW side of the problem. But this convention at least provides us with implicit tax rates at all ages for all potential routes, both those already available and those that will be available only later.

Having computed SSW for each pathway, what remains to be done is to weight these incentives. We do it conventionally using the observed shares of all these routes in global yearly exit flows, even though these probabilities are likely to be endogenous: these probabilities are equilibrium values combining the degree to which these routes are accessible to workers and their choices to make use of these routes.

The next conventional choice for simulations is to define to whom these

computations will be applied. We distinguish three skill levels corresponding to low, medium, and high levels of education and consider private- and public-sector workers. Computations will be performed separately for men and women but without any distinction between single and married persons: it is only personal pensions that are simulated here. Survivor's pensions in France follow complicated rules, with some of them means tested (those delivered by the *régime général*) and others not, leading to important threshold effects according to the ratio between wages earned by both spouses. The rules did not undergo significant changes during the period under review; this relativizes the need to model them to explain behavioral changes. Of course, there could have existed a time-varying interaction between these rules and the narrowing of the wage and career gap between men and women, but these potential interactions are a priori far too complex to be usefully retraced by a limited set of typical cases.

4.3.2 Earnings Histories

Retrospective data on wages are a major component of computations. In France, microdata on wages are available either from the Labor Force Survey (LFS) or from administrative sources such as the *Declarations annuelles de données sociales*. We favor the first data source despite a smaller sample size and the lower accuracy of self-reported wage levels, as the LFS provides information on the education level, our variable of social stratification.

Based on this dataset, three variants have been tested for earnings profiles:

- *Common synthetic profiles*. These profiles use age patterns observed in three countries (Germany, Italy, and the US) normalized to 1 at age 50 for each skill and sex group and converted in national equivalents through multiplication by country and time-specific wage levels at this age of 50. Here, the role of the French LFS is only to provide the wage levels observed at each period and at age 50 to rescale these common synthetic profiles to a level corresponding to the French situation. These common synthetic profiles will be used in the baseline simulations presented in section 4.4.
- *Country-specific but time-independent profiles*. We use profiles by age estimated in 2016 using the LFS data, and then, as for common synthetic profiles, we rescale them to the observed levels at each period at age 50.
- *Country- and time-specific profiles*. The profiles are fully derived each year from successive labor force surveys, differentiated according to gender and education levels.

We produce these three sets of profiles by gender and education levels (available in Blanchet et al. 2019b). In the three cases, the method applies only from 1982, the first year for which wage data are available in the LFS. Wage levels are also required for earlier periods. For instance, people retiring

at 65 in 1980 had started their careers up to 50 years before—that is, in 1930. Up to 1945, back projection is possible based on average wages provided by National Accounts. For periods that are still more remote, a conventional evolution of 2 percent per year is applied. This has limited practical incidence, as the reference wage is computed on only a short subperiod of these peoples' careers, generally located in the middle or second half of their careers.

Differences appear between the common synthetic profiles and the French profiles, mostly for high school graduates. For the synthetic profile, the increase is steep at the beginning of the period, and the wage evolution is quite flat from 30 to the end of the career. We note a small decrease at the end for men in the lower education group. As far as French profiles are concerned, the increase is smaller at younger ages, but wage profiles are rising during the whole career.

4.3.3 Survival Probabilities and Pathways

Concerning survival probabilities, as for wages, we have one "common" specification shared by all countries, used for our baseline's simulation.

For alternative pathways, we regroup them into the four main categories described in section 4.2: normal retirement, early retirement, unemployment, and invalidity. Information on access to these pathways by gender and education is provided mostly by the French LFS completed by the *Santé et Itinéraire Professionnel* survey (SIP—i.e., Health and Labor Market History) for disability.[1] Due to the small share for some exit routes for highly educated people, we compute the weights only for two education groups, considering as a whole those with high school diplomas and above. Relative weights are presented in appendix A.

For men and women aged between 55 and 59, we observe a decrease in the probability to be in either early retirement, unemployment, or disability over the period. The probability to experiment with these pathways is always lower for the higher educated. Note that for women with only primary or secondary school education, the employment rate, compared to other pathways, is quite low. We have excluded women out of the labor force for family or personal reasons and have rescaled the probabilities to 1.

Above 59, the employment rate is quite low for every group. Probabilities of unemployment or disability being very low, we observe the same pattern as in figure 4.1 for employment and the complementary pattern for retirement.

1. This second survey provides current and retrospective information on health and labor market status for 14,000 individuals aged 20 to 74 in 2010. All successive spells in labor market histories and all major health events in individuals' lives are reported. We select a subsample of spells corresponding to the states experienced by the individuals of the sample when aged 55 to 60 years old and consider the information relative to disability or sickness leave.

4.3.4 Computing Incentives, Net of Taxation, and Other Contributions

With all these elements in hand, it is possible to move to the computation of benefits. More precisely, for a given pathway k and an individual i observed at time t and age R, we compute the sequence of future benefits between ages R and T if she retires at R,$B_{k,t,a}(R,i)$ for $a = R$ to T and then sum them up with discounting and weighting by survival probabilities at each age to get the associated social security wealth $SSW_{k,t}(R,i)$, hence the accrual representing by how much this SSW increases (or decreases) in case of postponement by one year. As explained above, if R is lower than the eligibility age for the considered pathway, SSW will cumulate benefits only starting from this eligibility age. The associated accrual is

$$ACCR_{k,t}(R,i) = SSW_{k,t+1}(R+1,i) - SSW_{k,t}(R,i).$$

Hence the tax rate is

$$ITAX_{k,t}(R,i) = -ACCR_{k,t}(R,i)/Y_{t+1,i},$$

where $Y_{t+1,i}$ is the wage that this individual will earn next year in case of postponement.

Detailed pension benefits are calculated according to successive legislation using the code embedded in the French PensIPP microsimulation model. This computation takes into account taxes or other contributions to which both wages and pensions are submitted in order to compute a net replacement rate. The general principle of taxation of public pensions in France is that social security contributions are fully deductible from income tax, but pension benefits are subject to tax when received. French income tax is based on joint taxation, whereby all incomes earned by a tax unit are added and divided by the number of parts, or the number of units composing the tax unit—that is, 1 for each adult and 0.5 for each child. In addition to the income tax, pensions can be taxed by other social security contributions, like health care contributions or general flat tax contributions like the *Contribution sociale généralisée* (CSG) and the *Contribution au remboursement de la dette sociale* (CRDS). These latter contributions have been increasing since the early 1990s and have led to a reduction in the ratio of gross pension and net pension benefits.

Given the nature of the simulations based here on average earnings at the individual level, we have abstained from precisely modeling the rules of the joint income tax and prefer to approximate the average change in the taxation of pension by simulating all the other taxes—which have changed most across time. Hence we compute health care contributions, CSG, and CRDS to obtain net pensions for our different earnings profiles. The change over time in taxation is marked, going from 0 percent in 1980 to 7.4 percent in 2015.

4.4 Wage Earners in the Private Sector

4.4.1 Incentives Provided by the Normal Retirement Route

We start the presentation of the results by focusing on incentives provided by the central route, normal retirement. Even if incentives are also formally computed for ages below the normal ERA, we focus here on the 60–64 age bracket, for which they are the most significant. Accruals and associated tax rates for men and women are presented for the three education levels. Level 1 corresponds to primary or secondary school, and individuals are assumed to have started working at 16; level 2 is for high school graduates with an entry in the labor market at 20; and level 3 corresponds to individuals having more than a high school diploma and beginning work at 25.

The first set of results is based on the common synthetic earnings profiles discussed in section 4.3.2.[2] Results are qualitatively similar for men and women and will be commented on in global terms. Indeed, we consider women with uninterrupted careers whose paths differ from those of men only in terms of wage levels, not in terms of years of contributions, and it is this latter parameter that is the main determinant of replacement rates.

Incentive profiles for men or women at level 1 read as follows. For these individuals, before the 1983 reform, the retirement route was already opened at 60, but the full-rate age was equal to 65, with a strong penalty for earlier departures of 10 percent per year of anticipation, higher than that requested by actuarial neutrality. This resulted in a strong positive accrual and, formally, a "subsidy" to working at these ages—that is, a negative tax rate. For these individuals, the 1983 reform fully reversed the pattern. Having started working early, they became entitled to a full-rate pension as soon as 60, and in the absence of any bonus for postponement beyond the full-rate age, the only impact of postponing beyond 60 was a negative perception duration effect—that is, the fact of benefiting from one's benefits one year less, hence a negative accrual of the same order of magnitude at all ages and an associated positive tax rate of about 70 percent, roughly equal by construction to the replacement level. This is the situation described in Blanchet and Pelé (1999). It remained so until the 2003 reform that introduced the bonus for postponement beyond the FRA, bringing both the accrual and the tax rate closer to zero but not entirely.

The situation of zero taxation has been fully achieved only by the 2010 reform for ages 60 and 61 but not by having brought benefits more in line with the principle of actuarial neutrality. The mechanism has been different and stems from the convention used to compute the tax incentive for people who are below the eligibility age. Let us consider the case of an individual

2. Results using the alternative profiles are available upon request but do not lead to significant changes.

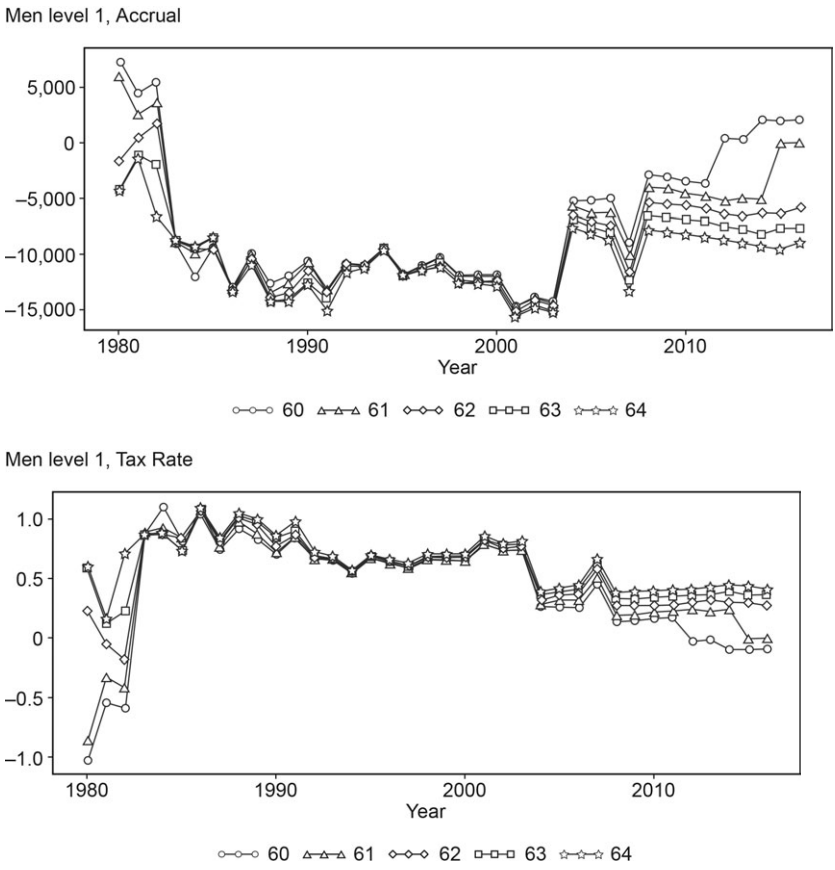


Fig. 4.4 Incentives provided by the normal pension route, 60 to 64

for whom the minimum age has been shifted to 61. For this individual, leaving the labor force at 60 and claiming for benefits at 61 generates the same stream of future benefits as leaving the labor force at 61. The perception of benefits will start at 61 in both cases. The only impact of working longer should be to accumulate higher entitlements, but this impact is marginal, as this individual will benefit anyway from the full rate at age 61, having had a sufficiently long career, and because years accumulated in excess of the full-rate condition but before 61 are not productive: only additional years of work beyond the FRA will generate additional entitlements. All this leads to the quasi neutrality of pensions rules at age 60 seen through the lenses of this tax rate indicator, as depicted by the line with circle markers. The same holds true at age 61(line with triangle markers) for individuals retiring a few years later, for whom the minimum age has been shifted to 62.

Of course, this does not mean that the 2010 reform has led to a system

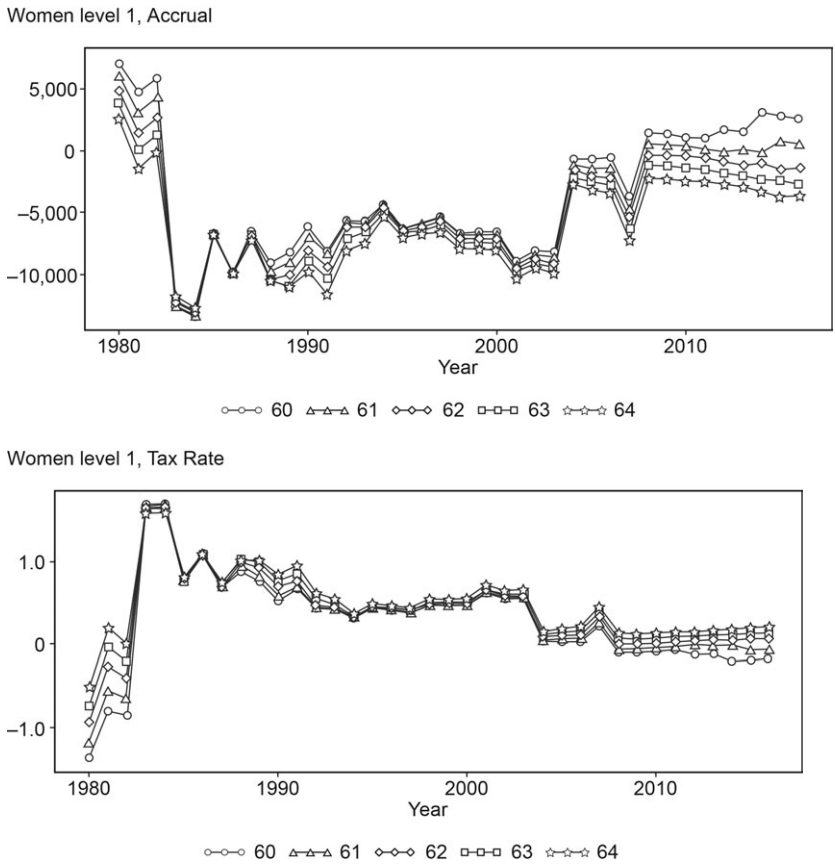


Fig. 4.4 (cont.)

that is entirely neutral for retirement behavior at ages 60 and 61—quite the contrary. We know indeed that this reform has led to substantial changes in retirement behavior in the 60–62 age group (Dubois and Koubi 2017), but this effect is not captured by the tax rate as computed here. The channel has rather been the drop to zero of the replacement rate offered at these ages.

What if we shift to the level 2 individuals having started working at age 20? The story is roughly similar, except for the absolute level of the accruals—proportional to past wages and also affected by a higher life expectancy—and also for a much stronger upward movement of the accrual at age 60 at the very end of the period due to a superposition of the effects of the 2003 and 2010 reforms. As for level 1, the effect of the 2010 reform is to suppress the duration effect of leaving employment at 61 rather than 60. But the 1993 reform adds to this a strong bonus effect, as the career length for this individual is now 41 years, no more attained at 60. For this individual, the additional year of work at 60 is therefore not lost in terms of the level of

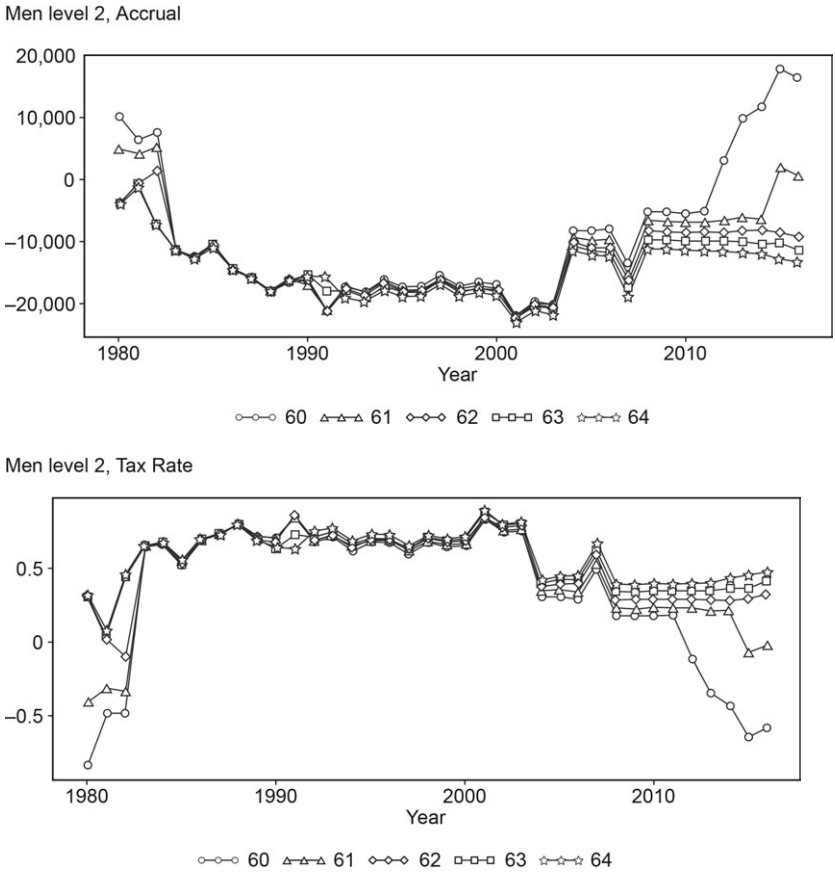


Fig. 4.4 (cont.)

benefits; it avoids a significant penalty when retiring at 61. The combination of the two elements generates a strong subsidy to working at 60—close to the one that existed before 1983.

What about the case of the type 3 individual, having started working at only 25? The interpretation of results is less straightforward. The beginning of the story is again the same as for the type 1 individual: a full-rate age equal to 65 and a strong penalty if leaving before. The absolute level of the accrual is again higher because this individual has higher earnings and is globally entitled to higher pensions with a higher life expectancy. The value of the implicit "subvention rate" is somewhat smaller, as pensions, albeit higher in absolute terms, are smaller in proportion to labor income. Yet globally, patterns are very similar between these two individuals before the 1983 reform. This reform did not strongly affect his incentive to retire at 60 or 61, since, due to his late entry into the labor market, he had to wait until 62.5 to get a full-rate pension. It is beyond this age that the initial subsidy

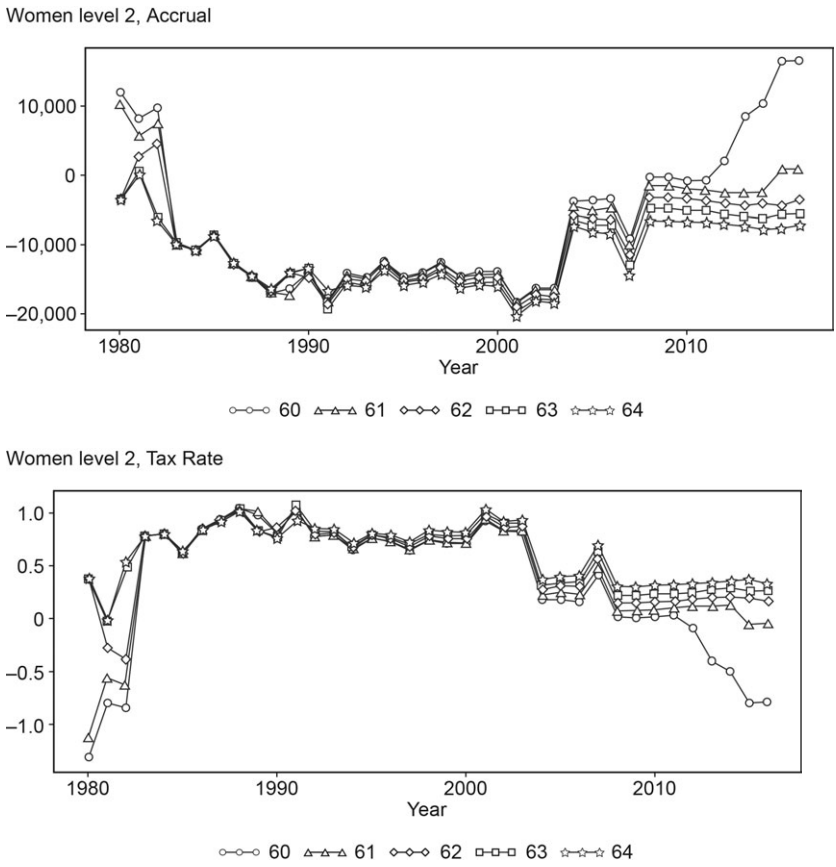


Fig. 4.4 (cont.)

is turned into taxation. But this taxation rapidly shifts to a subsidy again as a consequence of the 1993 reform that rapidly increases the age at which this individual is able to reach the full rate. This effect spreads progressively up to the higher end of the 60–64 age bracket, the move from a taxation to a subsidy being dampened somewhat by the 2003 reform that has reduced the magnitude of the penalty incurred for retiring before the full rate. For this individual, the 2010 reform also had the effect of reinforcing the subsidization of work at age 60 and then 61, but in a way that is less marked than it was for the type 1 and type 2 individuals due to the subsidization that already existed for this worker before the 2010 reform.

4.4.2 Alternative Routes

All in all, even if the tax rate does not cover all the channels through which reforms have tried to encourage later retirement, the picture is globally in line with the U-shaped employment pattern that we are expected to explain.

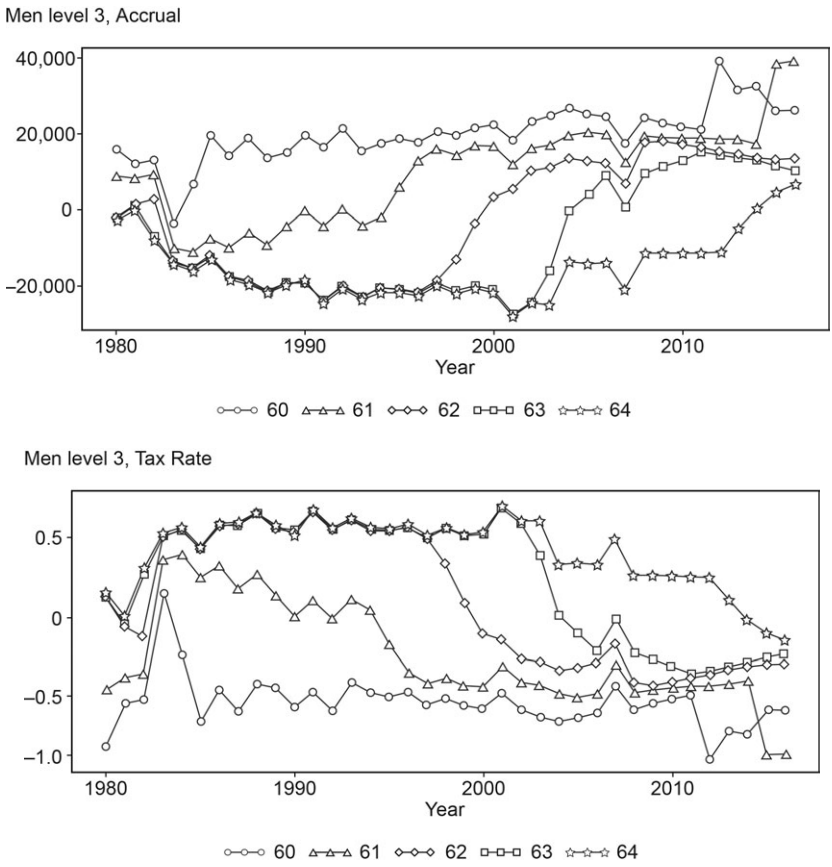


Fig. 4.4 (cont.)

Employment rates for the 60–64 age bracket have been low when the taxation of labor in this age group was high, during the second half of 1980 and 1990, and the turning point more or less coincides with a decline of these tax rates, even if the exact timing of this decline has not been uniform at all ages and for all types of workers. What if we move to the 55–59 age bracket and extend the analysis to other routes?

As mentioned above, four routes are taken into account in a stylized way. An individual aged between 55 and 59 can choose to leave employment with four options:

- either through the unemployment route or through an early retirement scheme, in these two cases with an eligibility age of 56 and a replacement rate of 60 percent;
- through disability, with an eligibility age of 55 and a replacement rate also equal to 60 percent;

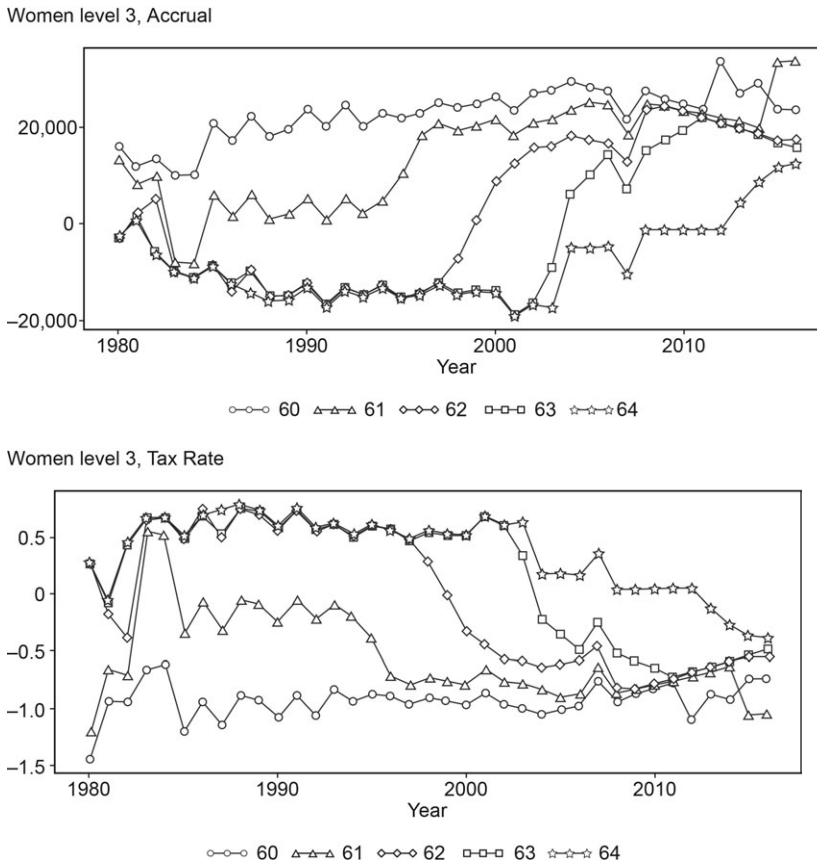


Fig. 4.4 (cont.)

- or only with the perspective of benefiting later on from a normal pension at the age of 60 before the 2010 reform, which then raised the ages to 61 and 62, with the pension offered at these respective ages but without any other forms of benefits until these ages.

Incentives associated with each of these routes are computed as for the normal route. For the first three routes, SSW is computed as the discounted sum of associated benefits until the full-rate retirement age and continued with normal pension benefits beyond this age. The problem is that these routes are not options available to everyone: benefiting from the disability route is conditional on suffering from health problems attested by special regulatory commissions; benefiting from an early retirement scheme generally results from the application to one's firm of a "social plan" negotiated between this firm and public authorities; and benefiting from unemployment

insurance benefits requires having been laid off by one's employer, which here again is not a free choice made by the employee. The way to account for these limitations is to weight incentives by some probability of having access to these routes. It is ex-ante probabilities that should have been ideally used, with ex-post probabilities resulting both from these ex-ante values and from the choices made by individuals to benefit or not from these routes in response to associated expected benefits. But ex-ante probabilities are not observable, and ex-post values are used instead, despite the endogeneity problem it creates. These probabilities are those presented in figure 4.3.

Figures 4.5 and 4.6 show the results. They give the profiles of accruals from 55 to 59 for each route taken separately and their associated aggregate tax rate. Results are given for men only, as gender has little influence on results when considering people with continuous careers (results for women are given in appendix B), and they are given only for the two extreme cases of type 1 and type 3 workers.

By construction, accruals for the three routes other than normal retirement have relatively simple structures that do not significantly depend on the category of workers. For the disability route, there is a relatively flat accrual, which is about the same irrespective of age. The same applies to unemployment insurance and early retirement benefits, but only starting from 56. At 55, the accrual is close to zero, as the expected stream of benefits is the same whether one works one year more before accessing the considered route or whether one immediately stops working and has to wait one full year without resources before entering into the route under consideration. One should note incidentally that such an eventuality is not very realistic, as benefiting from an early retirement benefit or from unemployment insurance must necessarily follow a period of employment. It cannot be deferred to a later period, contrary to claiming for one's pension, which can be done at or after the minimum pension age whatever one's current status on the labor market.

The main message from figures 4.5 and 4.6 is that it is essentially incentives associated with the normal route that make the difference, however distant the perspective of a simple normal retirement can be in this 55–59 age bracket. For the type 1 individual, the general message is that of a zero accrual—no perception duration effect and no bonus effect. The reason is that at the beginning of the period, the individual has accumulated a sufficient number of years of contributions to benefit from a full-rate pension at 60, whatever his participation profile between 55 and 59. It is only at the end of the period that access to a full-rate pension at 60 starts being dependent on this participation profile, once the individual starts being hit by the progressive impact of the 1993 and 2003 reforms. For the type 3 individual, on the other hand, immediately the individual has an incentive not to stop work at 55 or later, since additional years of work are systematically productive in terms of access to the full rate at 60. This incentive paradoxically disappears at the end of the period, but this is due to the fact that, at this point, the level

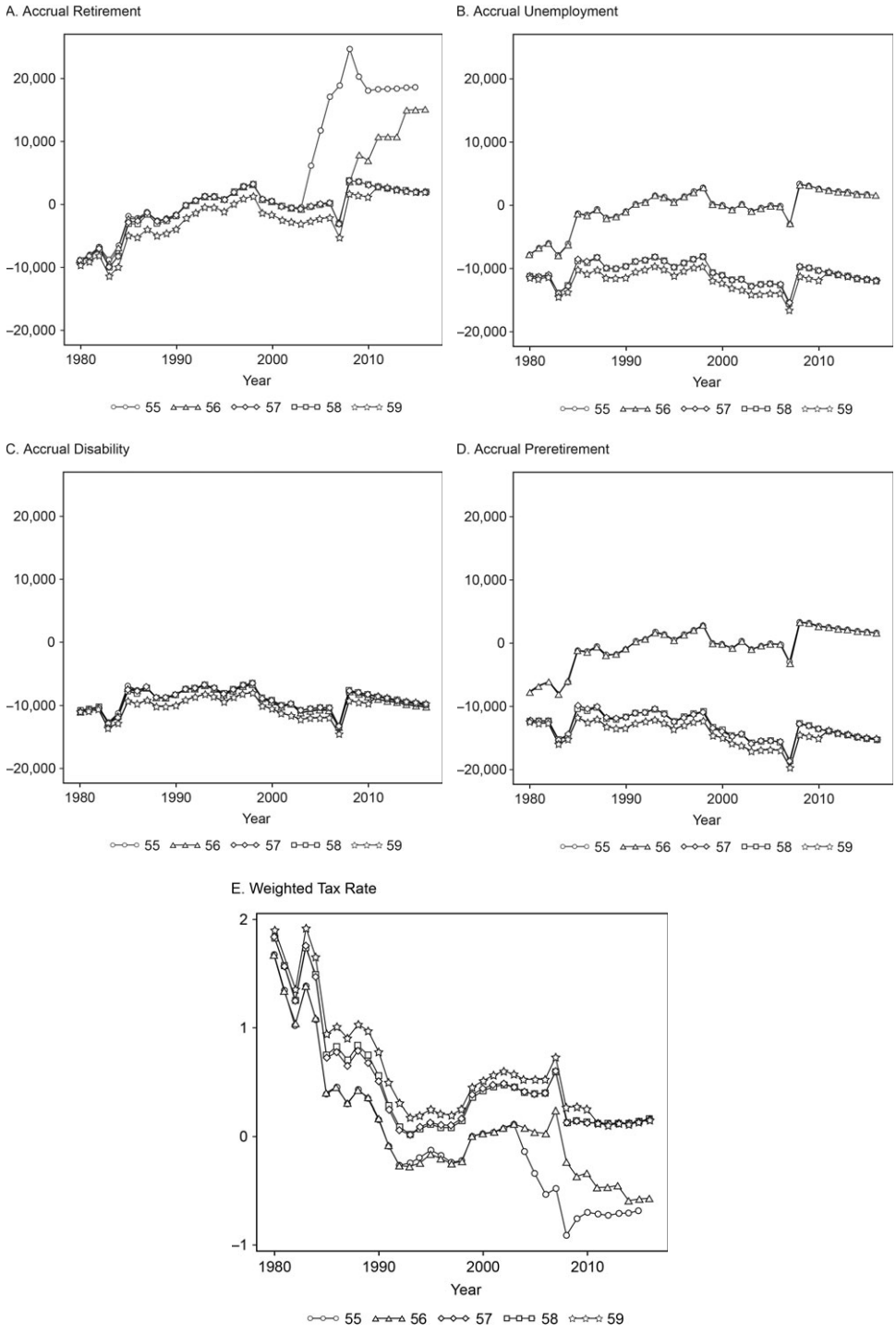


Fig. 4.5 Accruals 55–59 by pathway and aggregate tax rate (men, education level 1)

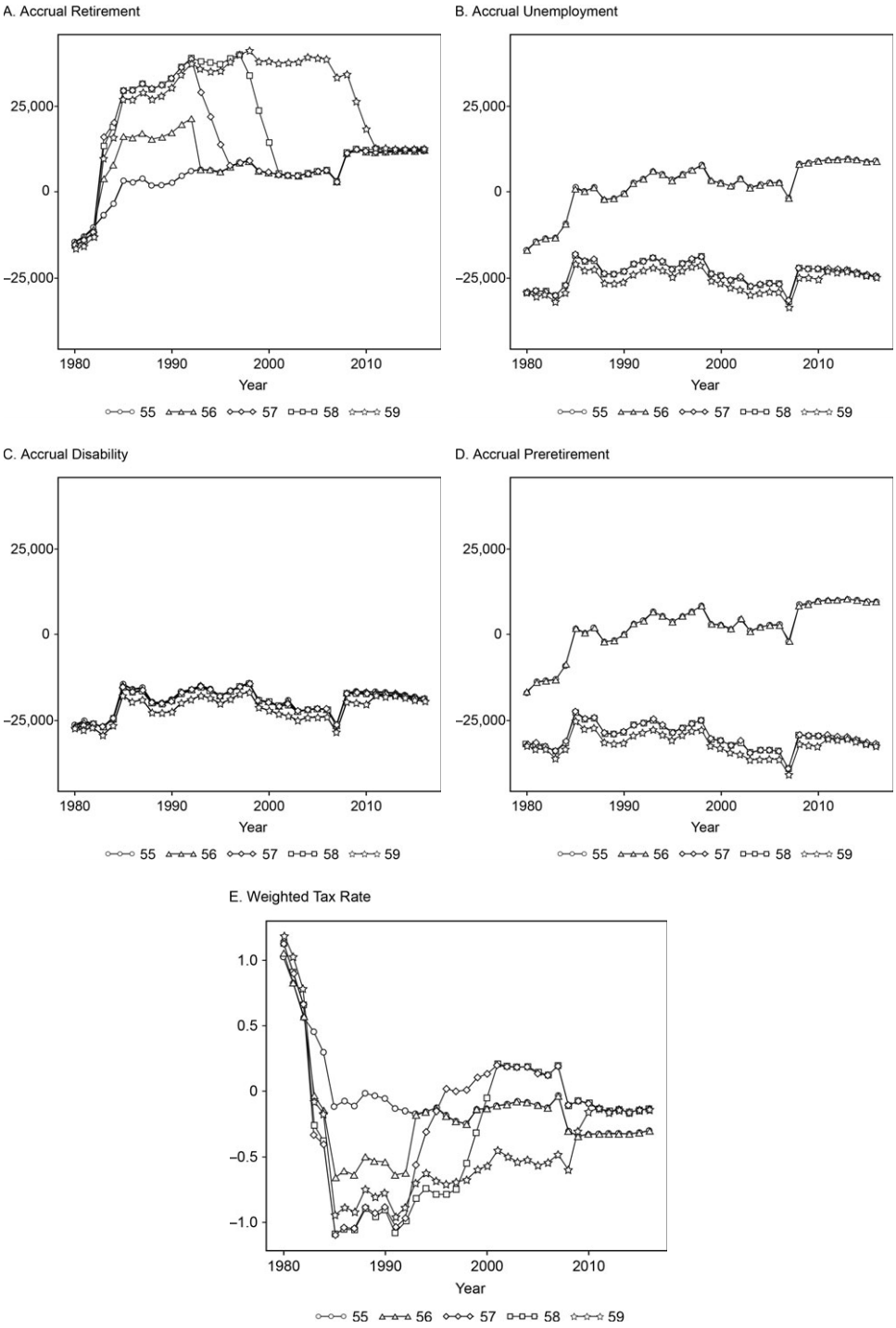


Fig. 4.6 Accruals 55–59 by pathway and aggregate tax rate (men, education level 3)

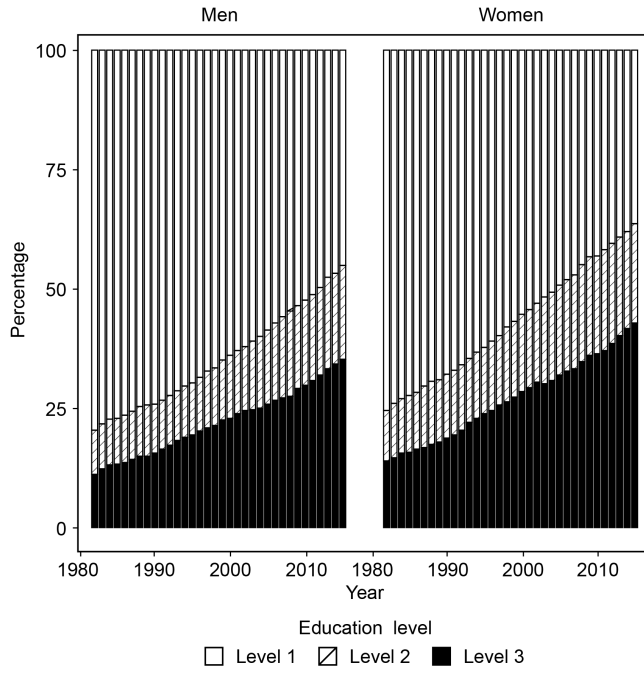


Fig. 4.7 Share of education level by year and gender
Source: French Labor Force Survey

of the pension at the minimum age is no longer determined by the length of career condition but is only determined by the distance from the statutory eligibility age: this individual will suffer the same penalty irrespective of how much he worked between 55 and 59.

Due to both the dominance of the normal route and the fact that it is this route that displays variable characteristics over time, the features of this route basically determine the profile of the aggregate tax rate displayed on the bottom of figures 4.5 and 4.6.

4.4.3 Synthesis

To summarize previous results, we then further aggregate tax rates over five-year age groups and education levels using the shares of each education level given in figure 4.7. We now reintroduce both men and women in the analysis and directly plot observed employment rates in the two aggregate age groups as functions of these tax rates. The expected correlation is negative: a higher average tax rate is expected to lead to lower employment levels.

Figures 4.8 and 4.9 confirm the presence of such a negative correlation, albeit with some irregularities, probably stemming from the fact that, as mentioned above, tax rates only capture one component of the incentive to

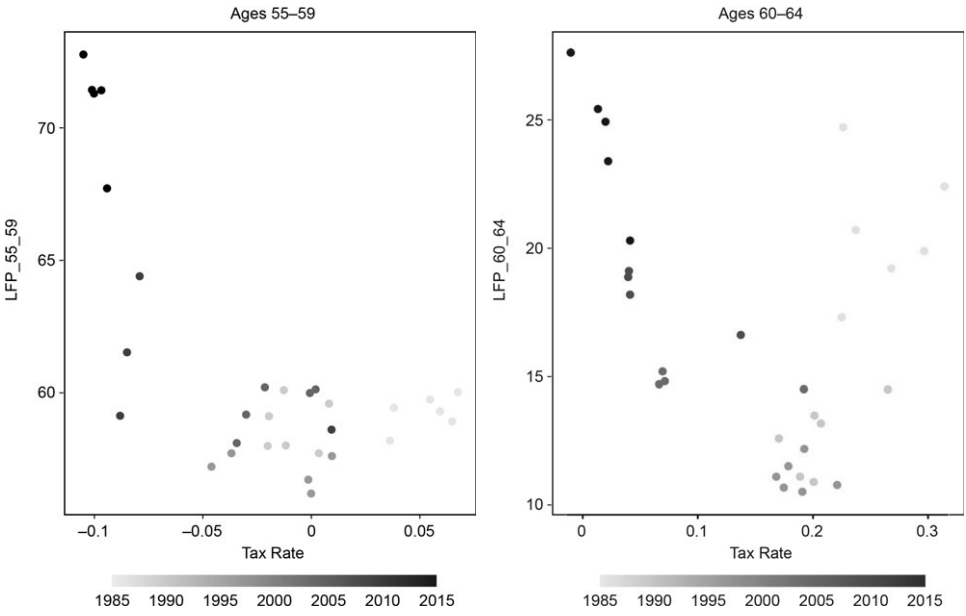


Fig. 4.8 Relationship between tax rate and labor force participation (men)

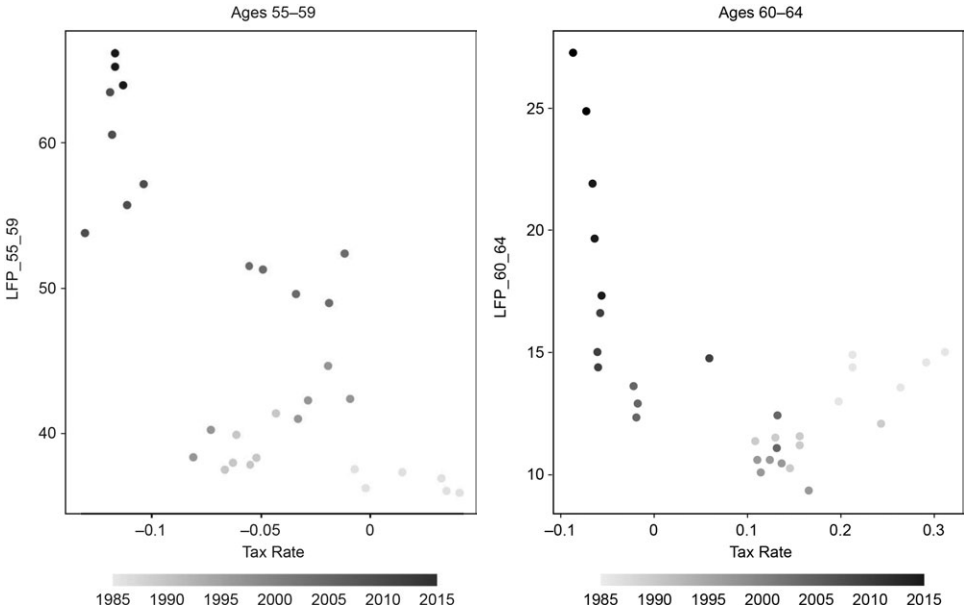


Fig. 4.9 Relationship between tax rate and labor force participation (women)

stay in the labor force: those resulting from deviations from marginal actuarial neutrality (i.e., the fact of having a social security wealth that varies with the age at exit from the labor force). This is not enough to characterize the way pension rules affect the retirement decision. Two distinct systems may be perfectly neutral, but with one offering low replacement rates and the other high ones, the former will clearly generate later departures than the second one.

The reform process in France also changed this parameter. The move closer to actuarial neutrality around the normal retirement age has been the distinctive feature of the 2003 reform, but in itself, it was not expected to be a major driving force for increasing retirement ages. Everything else equal, it even opened the possibility to leave earlier than before by reducing the penalty for departures before the full rate in the private sector, which, until 2003, was more penalized than that requested by actuarial neutrality. It is also and maybe mainly through shifts in FRA conditions that reforms have been the most effective in modifying retirement behavior.

4.5 Wage Earners in the Public Sector

This last section moves on with some results concerning retirement incentives for public-sector workers. Here the analysis will be limited to incentives in the 60–64 age group. Some specific categories of public-sector employees are entitled to retirement at much earlier ages—for instance, people in the armed forces, the police, or railway conductors. Such was also the case at the beginning of the period for primary school teachers. But these specific categories will be left aside. For other wage earners in the public sector, the minimum age has followed the same rules as in the private sector—that is, 60 until the 2010 reform and then moved up to 61 and 62. And for these people—except for the invalidity route, which will be neglected here—direct transition from employment to retirement is the general rule without the need for alternative transition routes, as these workers are not exposed to the risk of losing their jobs.

Other differences with private-sector employees have been presented above, and we briefly recall the main ones. Already before the 1983 reform, these public-sector employees only incurred a small penalty for retiring before the full-rate age, at 65. This remained true after this reform, with the new full-rate age determined by the alternative condition on age or number of years of contribution, and as for private-sector employees, no additional benefit was delivered in case of postponement beyond that age. The other difference with private-sector employees, until 2003, was that the length-of-career condition was kept equal to 37.5 years. It was only in 2003 that rules started to evolve for public-sector employees, with an almost complete convergence with the private sector: the condition on the number of years was raised to 40 and then, evolving in line for both sectors, the introduction of a

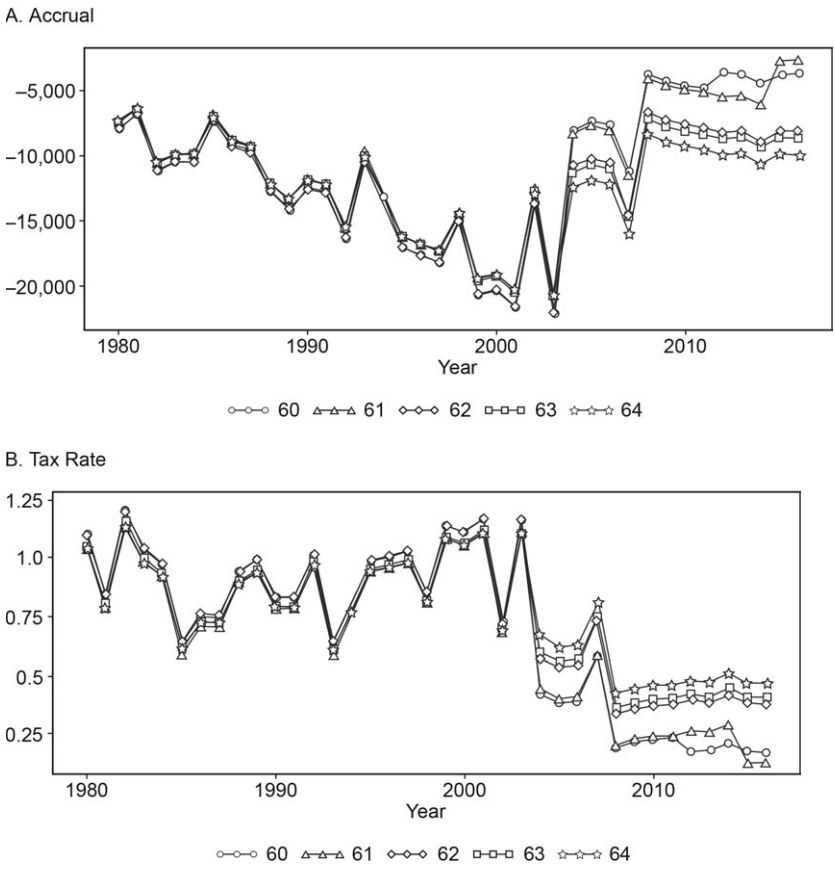


Fig. 4.10 Accruals 60–64, public sector (men, education level 1)

penalty for retiring before the full rate and the introduction of a bonification for retiring after. Lastly, the 2010 reform impacted the minimum age in the same terms in both sectors.

Figures 4.10 to 4.12 present the accruals for the same three "typical" workers. Results are presented for men only, being here again similar for both genders. For type 1 and type 2 workers, the tax rate is close to 100 percent at all ages until 2003. These people are entitled to the full rate as soon as 60 without any bonification if retiring later, so the "length of perception" effect dominates: foregoing one full year of benefits is equivalent to taxation at a rate roughly equivalent to the net replacement rate.

The situation is different for the type 3 individual. This person had to wait until 62.5 to get his or her full-rate pension. Despite the fact that no penalty existed on the "annuity rate," working at 60 and 61 is productive in terms of retirement benefits due to the simple proportionality between the level

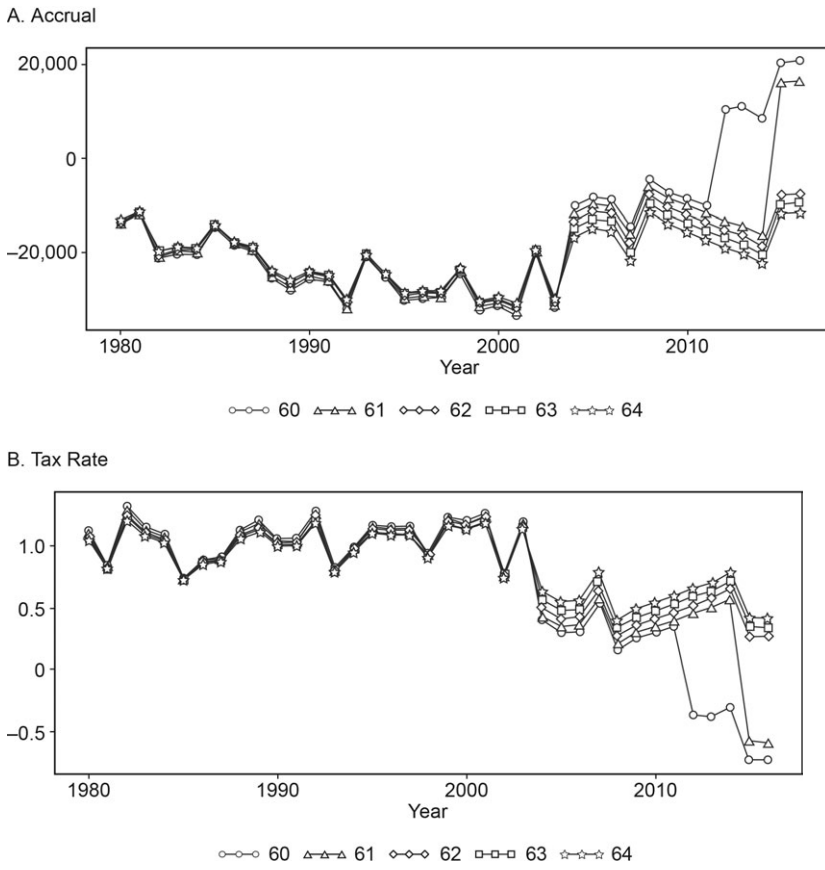


Fig. 4.11 Accruals 60–64, public sector (men, education level 2)

of the pension and the number of years of contribution, hence a lower tax rate at these two ages all over the period.

The 2003 reform affected incentives in relatively similar ways for the three levels, progressively bringing tax rates close to zero. The 2010 reform finally produced similar effects to those already commented on for workers in the private sector. It left the taxation rate close to zero at 60 and 61 for case 1: after the reform, additional years of work between 60 and 62 are not productive in terms of pension benefits, and working or not working between 60 and 62 is also neutral for the length of perception, which will start at 62 in all cases. For the type 2 worker, we have the same neutrality with respect to the length of the perception period, but now years worked between 60 and 62 do have an impact on the level of benefits: this person reaches age 60 with a number of years of contribution lower than the one needed to get

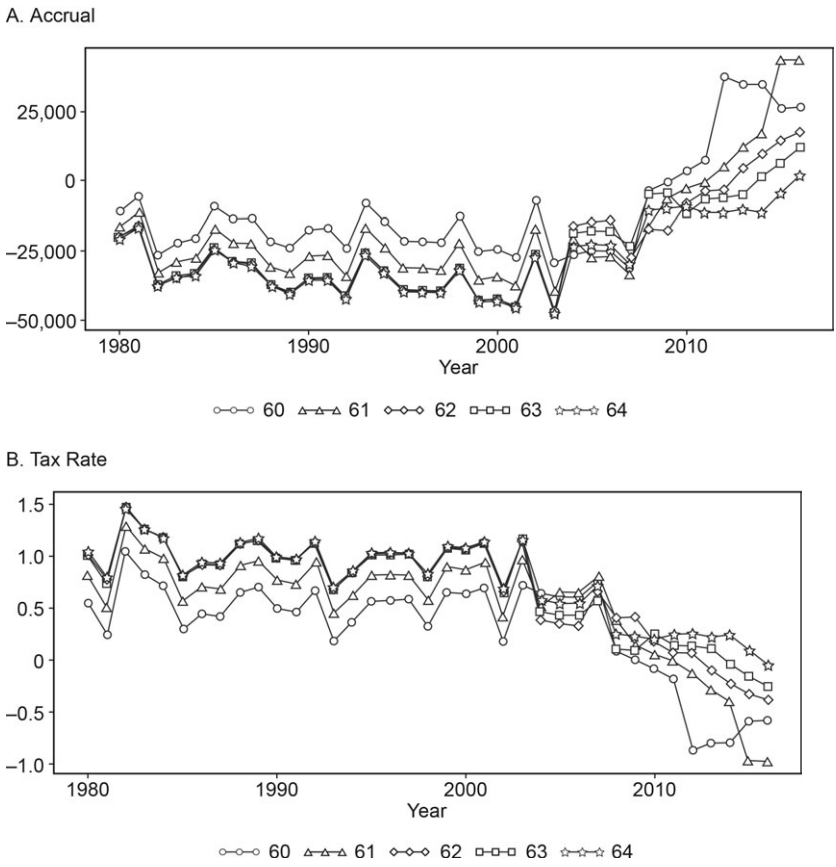


Fig. 4.12 Accruals 60–64, public sector (men, education level 3)

the full rate at 62, hence with a motivation to accumulate some more years of contribution.

The type 3 worker is not affected. Due to her very late entry to the labor market, the penalty when retiring at 62 will be based on the distance from the statutory eligibility age of 67 rather than on the distance from the number of years requested for the full rate. This penalty is therefore independent of labor market behavior at ages 60 and 61.

4.6 Conclusion

What is to be retained from this presentation? It has focused on monetary incentives to retire or not to retire and only on one of these monetary incentives—the so-called tax rate, which had already been the focus of the

first volume of this project (Gruber and Wise 1999). This tax rate measures by how much the expected flow of benefits changes in case of working one more year as a result of two opposite effects: a negative "length of perception" effect, since postponing generally implies foregoing one full year of benefits, and a positive "benefit level" effect, since postponing generally leads to a higher benefit level. Actuarial neutrality is reached when both effects cancel out. Examination of this indicator in the 1990s had emphasized the high level of this tax rate for France, at least for workers reaching the full rate as soon as 60. The essential explanation for this high tax rate was the fact that under rules that existed at that time, postponement beyond the full rate did not lead to any increase in the pension level. This was an assumed consequence of the 1983 reform, according to which the full-rate age had to be considered as a social norm in terms of retirement, beyond which working did not have to be encouraged and even had to be discouraged, with the idea that this policy could improve access to the labor market for younger cohorts (Ben Salem et al. 2010).

Removing this implicit taxation has been one of the components of the reforms that have followed—more particularly the 2003 reform that has reintroduced bonuses for years worked beyond the full rate and simultaneously adjusted the penalty for retiring earlier than the full rate. This penalty has been reduced in the private sector, where it was higher than requested for actuarial neutrality, and reinforced in the public sector, where it was previously almost nonexistent. The main message of this chapter is that this 2003 reform was successful in removing a large part of this taxation effect yet with a lot of exceptions stemming from the complexity of the French pension rules, which include a lot of nonlinearities or threshold effects (Briard and Mahfouz 2011). In particular, additional years worked before the minimum age are not systematically productive in terms of additional entitlements, and once this minimum age is reached, the penalty does not systematically depend on the number of years of contribution: for people with very short careers, it is the distance from the maximum retirement age that is the determinant of the penalty. The subtlety of these interactions between the "length of career" and "age" effects remains an important feature of the French pension system.

Despite its still incomplete character, this move toward actuarial neutrality is one candidate to explain the fact that, as in most of the other countries, employment and labor force participation rates have started reincreasing for senior workers. Yet is it only one possible explanation among others. Several important points have to be made and discussed here.

First of all, a traditional criticism of the focus on actuarial neutrality is that it reduces retirement decisions to a financial arbitrage. Monetary considerations are considered to be the main determinants of retirement choices. This criticism has itself two subaspects. One may criticize the fact of describing exit from employment as a choice, and one may criticize the

fact of considering that this choice is essentially governed by financial considerations.

On the latter point, some clarification is required. Economic models of retirement do not ignore at all that a lot of nonmonetary considerations are at play when deciding to retire (Blanchet and Debrand 2007). More elaborate models of retirement behavior used in ex-ante projections such as the option value model (Stock and Wise 1990) include parameters that capture these factors. The so-called preference for leisure parameter measures much more than what its standard denomination suggests; it implicitly captures work penibility—itself strongly dependent on health, but not on health alone—and/or the preference for nonmarket activities rather than for leisure *stricto sensu*. The preference for the present also includes some of these "nonmonetary" determinants of retirement behavior, such as subjective perceptions of life expectancy.

The point, therefore, is not to oppose an "enlarged" view of retirement behavior including all these determinants and a restrictive economic approach that would completely ignore them. The problem is rather to know what we gain in making "nonmonetary" determinants more explicit than has been done here, and the answer depends on what we intend to explain. Nonmonetary factors are definitely decisive in explaining behaviors at the microlevel: two people will not react in the same way to similar monetary incentives, and the explanation will necessarily stem from the nonmonetary side of the coin. The effects are less obvious when macro changes over time are of interest. Here, nonmonetary factors matter only if they change over time in a way that is likely to account for observed changes in labor force participation rates—more specifically here, the U-shaped pattern that was the topic of this chapter. On this point, most of the nonmonetary factors that one may have in mind do not appear to be natural candidates: health and life expectancy or education levels are rather trend variables; they can contribute to explaining the relative sizes of the descending and ascending branches of the U shape but not the fact that we have a U shape (Blanchet et al. 2019a). This gives sense to a focus on financial determinants, which are more likely to explain this U-shaped pattern.

The second subquestion of "choice" versus "no choice" is more difficult to set aside. For many people, the age at exit from the labor force is not the result of a free choice between working or not working: exit is a constraint and, when occurring before the minimum age, imposes a transition through an early retirement route independent from the relative financial "attractiveness" of these routes, which is captured by associated tax rates. The magnitude of this demand-side constraint may have changed over time and in a way that can potentially account for a significant part of the U shape. It may have changed both because labor market conditions have changed and also because of changes in regulations imposed on employers, with legislations or controls making it more or less easy to use senior employment as a

regulation parameter. In France, variations of these facilities have certainly played a strong role in shaping labor force participation profiles in the 55–59 age group.

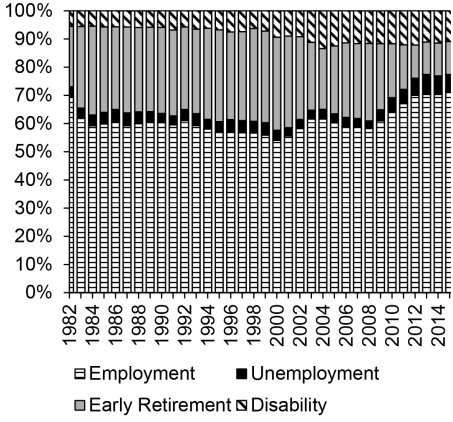
The last limit is that even in a world without demand-side constraints and where nonmonetary determinants of retirement behavior would be perfectly stable, tax rates are only one of the monetary factors that have to be considered. A zero tax rate can be attained in systems offering very high and very low replacement rates as soon as they offer the same progressivity rule in case of postponement. Yet two such systems will obviously have diverging impacts on the decision to retire.

It is indeed through direct changes of replacement rates offered at given ages or through shifts of the ages offering given replacement rates that French reforms have basically tried to change retirement behavior and are expected to go on doing so during the next decades. This has been done in three ways: by increasing the length or career condition for getting the full rate (in 1993, 2003, and 2014), by increasing the minimum age for getting this full rate (in 2010), and by lowering the level of expected benefits at this full rate through a computation of the pension on the basis of the 25 best years of one's career and through less favorable indexation rules, for both the reconstitution of past careers and the evolution of benefits during the retirement period. Changes in tax rates are only part of the general story explaining the U-shaped pattern of employment and labor force participation rates.

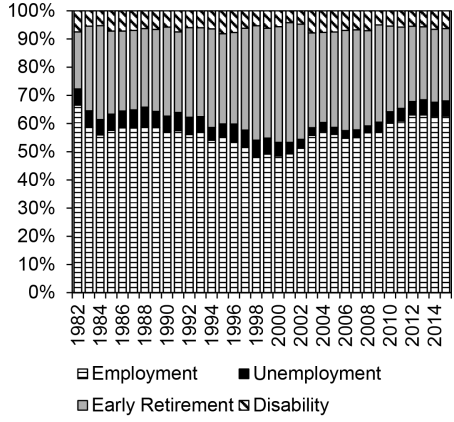
Appendix A

Pathways by Education Levels and Gender

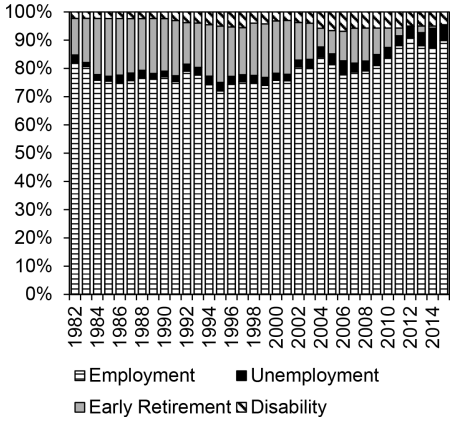
A. Primary or secondary school, Men 55–59



B. High school diploma and above, Men 55–59



C. Primary or secondary school, Women 55–59



D. High school diploma and above, Women 55–59

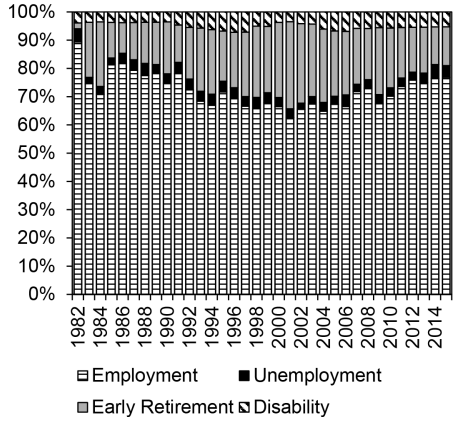
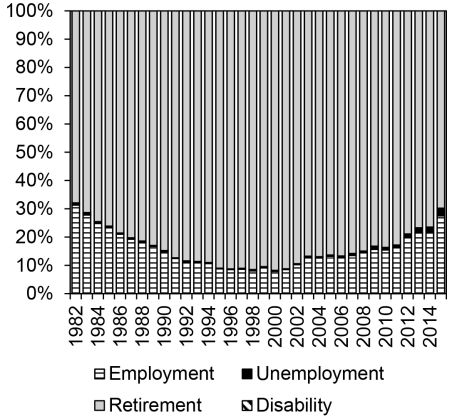


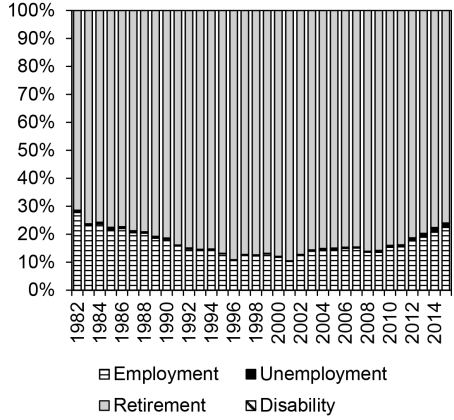
Fig. 4.A1 Pathways by education levels and gender

Sources: French Labor Force Survey and SIP survey

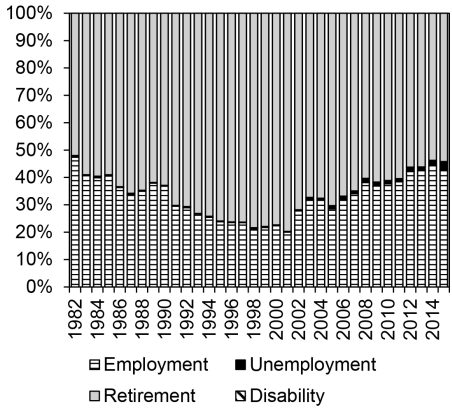
A. Primary or secondary school, Men 60–64



B. High school diploma and above, Men 60–64



C. Primary or secondary school, Women 60-64



D. High school diploma and above, Women 60–64

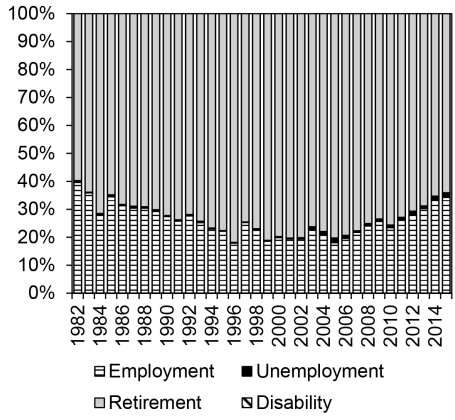


Fig. 4.A2 Pathways by education levels and gender

Sources: French Labor Force Survey and SIP survey

Appendix B

Accruals 55–59, Women

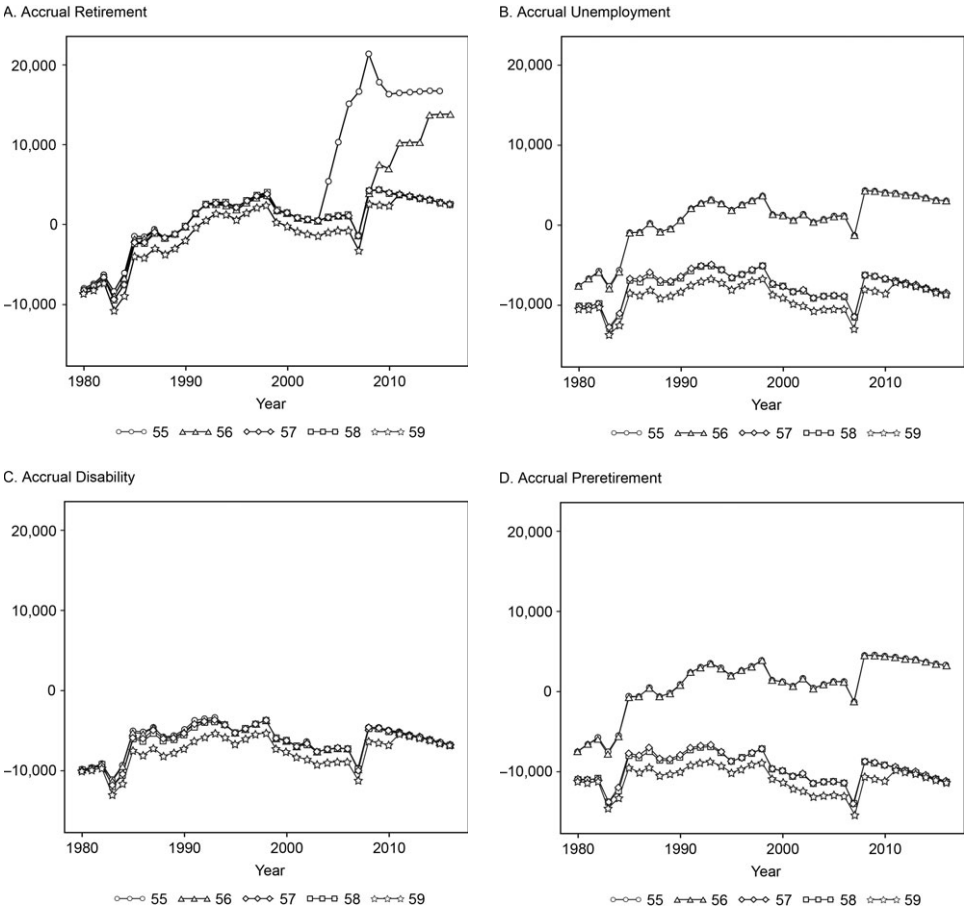


Fig. 4.B1 Accrual by year, age, and pathway (women, level 1)

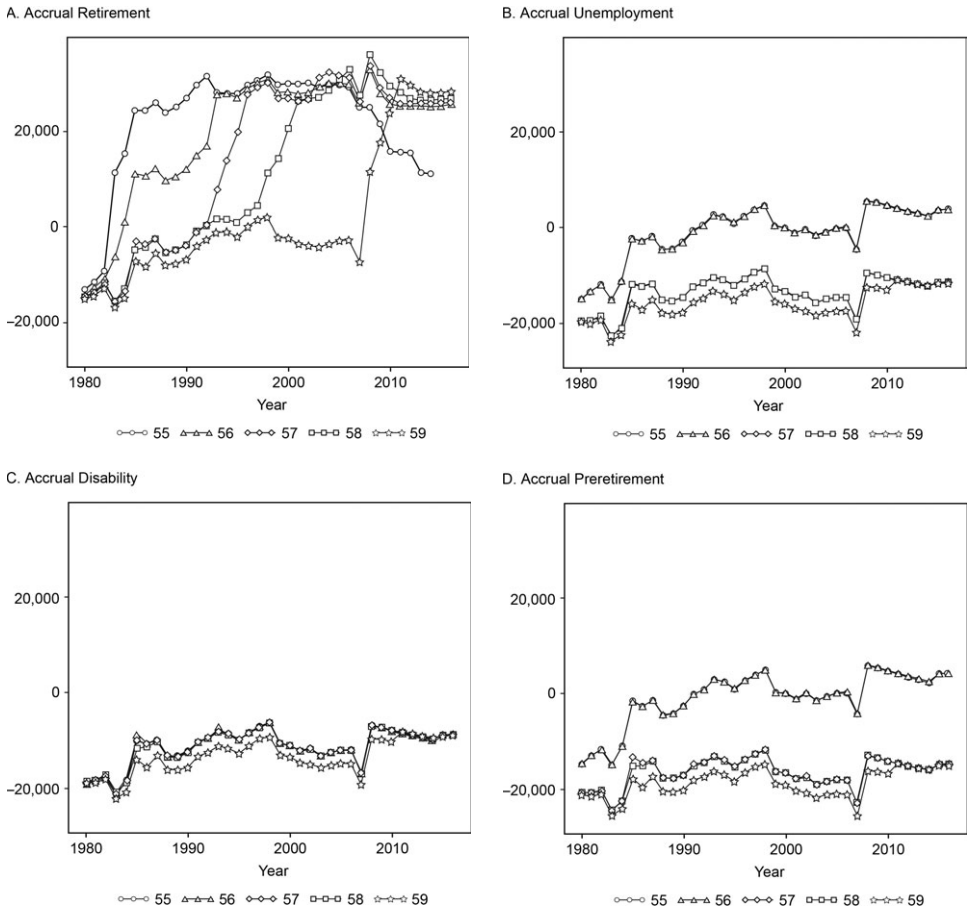


Fig. 4.B2 Accrual by year, age, and pathway (women, level 2)

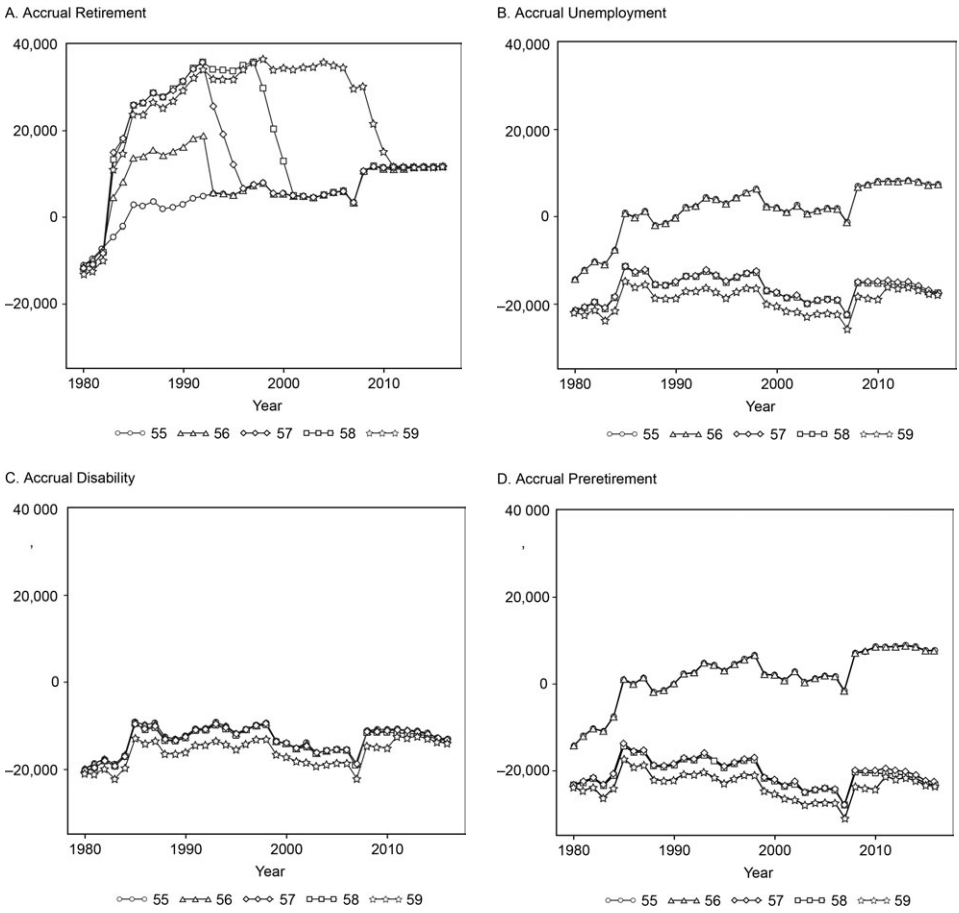


Fig. 4.B3 Accrual by year, age, and pathway (women, level 3)

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