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Chapter Author: Melika Ben Salem, Didier Blanchet, Antoine Bozio, Muriel Roger

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Labor Force Participation by the Elderly and Employment of the Young
The Case of France

Melika Ben Salem, Didier Blanchet, Antoine Bozio, and Muriel Roger

4.1 Introduction

One of the justifications that has been provided for early retirement policies in developed countries is the idea that such policies can facilitate access to the labor market for younger people and help lower global unemployment. Such a belief has undoubtedly played a role in France, where early retirement policies started to expand during the 1970s in response to rising unemployment.

Three decades later, France not only ends up with one of the lowest employment rates for the elderly among the Organization for Economic Cooperation and Development countries but also with one of the highest youth unemployment rates. Given such an outcome, beliefs about the efficiency of early retirement policies have considerably lost ground. Even if the idea of making room for new generations remains a frequent self-justification for individuals who choose to retire early, few economists or policymakers would now argue that early retirement policies are a miracle tool for fighting unemployment. The political agenda has rather shifted

Melika Ben Salem is a professor at the Université Paris-Est Marne-la-Vallée and a lecturer at the Paris School of Economics (INRA). Didier Blanchet is head of the department of General Economic Studies at the French National Statistical Institute (INSEE). Antoine Bozio is a senior research economist at the Institute for Fiscal Studies. Muriel Roger is a research economist at the Paris School of Economics (INRA) and a member of the department of General Economic Studies at the French National Statistical Institute (INSEE).

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toward increasing activity and employment rates for older workers, especially since the 2003 pension reform.

But some questions remain. One is retrospective: how far must we push the idea that these policies have been ineffective or counterproductive? Can we definitely be confident that such policies have been of no help, even for the short run? To put it in another way, would our labor market situation have been better or worse without these early retirement policies?

The other question is symmetrical and prospective: are we sure that returning to higher retirement ages will have no adverse effects on unemployment rates? This remains a key political issue in France (Blanchet and Legros 2002). There are some advocates of the supply-side view that a strong positive shock on incentives to remain in the labor force for older workers could be sufficient to increase the employment rate for older workers while causing no harm to younger ones (D'Autume, Betbeze, and Hairault 2005). But detractors of such a policy argue that at least in the short run, it will only make unemployment worse for all age groups, with no net financial gains for social insurance. They believe that measures aimed at increasing the retirement age should not be pursued before any significant decline of the unemployment rate or even before the downturn of the labor force leads us to situations of labor shortage. In short, even if there is an increasing consensus on the fact that increasing the retirement age is more or less unavoidable in front of expected demographic trends, views continue to diverge concerning the optimal timing, intensity, and modalities of such an increase.

In this context, any empirical element on the articulation between retirement policies and general equilibrium on the labor market is welcome. The present chapter will try to contribute to this debate by concentrating on the retrospective issue. Its objective is to study the long-term relationship between labor force participation (LFP) of the old and unemployment of the young. The chapter will be organized as follows. Section 4.2 will be devoted to a presentation of the main reforms of social security and early retirement schemes since the beginning of the 1970s. We will pay particular attention to the role played by labor market considerations in justifying these reforms. Section 4.3 will then present one assessment of the incidence of these changes on labor market outcomes for younger workers. This first approach will correlate LFP for older workers with employment or unemployment rates for young or middle-age workers. One limit of this approach is that changes in LFP rates for senior workers do not only reflect the impact of retirement policies. Employment rates for all age groups are influenced by general labor market conditions, and this might lead to spurious correlation due to a simultaneity issue. Controlling for the economic cycle is one way to minimize this bias, but this comes at a cost—namely, that of abandoning the search for an unconditional relationship between young and old employment. The main criticism of economists regarding early retirement policies is that they don't take into account the knock-on effect on output.

Testing substitution conditional on output would therefore not be sufficient to establish the long-term efficiency or inefficiency of these policies. Even when controlling for the economic cycle, one may want to look for more direct effects of pension reforms on employment of the youth.

Therefore, the rest of the chapter tries to adopt another strategy, which assesses directly the impact of incentives to early retirement on youth unemployment. This strategy involves two steps. The first one is to build indicators that measure the intensity of these incentives. This step is presented in section 4.4.1. Once this has been done, these indicators are used as explanatory variables for labor market outcomes of the different age groups in section 4.4.2. This second strategy is not without flaws, either. In the case of France, we show that the incentives are themselves endogenous; that is, they have been put in place at times of rising unemployment. This means that a causal interpretation of our results remains problematic. The conclusion will come back to the general interpretation of our results.

4.2 Background: Debates and Policies

The aim of this section is to present a brief history of the development of early retirement in France, with specific attention to the role played by labor market considerations in debates that have accompanied this trend.

Several factors have converged in favor of these policies. The aspiration of workers or labor unions to early retirement has naturally played a strong role; it was the continuation of the fight against "work alienation." In the 1970s, a campaign slogan of the CGT (*Confédération Générale du Travail*), a communist-inspired union, was thus "Better Retired than Unemployed" (Guillemard 1983). In 1997, four years after the first reform that tried to increase the normal retirement age, the CGT union still officially favored the fifty-five-year-old retirement age for everyone, in particular with the goal to lower unemployment. According to a poll released at the time in the daily newspaper *Le Monde,* 61 percent of French people were in favor of "the 55 retirement age in order to lower unemployment."[1] Surveys on the perception of early retirement by employees also showed that if the first reason for accepting early retirement was the wish to stop working, many employees stated the need to leave jobs for the young as a clear motivation for their choice (Caussat and Roth 1997). The attraction for early retirement still remains relatively high in France compared to other countries, according to some results from the Survey of Health, Ageing, and Retirement in Europe (SHARE; Blanchet and Debrand 2008).

But employers and governments have also played a large role in the development of this "culture of early exit," to use an expression coined by Guillemard (2003). Employers saw these early exits as a way to facilitate

1. *Le Monde,* January 9, 1997.

the restructuring of old industries or to solve their problems of excess labor capacity. As far as governments are concerned, these early retirement policies have been one dimension of a global Malthusian answer to labor market problems, based on the idea that the total amount of work is constrained, so unemployment is just the result of an unequal distribution of work. In this context, work sharing appeared to be a good way to lower unemployment, either within cohorts (working-time reduction) or between cohorts (early retirement or longer studies). The idea that work sharing was a solution to unemployment problems was also supported by books like *The End of Work* (Rifkin 1996), which topped the best seller list in France in the 1990s. This general orientation has been common to right-wing and left-leaning governments, the only difference concerning the choice of instruments: conservative governments favored policies excluding women or immigrants from the labor force and subsidizing employers for early retirement; left-leaning governments favored lowering hours of work or lowering the age of normal retirement.

We shall examine how all these policies have been implemented, with a specific focus on policies that have applied to wage earners in the private sector, who represent the majority of the population. These workers traditionally benefit from a basic pension delivered by the "*general regime*" and from one or two complementary benefits delivered by two complementary schemes—ARRCO (*Association pour le Régime de Retraite Complémentaire des Salariés*) and AGIRC (*Association Générale des Institutions de Retraite des Cadres*)—the second one being specific to highly skilled white-collar workers. Besides these two or three forms of "normal" benefits, many of these workers have benefited during the same period from the emergence and consolidation of various forms of early or pre-retirement schemes.

To make the presentation easier to follow, we shall distinguish three main phases, identified on figure 4.1, which gives the evolution of global stocks of retired or pre-retired people for the fifty-five to sixty-four age group by broad categories:

- The first phase is a phase of increased generosity of normal pension benefits, with a normal age of retirement that remained equal to sixty-five, but accompanied by the progressive development of pre-retirement schemes for the sixty to sixty-four age group. This period lasted until the end of the 1970s.
- The second period is a period of acceleration of these early exits: first through the expansion of pre-retirement between sixty and sixty-four, then through the lowering of the normal retirement age to sixty (1983 reform), and last by the development of new pre-retirement routes that have extended the phenomenon to the fifty-five to fifty-nine age bracket.

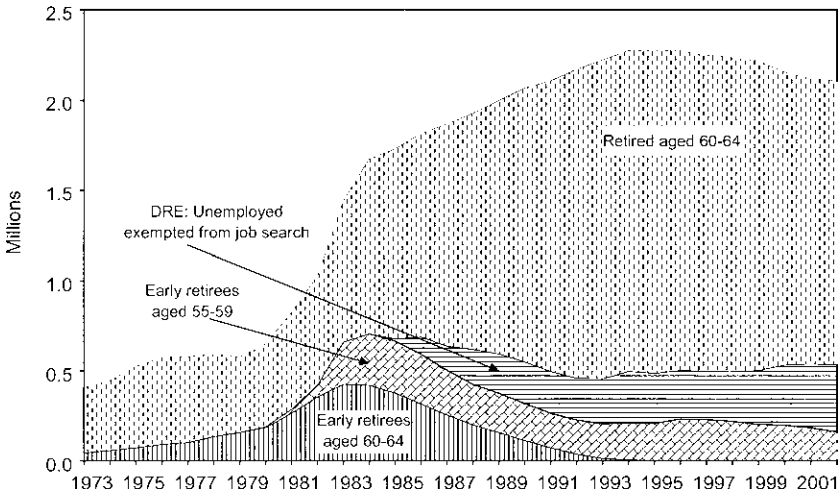

Fig. 4.1 Social security and early retirement programs (1973 to 2002)

- The third phase is one of relative stabilization, with a combination of closure or resorption of some schemes, partly compensated by the development of other ones, accompanied with two pension reforms that have started paving the way for future increases in the normal retirement age—the 1993 and 2003 reforms.

4.2.1 The Seventies: More Generous Pensions at Sixty-Five and Development of Pre-Retirement for the Sixty to Sixty-Four Age Group

Before 1971, the "general regime" offered a pension that at best was 40 percent of a reference wage, which was the average of past wages computed on the ten last years of one's career. This level was proposed at age sixty-five. A reduction/bonus of 10 percent per missing/additional year of age was applied to this pension level. For mortality conditions of the period, such an adjustment was not very far from actuarial neutrality.

The Boulin Law in 1971 has been the main change that has occurred over the period for this general regime; it increased the global generosity of the system. The normal replacement rate was raised from 40 percent to 50 percent, and the reference wage started to be computed over the ten best years of one's career rather than the ten last ones. At this stage, the motivation was not at all to encourage earlier exits. It was essentially to reduce the income gap between workers and retirees. No strong change occurred concerning retirement age; the normal age remained sixty-five, with the same bonuses/penalties for postponement/anticipation.

In this context, retirement before sixty-five took two routes. The first one was the opportunity to leave and get a normal retirement as soon as sixty in the general regime for specific categories of people, such as veterans, blue-collar working mothers, and so forth.

The second one has been the progressive development of pre-retirement schemes. It was in 1963 that such early retirement policies first appeared in France with the creation of the National Job Fund (*Fond National pour l'Emploi,* FNE) and with the associated benefit (ASFNE). This scheme provided a replacement rate of 80 percent to 90 percent of the previous net wage. It started as a very specific program but became more massive in the seventies when the steel industry underwent massive restructuring, affecting entire areas in the north of France. The fund was completely financed by the government. It must be mentioned that at the outset, this scheme did not really respond to workers' will to retire early. Early dismissal of workers belonging to declining industries was often seen by these workers as a form of denial of their social utility and therefore not welcomed by them. And the idea of using this policy to fight global unemployment was not dominant, either. The question was more sector specific, and this policy was considered transitory. The idea was just to lower the social cost of restructuring older industries. The scheme remained targeted to these regions and limited to collective layoffs.

The early retirement policy for the steel industry was further strengthened in 1972 with the creation of the CGPS (*Convention Générale de Protection de la Sidérurgie*), extending pre-retirement to wage earners as young as fifty. In the meantime, other sectors had started making large use of early exits, such as the automobile and textile industries, as a way to reduce their workforce and/or automate their production chains. A consensus was reached between unions and employers that led UNEDIC (*Union Nationale Interprofessionnelle pour l'Emploi dans l'Industrie et le Commerce,* the unemployment insurance[2]) to provide an early retirement scheme (*garantie de ressources,* GR) on a large scale. The program was first limited to layoffs (*Garantie de Ressources Licenciement,* GRL). It was targeted to the sixty to sixty-five age group. The replacement rate was 70 percent of the previous gross wage, thus higher than a full-rate pension.

It is over this period that the idea of using early exits to facilitate access to employment for younger workers took importance. As unemployment rose in the 1970s due to macroeconomic shocks, collective layoffs appeared more and more socially difficult to accept, and early retirement policies developed at a considerable rate. A consensus favored these policies as a good way to reduce unemployment. The evolution of the *garantie de ressources* is the best testimony of this change. Initially limited to layoffs in 1972, it was extended in 1977 to those people who voluntarily left their jobs (*Garantie de*

2. The unemployment insurance is financed and managed by unions and employers.

Ressources Démission, GRD), with the explicit ambition of reducing unemployment for the young. The preamble of the 1977 agreement clearly states, "All the parties signing this agreement expect the release of jobs allowing many unemployed to find jobs."

4.2.2 The Early 1980s: Lowering of the Normal Retirement Age and a New Phase of Expansion for Pre-Retirement

The development of these policies was also influenced by the desire to win votes in forthcoming elections.[3] For example, in 1980, just before the 1981 presidential election, the right-wing government in office reactivated the old ASFNE scheme, extending it to wage earners fifty-six years and two months old, and even fifty-five by derogation. This tendency was continued by the Socialist government that took over in 1981. Between June 1982 and December 1983, the CSPRD (*Contrat de Solidarité préretraite démission*) scheme offered a replacement rate of 70 percent of the gross wage to wage earners older than fifty-five with more than ten years of contribution who had resigned. The objective of a one-for-one substitution of senior workers by younger ones was explicitly stated, conditional on the firm maintaining its staff constant, hiring in priority young workers under twenty-six, lonely women, or unemployed people.[4] Announcing the scheme in Lille—the north of France that had been particularly hit by massive restructuring in manufacturing—the French prime minister of the time, Pierre Mauroy, asked the older workers to accept this scheme: "And I would like to speak to the elders, to those who have spent their lifetime working in this region, and well, I would like them to show the way, that life must change; when it is time to retire, leave the labor force in order to provide jobs for your sons and daughters. That is what I ask you. The Government makes it possible for you to retire at age 55. Then retire, with one's head held high, proud of your worker's life. This is what we are going to ask you. . . . This is the "contrat de solidarité." That those who are the oldest, those who have worked, leave the labor force, release jobs so that everyone can have a job."[5]

This CSPRD scheme has been the victim of its large success. In less than a year, more than 200,000 people retired through this scheme, which led to its closing (for cost reasons) one year later in December 1983, with intentions of returning to a more rigorous policy. But in the meantime, the government had decided to fulfill one of its electoral promises—retirement at age sixty. This measure was taken in a context that was temporarily favorable

3. Even if governments might have been convinced that early retirement was not effective in the long run, they might have used these schemes as way to secure a short-term reduction in the unemployment rate.

4. This scheme is very similar to the job release scheme implemented in the United Kingdom since 1977 (see chapter 11 in this volume), except that the level benefit—earnings related—was much more generous, particularly for high-wage earners.

5. Quoted in Gaullier (1982, 230).

for the general regime. The age group depleted by low birth rates during the First World War (i.e., born between 1915 and 1919) had started retiring in 1980. During a few years, the number of pensioners decreased, lowering the demographic ratio and generating surpluses in the pension system. The idea, therefore, was to seize this opportunity for a switch of the burden of early retirement from unemployment insurance (UNEDIC), which suffered from large deficits, to the pension system.

Formally, this 1983 reform did not change the minimum retirement age that was already equal to sixty before the reform.[6] The point was that leaving at this age initially implied a very high penalty, with a replacement rate of only 25 percent. The reform removed this penalty, allowing a 50 percent replacement rate at sixty, conditional on 37.5 years of contribution (with an unchanged penalty for those not fulfilling this condition). Contrary to early retirement schemes that were targeted, albeit imperfectly, toward the less-qualified workers, the 1983 reform was a general incentive to early retirement, given the fact that a large majority of people fulfilled this condition at sixty—at least among men.

The debate in 1983 around this lowering of the retirement age (from sixty-five to sixty) made clear once again that the goal of the reform was to release jobs for the young as well as to provide more leisure for the elderly. The best illustration of this is the fact that the reform not only increased the replacement rate but also discouraged the pursuit of work at older ages. In particular, increases in the pension rate were not possible once you had reached the "full rate."[7] The law stated that "the goal is to allow the grant of a full pension but not to encourage the pursuit of work after age 65."[8] The possibility to work while having a pension was also restricted in the hope that new pensioners would actually leave jobs for the young.[9] The Employment Ministry of the time presented the reform as a success: "The lowering of the retirement age strengthens the positive effects on employment that early retirement policies made possible. It even widens these positive effects as a large share of the population is concerned."[10]

These changes have been accompanied by changes in rules governing complementary pensions. These complementary pensions are computed according to a system that has some resemblance to the principle of notional accounts: contributions are used to buy "points," and the total number of

6. Technically, this reform was only for men, as women already had the opportunity to retire at age sixty, with full rate provided after 37.5 years of contribution. Women, however, were much less likely to fulfill this condition.

7. The only remaining way to increase its pension level was through an increase in the reference wage; that is, for employees with increasing wages after age sixty.

8. Preamble of the Ordonnance from March 26, 1982.

9. The Ordonnance from March 1982 restricted the work of pensioners. They were required to quit the firm where they were previously working and pay an additional tax to unemployment insurance. This tax was removed by the law of January 27, 1987.

10. "La retraite à 60 ans," *Droit Social,* no. 4 (April 1983).

points accumulated during one's career is converted into a pension level at retirement, with, until 1965, a quasi-actuarial adjustment according to retirement age. In 1965, the bonus for postponement had been suppressed for people retiring beyond sixty-five but the penalty maintained for retirement before sixty-five. In 1983, this penalty itself was fully removed for people retiring from the general regime with the full rate, reinforcing the incentive to retire at sixty for these people.

4.2.3 Since the mid-1980s: Changes and Continuity

The 1983 reform was expected to lead to the extinction of early retirement schemes for the sixty to sixty-four age bracket.[11] It was also expected that no further development of pre-retirement would take place. The government now wanted to avoid the development of similar amounts of early exits upstream the new retirement age of sixty (i.e., in the fifty-five to fifty-nine age bracket). Now that the normal retirement age had been lowered, pre-retirement was expected to play no more than a marginal role.

But this objective has not been fulfilled, given the continued pressure in favor of early retirement. The following story has been a story of permanent tension between the will to restrict early exits and the necessity to cope with employers' and employees' common interest in favor of early retirement. Evolutions that took place over this period can be classified according to whether they favored early exits or tried to limit them.

The main new evolution favoring early exits over this period has been the expansion of the unemployment insurance route. This essentially took place by the creation of the DRE (*Dispense de recherche d'emploi*) that was introduced in 1985.[12] The system exempts unemployed people from job seeking past a certain age (fifty-five at its creation) and offers them nondegressive benefits until they become entitled to a full-rate pension. One impact of this system has been to arithmetically lower the unemployment rate in the International Labor Organization (ILO) sense of the term, since the ILO definition considers job seeking as a necessary condition for being counted as unemployed, and this system is quasi-equivalent to pre-retirement, even if it offers replacement rates that are generally less generous than those provided by pre-retirement schemes *stricto sensu.* The unemployed who are exempted from job seeking can currently receive three different forms of benefits: the ASS (*allocation de solidarité spécifique*) provides an unemployment benefit 50 percent higher for those fifty-five and older who have at least ten years of contribution; the ACA (*allocation chômeurs âgés*) is targeted at the unemployed with forty years of contribution; and the AER (*allocation équivalent retraite*) is a means-tested additional benefit. In the 1990s, the

11. The switch was progressively done, because GR schemes were more generous than SS provisions, so most early retirees remained in the scheme until age sixty-five.

12. Again, this scheme was implemented just before the 1986 parliamentary elections.

DRE became numerically more important than early retirees. A regulation of this system through financial penalties on layoffs of older workers was attempted (the Delalande contributions) but with limited success (Behaghel, Crépon, and Sedillot 2005).

On the other side, we have seen the progressive closing of schemes that existed at the beginning of the period and their replacement by new schemes that have been increasingly short-lived and/or more targeted. We have already mentioned the complete closing of the CSPRD in 1983 and the progressive extinction of the *garantie de ressources.* A reduction of ASFNE benefits also took place. The initial replacement rate of the ASFNE, which was originally 70 percent, was reduced in 1982 to 65 percent under the social security (SS) ceiling[13] and to 50 percent between one and two ceilings. In 1994, this scheme was restricted to wage earners older than fifty-seven. It is now becoming progressively extinct.

The alternative pre-retirement schemes that have been created over the period to replace the former schemes have had much narrower targets. One example is the ARPE (*allocation de remplacement pour l'emploi*) scheme created in 1995, targeted at wage earners older than fifty-eight with at least forty years of contribution. The ARPE benefit provided a replacement rate of 65 percent of gross wage of the last twelve months.[14] The idea of encouraging youth employment was still present in this scheme; employers using the ARPE were compelled to replace early retirees by younger workers, especially under age twenty-six. In the case of no new hiring, firms had to reimburse the unemployment insurance. The ARPE itself was suppressed after five years of existence and replaced in 2000 by the still more focused CATS (*cessation d'activité de certains travailleurs salariés*) and CAATA (*cessation anticipée d'activité des travailleurs de l'amiante*). The CATS scheme is targeted at workers who had especially difficult working conditions (at least fifteen years on an assembly line or with night work). The minimum age is fifty-seven, although this condition can be lowered to fifty-five for certain sectors. The benefit is 65 percent of gross wage under the SS ceiling and 50 percent between one and two ceilings. The CAATA scheme targets workers exposed to asbestos; the benefit is computed as in the CATS scheme.

The other major change in the direction of later exits took place at the level of the pension scheme itself, with the two reforms enacted in 1993 and 2003.

The 1993 reform has affected incentives to retire in two ways. One way is by the reduction of pension levels at the full rate: instead of being computed on the ten best years of one's career, the reference wage is progressively

13. This threshold represents approximately the average wage in France.

14. Similarly, the CFA (*Congé de fin d'activite*) has also existed in the public sector, providing a replacement rate of 75 percent to civil servants older than fifty-eight with forty years of contribution.

computed on a longer period, up to twenty-five years for people born in 1948 or after. Coupled with less generous revalorization rules for these past wages, this is expected to have a strong long-run impact on pension levels. The second way is by the strengthening of the conditions required to get the full pension: it has progressively increased from 37.5 to forty years by one quarter each year.

As far as the retirement age is concerned, this 1993 reform remained symbolic, given that a large share of cohorts currently retiring go on fulfilling the new condition of forty years of past contributions. This led to the proposal of further strengthening this condition at the end of the 1990s (Charpin 1999), and this has been the main axis of the 2003 reform. For cohorts born between 1944 and 1948, the condition will temporarily remain fixed at forty years: this period has been used for organizing a convergence by public sector employees who are not concerned by the 1993 reform and for whom the condition has remained equal to 37.5. But starting in 2008, the progression of this condition starts again in the private sector: it is planned to be forty-one for the 1952 cohort and then to increase parallel with life expectancy, the progression now going at the same speed in the private and public sectors. Simultaneously, and still according to proposals from the Charpin report, the 2003 reform also changed the structure of incentives around the full rate: the penalty for early retirement has been reduced, and the bonus for postponement that had been suppressed in 1983 has been reintroduced, albeit at a lower level. After stabilization, the penalty should be 5 percent per year missing and the bonus equal to 3 percent per year of postponement. All this brings the rule closer but not strictly equivalent to actuarial neutrality.

4.2.4 Where Do We Stand? The Current State of Ideas Concerning Early Retirement

Which preliminary conclusions can we draw from this rapid examination?

Concerning trends, the main message is that the "golden age" of early retirement expansion essentially lasted until the mid-1980s. We will use this period to test the impact of this policy on labor market outcomes. After this period, France has at best been able to stabilize the employment rate for its senior workers. Some steps in the direction of reincreasing the retirement age have been made by the 1993 reform (Bozio 2008), and more significantly by the 2003 reform, but the effects will be progressive at best and cannot be observed at this stage.

Concerning the evolution of opinions on the retirement/labor market relationship, the idea that Malthusian policies are an efficient answer to labor market disequilibrium has significantly lost ground. This applies both to early retirement policies and to other Malthusian policies such as working-time reduction. As far as retirement policy is concerned, the idea that raising

the retirement age is the proper long-run solution to increased longevity has become widespread.

The point where dissensus remains more important concerns the facility of implementing such a policy in a context of high unemployment with especially low labor demand for senior workers.

At one extreme of the spectrum, the idea that it is nonsense to try to increase the age of retirement when unemployment is high remains pregnant. Just to quote one example, A. Lipietz, both a politician and economist, expressed in *Le Monde* in 1993 his opposition to proposals from a report (Commissariat Général du Plan 1991) that advised the increase of the required length of contribution: "The reduction of active life, which was an effective tool to reduce unemployment will be blocked. With a constant macroeconomic situation, each 'non out going' from the labor market will be immediately matched with a 'non in coming,' either an unemployed remaining unemployed or a young student becoming unemployed." This statement is now a bit dated but would probably continue to be shared by many observers or actors.

At the other extreme of the spectrum, some authors argue that this high unemployment rate is precisely the consequence of early retirement policies. A recent report from the Conseil d'Analyse Economique (D'Autume, Betbeze, and Hairault 2005) defends that view and argues that a stronger revision of incentives for early retirement could very well improve rather than deteriorate the employment situation of older workers: it would simply lengthen the horizon on which people plan the end of their active lives, restore their incitation to seek employment when they are unemployed, and contribute to restoring their employability from the point of view of employers. All this could take place without negative effects on other segments of the labor force, since there are little substitution effects between age groups on this labor market.

Somewhere in between, we can have the view that changes in the retirement age are indeed neutral for unemployment rates in the long run but not necessarily so in the short run. The long-run neutrality is warranted by the fact that changes in the retirement age only change the scale of the labor market, without impinging on its properties. But this does not necessarily warrant "superneutrality," (i.e., a complete absence of the impact of changes in the growth rate of labor supply). If we do not have such superneutrality, there is indeed a problem of appropriate timing for increasing the retirement age. Can we start this policy before having returned to full employment, or should we wait until full employment has been restored?

Current evolutions of the unemployment rate are not contradictory with this concern: the unemployment rate has been declining again in France since 2005, and many observers argue that this is partly the result of the fact that large cohorts of baby boomers have begun to retire. Increasing too rapidly the retirement age or being too restrictive on early retirement could

slow down or even revert this process, at least for some time. This view is also consistent with quite a wide range of models of the labor market. This differentiation between short-run and long-run effects was already present in macroeconometric analysis of the impact of pre-retirement that had been performed during the 1990s (DARES 1996). It is confirmed by more recent explorations of alternative modelings of the consequences of demographic changes on unemployment (Ouvrard and Rathelot 2006).

At this stage, the question turns out to be an empirical one. We need to evaluate exactly what have been the consequences of these past policies, and this is what we shall try to do in the rest of this chapter.

4.3 Labor Force Participation for Older Workers and Labor Market Outcomes

We shall start our empirical examination with a simple visual examination of the links between these major policy changes and employment of older workers and a simple regression analysis of how these changes in older worker rates of employment did or did not affect labor market outcomes for other workers. One limit of this approach will be the fact that changes in LFP rates for senior workers do not only reflect the impact of retirement policies; they are also influenced by general labor market conditions. Controlling for the economic cycle will be one way to minimize this bias.

4.3.1 A Visual Examination

Time series of employment or unemployment rates have been provided by the Labor Force Survey (LFS) conducted by the French National Statistical Institute (INSEE) since 1950. We use the 1968 to 2005 waves of this LFS. From 1968 to 2002, the households included in the Labor Force Survey sample are interviewed in March of three consecutive years, with one-third of the households replaced each year. The French Labor Force Survey thus presents a break in the series in 2003 resulting from the transition from an annual to a continuous survey.[15] Since 2003, the households included in the French LFS have been interviewed in six consecutive quarters, with one-sixth of the households replaced each quarter. The survey samples are representative of the French population aged fifteen and up. Education and labor market status are completed for each interview.

Trends in labor force participation, employment, unemployment, and school attendance by age are given in figures 4.2 and 4.3. The rates are defined as the number of active, employed, unemployed, or in-school individuals in an age group divided by the total number of individuals in this age group. Age groups are the following: youth from twenty to twenty-four

15. The dummy variable introduced in the regressions to fix the problem was never significant.

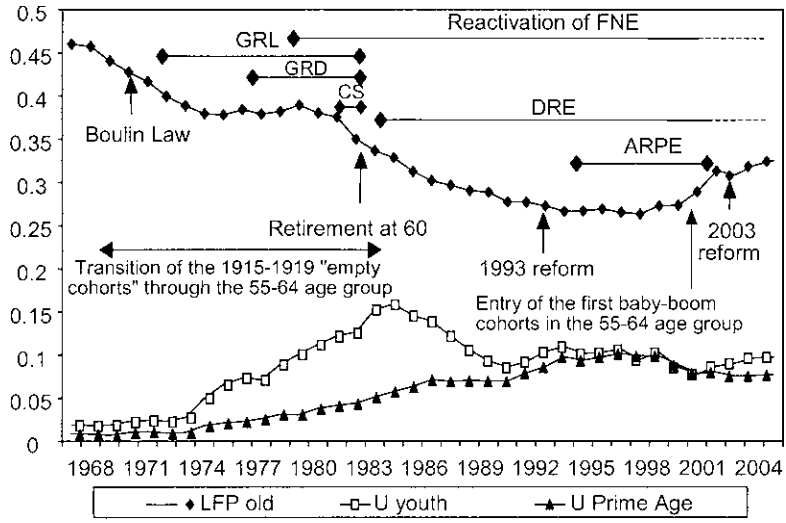

Fig. 4.2 Labor force participation of old workers and unemployment

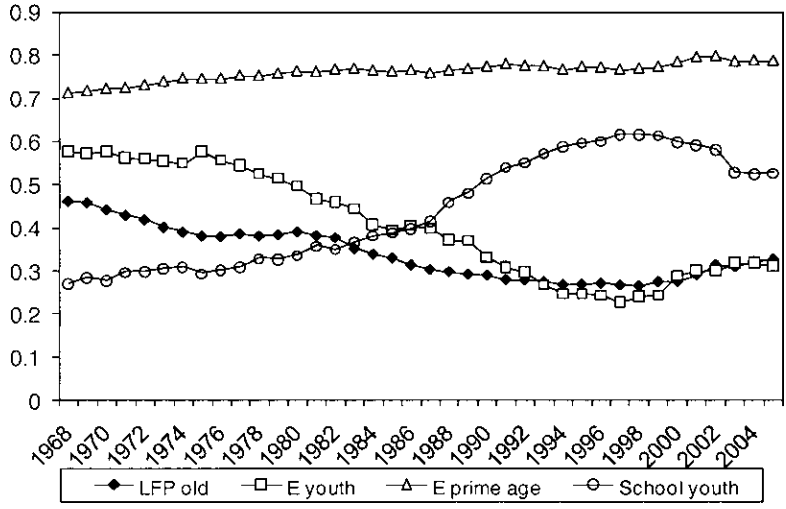

Fig. 4.3 Labor force participation of old workers and employment

years old, prime age from twenty-five to fifty-four, and seniors from fifty-five to sixty-five.

Participation rates of senior workers are quite low and are decreasing over the period, with a trend change at the end of the period due to the boom of the late 1990s. Until 1982, the decrease corresponds to a period of early retirement policies. The year 1982 marks a change in policy with the decrease in the retirement age.

The unemployment rate rose in France during the 1970s and 1980s in all age groups, and particularly for the young, with a peak in the beginning of the 1980s. The trend reverses after that. When considering figure 4.3, we see that the employment rate of the twenty to twenty-four age group is decreasing over nearly the whole period, except for a small increase in the beginning of the twenty-first century. The decrease in the youth unemployment rate is due to a massive increase in the school rate and not to a greater employment rate of young workers. The shape of the employment rate of young people is the exact opposite of the one of the school participation rate.

Concerning prime age workers, the employment rate has been quite stable over the period. The stability of the employment rate, despite massive unemployment, has to be linked with the increase of female labor participation.

4.3.2 Some Regression Results

To study the long-term relationship between labor force participation of the old and employment of the young, we will first present the results of simple ordinary least squares (OLS) regressions. The sample period for our yearly data goes from 1968 to 2005. We consider five dependent variables: the unemployment rate, the employment rate and the school attendance for young people, and the unemployment and employment rates for prime age workers. The parameter of interest is the coefficient of the labor force participation of old workers. Estimations are conducted in levels but also in three-year lags and five-year differences. Two sets of estimations have been made. In the first one, covariates included are gross domestic product (GDP) per capita, its growth rate, and the share of this GDP generated by manufacturing. In the second one, we add the mean school leaving age. Results are given in tables 4.1 and 4.2.

The first half of table 4.1 shows that direct estimation of the correlation, without controlling for general labor market conditions, suggests a negative link between senior LFP and youth unemployment and a positive link with youth employment. It also depresses the young's tendency to remain in school. All this goes more or less in the same direction of weakening the Malthusian view: a higher activity rate for senior workers stimulates the insertion of younger people into the labor market.

If we now turn to the case of prime age workers, we observe some differences. We still have a negative relationship between senior LFP and the unemployment rate of these prime age workers—once again an anti-Malthusian result. But the correlation with these prime age workers' employment rate is also negative. In other words, a lower senior LFP has the paradoxical effect of simultaneously increasing the probability to be employed and the probability to be unemployed for a prime age worker. The explanation of this paradox is probably in the increase of female labor force participation over the period.

In any event, once controls are included, many of these correlations van-

Table 4.1 **Direct relationship between the elderly labor force participation and the employment and unemployment of young and prime age persons**

	Youth, 20 to 24			Prime age, 25 to 54	
	Unemployment	Employment	School	Unemployment	Employment
		No controls			
Levels	–0.742	1.723	–1.486	–0.480	–0.250
	(0.062)	(0.165)	(0.170)	(0.030)	(0.034)
Three-year lag on elderly employment	–0.492	1.783	–1.683	–0.457	–0.185
	(0.090)	(0.136)	(0.141)	(0.024)	(0.031)
Five-year difference	–0.606	0.790	–0.208	–0.208	0.049
	(0.003)	(0.199)	(0.198)	(0.051)	(0.039)
Five-year log difference	–2.202	0.830	–0.502	–1.909	0.034
	(0.457)	(0.236)	(0.265)	(0.466)	(0.022)
		With controls			
Levels	–0.371	1.182	–1.080	–0.316	–0.080
	(0.246)	(0.566)	(0.677)	(0.108)	(0.097)
Three-year lag on elderly employment	0.161	1.433	–1.845	–0.345	–0.054
	(0.124)	(0.222)	(0.255)	(0.048)	(0.046)
Five-year difference	–0.455	0.116	0.348	–0.053	0.016
	(0.184)	(0.229)	(0.225)	(0.045)	(0.061)
Five-year log difference	–1.297	0.148	0.535	–0.152	0.011
	(1.119)	(0.227)	(0.370)	(0.714)	(0.038)

Notes: Reported is the coefficient of elderly labor force participation. Controls are GDP per capita, growth of GDP per capita, and the proportion of GDP generated by manufacturing. Three-year lag means that we regress the dependent variable on a three-year lag of elderly employment. Five-year difference means that we take fifth differences for the right- and left-hand sides. Five-year log difference means that we take the log of each X and Y variable, then take five-year differences.

ish, the coefficients of senior LFP becoming generally insignificant, as shown in the second half of table 4.1. Nevertheless, those coefficients that remain significant go on supporting the anti-Malthusian view that a high senior LFP is good news rather than bad new for other groups of workers. But controlling for output poses a number of problems. First, we are interested in the unconditional relationship between young and old employment, so any estimation controlling for GDP will remain unsatisfactory. Next, even if we were only interested in this conditional relationship, it is hard to pretend that our controls perfectly account for changes in labor demand. From these time series regressions, it is impossible to exclude the possibility that some simultaneity issue is not at play here.

There is a further issue when looking at youth employment rates, particularly striking in the case of France, and that is the role of education policies, which have dramatically affected the situation of people in the fifteen to twenty-four age group, as was shown in figure 4.3. To check whether this factor affects our results, we have made a second set of regressions, presented in table 4.2. This table is comparable to the second half of table 4.1 but

Table 4.2 **Direct relationship between the elderly labor force participation and the employment and unemployment of young and prime age persons, control by the mean school leaving age**

	Youth, 20 to 24		Prime age, 25 to 54	
	Unemployment	Employment	Unemployment	Employment
		With controls		
Levels	–0.513	0.213	–0.103	–0.001
	(–0.274)	(0.399)	(0.057)	(0.104)
Three-year lag on elderly employment	0.072	0.243	–0.120	0.070
	(0.177)	(0.259)	(0.036)	(0.043)
Five-year difference	–0.381	0.338	–0.071	0.070
	(0.178)	(0.182)	(0.041)	(0.038)
Five-year log difference	–0.329	0.325	0.300	0.041
	(0.801)	(0.207)	(0.645)	(0.023)

Notes: Reported is the coefficient of elderly labor force participation. Controls are GDP per capita, growth of GDP per capita, the proportion of GDP generated by manufacturing, and the mean school leaving age. Three-year lag means that we regress the dependent variable on a three-year lag of elderly employment. Five-year difference means that we take fifth differ-ences for the right- and left-hand sides. Five-year log difference means that we take the log of each X and Y variable, then take five-year differences.

with the mean age at leaving school used as an additional control variable. Results do not dramatically change compared to those of the first approach. Coefficients obtained after controlling for this school-leaving age are generally less significant than before controls, but when they are, they generally go on supporting the non-Malthusian view that senior workers and workers from other age groups are complements rather than substitutes.

4.4 Measuring Changes in Retirement Incentives

Even when controlling for various determinants of general unemployment, the approach followed in the previous section is difficult to interpret in terms of a causal impact of early retirement policies on employment rates of younger workers. Let's assume that some unobserved factors can have simultaneous impacts on the unemployment of younger workers and on labor force participation of older workers, these impacts being a priori of opposite signs. In principle, this will imply that periods of low labor force participation for older workers will also tend to be periods of high unemployment for younger ones. Let's also assume that a causal impact of retirement policies on youth unemployment actually exists and is of positive sign—that is, accelerating exits from the labor force by senior workers helps in lowering unemployment for younger workers. In such a context, the two relationships will offset each other, and the true benefits of early retirement policies on youth unemployment will be underestimated.

The ideal way to deal with these problems would be by instrumenting LFP

rates of older workers with a variable that explains this labor force participation but that cannot be suspected of being endogenous to the global situation of the labor market. If policies had been decided completely independently from this labor market situation, an index summarizing the intensity of such policies would do the job. We shall actually look at the impact of such an index on labor market outcomes for the different age groups. But we know in advance that the exogeneity assumption is doubtful in the French case. Policies encouraging early exits have been at least partly motivated by the labor market situation, as seen in section 4.2. We shall therefore adopt a more agnostic strategy, looking at the possibility of reciprocal causation between policies and these labor market variables, relying on Granger causality tests.

The next subsection will present the method used for computing our indicator of the incentives to retire. Regression results and Granger causality tests will be presented in the subsequent one.

4.4.1 Incentive Measures

The purpose of this subsection is to translate the qualitative descriptions of section 4.2 into quantitative measures of the intensity of policies aimed at accelerating exits from the labor force by older workers. Among the many difficulties of such an exercise, one stems from the intrinsic complexity of the French system, which combines many different regulations applying to different categories of workers: wage earners in the private sector, civil servants, workers from large public firms (the so-called *régimes spéciaux*), or self-employed. As we did in section 4.2, we shall here bypass this element of complexity by concentrating on the case of wage earners in the private sector, for two reasons: these workers represent the large majority of the labor force (60 percent to 70 percent), and it is for this category of workers that the major changes occurred throughout the period.

As far as normal retirement is concerned, wage earners in the private sector are covered by one basic scheme (the *regime général*) and one or two complementary schemes—ARRCO and AGIRC—the latter being specific to highly qualified workers (*cadres*). Section 4.2 mentioned the major reforms that have been applied to the *régime général* during the period under review. Our analysis takes these reforms into account and also the associated changes in complementary schemes. Concerning access to pre-retirement, a one-by-one inclusion of all the possibilities that have existed over the period is beyond the scope of this chapter and would probably be of little interest, given the very aggregate nature of the index we are trying to build. The strategy has been instead to proxy all these routes by the dominant one for each period, giving to this route a global weight equal to the total flow of early retirees for each period.

Computations are made by gender, whatever the cohort, with a wage permanently equal to the current social security ceiling, and by deciles of length

of services. Results are averaged over the subgroups. Assuming a career at the SS ceiling is close to assuming a "median" career, since the social security ceiling changed more or less in phase with the average wage.

Figure 4.4 presents results in terms of social security wealth (SSW), depending on age and time at retirement. It actually gives a good view of the main changes observed since the end of the 1960s. The SSW series has a general upward trend reflecting general economic growth. Under pre-1971 conditions, we have a strong progressivity of the pension level as a function of age. The 1971 reform leads to a strong jump. The jump is higher for people retiring around sixty, especially in 1972, due to transitory constraints on the maximum pension level that minimized the benefit of the reform for people retiring late. On the whole, the gap between pension levels reached between sixty and sixty-five remains rather large. The 1983 reform leads to an inversion of the relative position of the different curves: the reason is because offering the same replacement rate at sixty and sixty-five means offering a higher SSW at sixty than at sixty-five, due to the fact that the expected length of the retirement period is longer at sixty than at sixty-five. The opposite was true before 1983, due to the overactuarial magnitude of the penalty that applied before this date to people retiring before sixty-five.

The next step is to try combining this series into a single summary indicator. Let $W(a, y)$ represent the social security wealth of a person retiring at age a in year y. Let $q(a, y)$ represent the probability of facing such an incentive at this period and at this age; that is, the probability of still not being retired and of being entitled to such a benefit. Before the first eligibility age of sixty, this probability will be zero. After sixty, it will be 1 minus the share of people already retired; that is, $1 - p(a, y)$. Given these elements, the

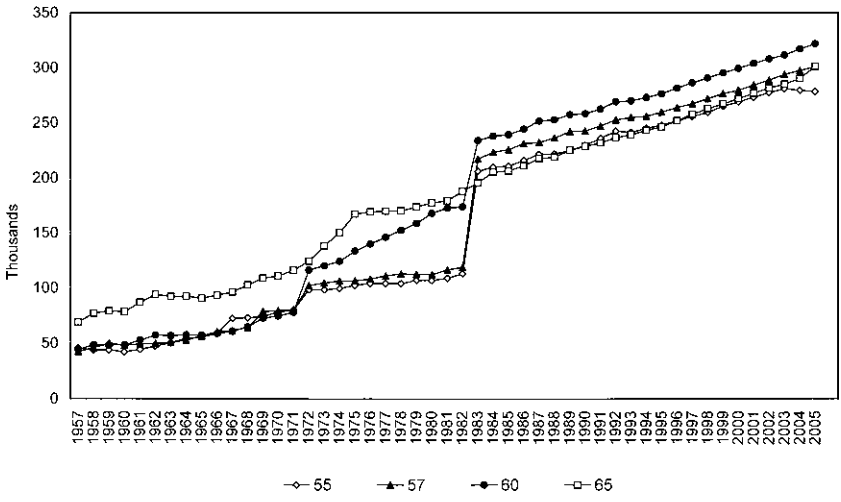

Fig. 4.4 Social security wealth by date and age at retirement

aggregation strategy averages past incentives $W(a, y)$ over the current stock of retirees, since what we want to measure is the cumulative effect of past incentives on current LFP rates of people over sixty. The global index that provides this aggregation is:

$$(1) \qquad \text{wbar}(y, r) = \sum_{55}^{65}\left[\frac{p(a, y)}{\sum_{55}^{65} p(a, y)}\right] \times \left[\frac{\sum_{t=0}^{a-55} W(a - t, y - t, r) \times q(a - t, y - t)}{\sum_{t=0}^{a-55} q(a - t, y - t)}\right],$$

where the second bracket synthesizes past incentives faced by people currently retired at age a, which are then averaged over all groups of people currently retired, with ages comprised between fifty-five and sixty-five.

This aggregate indicator is provided in figure 4.5. It essentially captures the strong impact of the 1983 reform in favor of an earlier retirement.

We have also explored another version of the incentive measure, built not only on the expected social security wealth for retiring at a given age but also on the difference between the social security wealth derived for retiring now and the maximum possible value of this SSW for later ages at retirement. Let us call PV(a, y) the "peak value"—that is, the maximum of the $W(a', y + a' - a)$ that can be attained for departures at ages higher than or equal to a and a^*, the corresponding age.

The aggregation of $W-$PV, using the same kind of formula as formula (1), is given by the bottom line of figure 4.5. The pattern of $W-$PV unfortunately

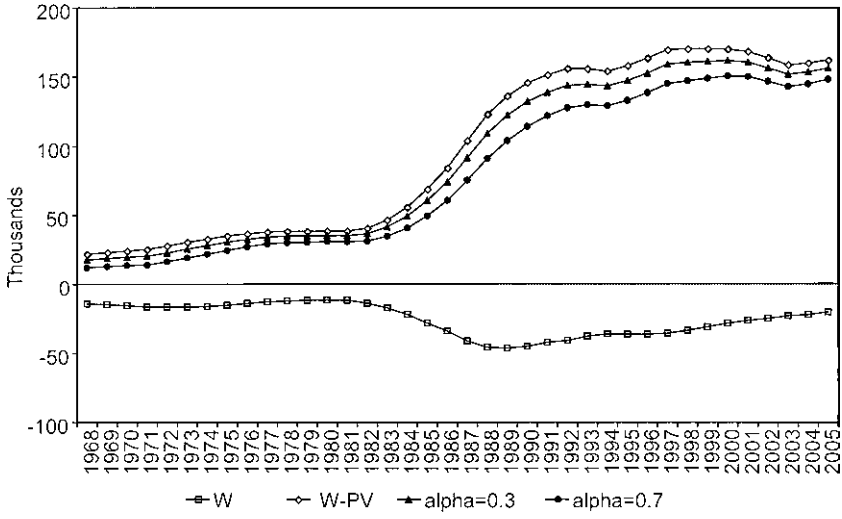

Fig. 4.5 Incentive measures

appears difficult to interpret. Previous results on microdata had underlined the importance of the peak value or of the distance to the peak value in the decision to retire. Following the microresults, an increase in W – PV (W – PV is negative) should induce a decrease in the labor force participation. An increase in W – PV indeed means that individuals are approaching the optimal date to claim their pension. The 1983 pension reform in France induces a discontinuity in the age of the peak value. Before the reform, the optimal age to claim a pension was sixty-five; it moves to sixty in 1983. The discontinuity in W – PV makes the aggregation difficult. Thus, figure 4.5 shows that W – PV presents a decreasing pattern in 1983, even if we were expecting the reverse.

Nevertheless, we have attempted to build an index, mixing the incentives properties of both PV and (W – PV). The elementary formula is of the form:

$$(2) \qquad I(a, y, r) = W(a, y) + e^{-r(a^*-a)}[W(a, y) - \text{PV} \times (a, y)].$$

It can be interpreted as a weighted average between the gain from leaving immediately and the additional gain from postponing until the age that maximizes W, with a weighted factor for future gains equal to $e^{-r(a^*-a)}$, which will be proxied by a constant factor α. A global index ibar is computed as the global index wbar from formula (1). The conventional values $\alpha = 0.3$ and $\alpha = 0.7$ lead to the last two curves on figure 4.5. Given the relatively small difference between these curves and the initial one, we shall here concentrate on results based on W only. For comparison purposes with other countries, we give results based on the 'ibar' approach (equation [2]) in the appendix.

4.4.2 Measuring the Impact of Pension Policy Indices on Labor Market Outcomes

Tables 4.3 to 4.5 present the effects of aggregate social security wealth on different labor market outcomes: labor force participation of the old (denoted LFPold) and unemployment and employment rates of the young (denoted, respectively, Uyouth and Eyouth). Several specifications and sets of control variables are used to test the robustness of the results. In addition to the three control variables used in table 4.1 (GDP per capita, growth of GDP per capita—denoted DGDP—and the share of manufacturing in GDP—denoted MS), we have also used the mean age of the fifty-five to sixty-five age group (denoted MA_5565)[16] and the ratio of the minimum wage to the average wage (denoted MW). As in our previous analysis, the mean school leaving age (denoted MSLA) is used to measure the impact of

16. The labor force participation of the old is influenced by changes in the age structure. In particular, large changes in the mean age of the fifty-five to sixty-four age group were experienced in France between 1974 and 1985 as a result of the low fertility rates during World War I; that is, cohorts born between 1915 and 1918 are much smaller than previous and later cohorts.

education policies, which might have been fostered by concerns about youth unemployment and are essential in explaining the drop in youth labor force participation in France.[17]

All three tables have the same structure. In the top part, we present the coefficients of the wealth index according to various specifications. In the first specification (column [1]), we use the same set of control variables as in table 4.1 (GDP per capita, its growth rate, and the share of manufacturing in production). In the following columns, we add or remove control variables according to their relevance for the corresponding labor market outcome; that is, the mean age of the fifty-five to sixty-five age group in the LFPold regression or the minimum wage for Eyouth and Uyouth. The number of observations being relatively low (a maximum of thirty-eight observations to a minimum of thirty-two when taking the fifth differences of the variables), we test the robustness of these regressions by limiting the number of control variables, either for the business cycle (GDP per capita, its growth rate) or the productive structure of the economy (the share of manufacturing in production), in order to leave explaining power for the more specific variables (columns [3] and [4]). Endogeneity of the pension policy in the French political context, as discussed previously, is an issue that could not be put aside. We try to address this issue by implementing some Granger causality tests in a bivariate framework. We present these results in the bottom part of each table. Control variables are introduced as exogenous variables (we do not have enough degrees of freedom to deal with all variables as endogenous ones). We have two bivariate systems to estimate—youth unemployment and the pension wealth index and youth employment and the pension wealth index—and we test if past youth employment (or unemployment) could improve the prediction of the pension wealth index; that is, if youth unemployment (or employment) at date t helps to better predict the pension wealth index at date $t + 1$, whatever the exogenous variables.

Table 4.3 corresponds to the regressions with all the variables in levels. First, the effect of the wealth index on the labor force participation of the old has the expected negative sign. However, it is not significant in specification (2), which includes the largest set of controls, and in specification (3), for which the growth rate of GDP per capita has been omitted. When comparing specifications (1) and (4), the inclusion of the mean age of the fifty-five to sixty-five age group instead of the share of manufacturing in production increases the negative impact on the labor force participation of the old of the pension incentives index. For the other labor market outcomes, the effect of the wealth index is always significant, whatever the set of the control variables, and is with a similar size and the same sign: negative for both the

17. The share of the young in school (denoted Syouth) could be an alternative measure of these education policies. Yet, it is linked by an identity relationship to the unemployment and employment of the young.

Table 4.3 **Regressions in level, wealth index estimated coefficient**

	(1)	(2)	(3)	(4)
LFPold	**–0.022**	–0.000	–0.000	**–0.093**
	(0.012)	(0.011)	(0.011)	(0.008)
Uyouth	**–0.04**	**–0.076**	**–0.070**	**–0.057**
	(0.014)	(0.015)	(0.014)	(0.016)
Eyouth	**–0.191**	**–0.189**	**–0.196**	**–0.194**
	(0.018)	(0.022)	(0.020)	(0.023)
Syouth	**0.244**	**0.234**	**0.242**	**0.219**
	(0.015)	(0.020)	(0.019)	(0.019)
Causality tests				
Uyouth → W	yes	yes	yes	yes
W → Uyouth	yes	yes	yes	yes
Eyouth → W	no	no	no	no
W → Eyouth	no	no	no	no

Notes: (1): LFPold = GDP, DGDP, MS; Uyouth, Eyouth, Syouth = GDP, DGDP, MS. (2): LFPold = GDP, DGDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, DGDP, MS, MW. (3): LFPold = GDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, MS, MW. (4): LFPold = GDP, DGDP, MA_5565; Uyouth, Eyouth, Syouth = GDP, DGDP, MW. Parameters in bold are significant at the 5-percent threshold.

unemployment and employment of youth and positive for the schooling of youth. An increase in the social security wealth index is associated both with lower youth employment and lower youth unemployment. This result is not completely surprising, given that the pension wealth index is also associated positively with the share of the young in school. To rephrase this result in the light of our previous descriptive analysis (section 4.3), at a time of increased youth unemployment, both early retirement policies and expansion of schooling have taken place. Taking into account these education policies, which is done in table 4.5, may allow us to help shed light on the relationship between retirement policies and the labor market status of the young.

When looking at the results of the causality tests, we accept Granger causality between the unemployment of youth and the wealth index in both directions, whereas we reject it between the employment of youth and the wealth index. It is therefore more cautious to avoid causal interpretation of the effect of the wealth index on the youth labor market outcomes, given these endogeneity issues.

Results in table 4.4 correspond to regressions with all the variables in fifth differences. Differentiation is a way to address the endogeneity issue. By differencing, we lose control variables, such as the growth of GDP per capita, and we implement only two specifications. As we lose almost 10 percent of our observations, the coefficient of the wealth index is no longer significant in the regression on the labor force participation of the old. As a result, the regressions on the other outcomes cannot be interpreted in a causal way.

Surprisingly, the coefficient of the pension wealth index on the other labor market outcomes remains significant and of the same sign (the size is more volatile) as in the regressions in levels. The Granger causality tests confirm the results obtained in table 4.3. These results reinforce the need to control for education policies.

Table 4.5 is very similar to table 4.3, except that we systematically add the mean school leaving age in each set of control variables. There remain only two explained variables—employment and unemployment of youth—since the mean school leaving age is not relevant for the fifty-five to sixty-five age group (the coefficient for the LFPold regression is then the same as in table

Table 4.4 **Regressions in fifth differences, wealth index estimated coefficient**

	(1)	(2)
LFPold	–0.002	–0.002
	(0.026)	(0.014)
Uyouth	**–0.095**	**–0.211**
	(0.029)	(0.025)
Eyouth	**–0.078**	**–0.183**
	(0.030)	(0.039)
Syouth	**0.137**	**0.311**
	(0.027)	(0.032)
Causality tests		
Uyouth → W	yes	yes
W → Uyouth	yes	yes
Eyouth → W	no	no
W → Eyouth	no	no

Notes: (1): LFPold = GDP, MS; Uyouth, Eyouth, Syouth = GDP, MS. (2): LFPold = GDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, MS, MW. Parameters in bold are significant at the 5-percent threshold.

Table 4.5 **Regressions in levels, with the mean school leaving age added: Wealth index estimated coefficients**

	(1)	(2)	(3)	(4)	(5)
Uyouth	**–0.106**	**–0.052**	**–0.063**	0.024	–0.062
	(0.027)	(0.028)	(0.028)	(0.031)	(0.045)
Eyouth	**–0.140**	–0.047	**0.078**	**–0.124**	**–0.148**
	(0.033)	(0.039)	(0.039)	(0.048)	(0.038)
Causality tests					
Uyouth → W	yes	yes	yes	yes	yes
W → Uyouth	yes	yes	yes	no	yes
Eyouth → W	no	no	no	yes	no
W → Eyouth	no	no	no	no	no

Notes: (1): GDP, DGDP, MS. (2): GDP, DGDP, MS, MW. (3): GDP, MS, MW. (4): GDP, DGDP, MW. (5): GDP, DGDP. Parameters in bold are significant at the 5-percent threshold.

4.3), and it is certainly endogeneous in the Syouth regression. The effect of the wealth index on unemployment or employment of the youth and Granger causality between the wealth and the two outcomes of interest are the same as in table 4.3 when controlling for the mean school leaving age.

The causality tests lead us to confirm that these variables are indeed endogenous. Causal relationships are therefore impossible to establish, and we are left with the weak evidence of previous sections.

4.5 Conclusion

The main objective of this chapter has been to study the link between youth labor market status and older workers' labor force participation in the case of France. The main reforms favoring early retirement policies in the decade between 1975 and 1985 were based, at least in the political debate, on the argument that they would foster young workers' employment. Evidence of the correlation between youth labor market outcomes and old workers' labor force participation plead more in favor of a positive association between young and old workers in the labor market. An increase in the old workers' participation is indeed correlated with an increase in the employment rate of young workers and a decrease in their unemployment rate. Even when controlling for the economic cycle, this positive association remains—albeit less robustly. These correlations based on time series, however, are not evidence of a causal relationship between young and old employment. For a start, even if we had been able to properly measure substitution between these two age groups, controlling for total output in the economy, we would not be able to state that these policies have been effective in the long term, unconditional on output. In our case, we do not find evidence of substitution conditional on output. The second caveat of these time series correlations is that it is impossible to exclude the possibility that they are not faced with a simultaneity issue—that is, that general employment conditions, not taken into account in our controls, could explain both employment of the young and of the old.

To deal with this problem, we instead use the LFP rates of older workers in an index summarizing the intensity of policies aimed at removing older workers from the labor market, based on social security wealth. The effect of the wealth index on youth labor market outcomes is always significant, whatever the set of control variables we use, and is with a similar size and the same sign. The coefficient is negative for both the unemployment and employment of youth, with or without controlling for school attendance. Granger causality tests between unemployment of youth and the wealth index show a significant link in both directions, whereas nothing is significant between the employment of youth and the wealth index.

Establishing a causal relationship of the reduction of labor force participation of the old on employment prospects of the young is indeed challenging work. Given the general equilibrium element of their impact and the

endogeneity of the policies at stake, one is constrained to look—within one country—at time series. If we do not find evidence that reducing the labor force participation of the old provides jobs for the young, we cannot exclude altogether the possibility that some general and unaccountable cause is hiding their true effect.

Appendix

Tables 4A.1 and 4A.2 are defined as table 4.3, and tables 4A.3 and 4A.4 are defined as table 4.5, except that the pension index here is a composite index, defined as:

$$I(a, y, r) = W(a, y) + e^{-r(a^*-a)}[W(a, y) - \text{PV} \times (a, y)].$$

The main issue with this pension index is to find a value for α, which is a kind of subjective preference for the present rate. According to the average values of different long-term and no-risk interest rates for the time period, it can range from 0.3 to 0.7. We thus replicate the same exercise as for the wealth index for two pension indices (denoted ibar), and tables 4A.1 and 4A.3 (respectively, tables 4A.2 and 4A.4) report the results for $\alpha = 0.3$ (respectively, $\alpha = 0.7$). Globally, the results are very similar to the results obtained with the wealth index. Indeed, we find that the paradoxal results remain; that is, the complementarity between youth employment and the

Table 4A.1 **Regressions in level, α = 0.3**

	(1)	(2)	(3)	(4)
LFPold	–0.001	–0.021	–0.001	**–0.096**
	(0.011)	(0.012)	(0.011)	(0.009)
Uyouth	**–0.082**	**–0.040**	**–0.074**	**–0.067**
	(0.015)	(0.014)	(0.014)	(0.016)
Eyouth	**–0.202**	**–0.198**	**–0.198**	**–0.209**
	(0.023)	(0.019)	(0.019)	(0.024)
Syouth	**0.251**	**0.254**	**0.257**	**0.242**
	(0.019)	(0.013)	(0.013)	(0.018)
Causality tests				
Uyouth → ibar	yes	yes	yes	yes
Ibar → Uyouth	yes	yes	yes	yes
Eyouth → ibar	no	no	no	no
Ibar → Eyouth	no	no	no	no

Notes: (1): LFPold = GDP, DGDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, DGDP, MS, MW. (2): LFPold = GDP, DGDP, MS; Uyouth, Eyouth, Syouth = GDP, DGDP, MS. (3): LFPold = GDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, MS, MW. (4): LFPold = GDP, DGDP, MA_5565; Uyouth, Eyouth, Syouth = GDP, DGDP, MW. Parameters in bold are significant at the 5-percent threshold.

Table 4A.2 **Regressions in level, α = 0.7**

	(1)	(2)	(3)	(4)
LFPold	–0.001	–0.021	**–0.101**	–0.001
	(0.011)	(0.012)	(0.010)	(0.011)
Uyouth	**–0.090**	**–0.040**	**–0.083**	**–0.080**
	(0.014)	(0.014)	(0.016)	(0.014)
Eyouth	**–0.221**	**–0.207**	**–0.226**	**–0.226**
	(0.024)	(0.020)	(0.027)	(0.022)
Syouth	**0.276**	**0.266**	**0.273**	**0.278**
	(0.017)	(0.011)	(0.016)	(0.015)
Causality tests				
Uyouth → ibar	yes	yes	yes	yes
Ibar → Uyouth	yes	yes	yes	yes
Eyouth → ibar	no	no	no	no
Ibar → Eyouth	no	no	no	no

Notes: (1): LFPold = GDP, DGDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, DGDP, MW. (2): LFPold = GDP, DGDP, MS; Uyouth, Eyouth, Syouth = GDP, DGDP, MW. (3): LFPold = GDP, MS, MA_5565; Uyouth, Eyouth, Syouth = GDP, MS, MW. (4): LFPold = GDP, DGDP, MA_5565; Uyouth, Eyouth, Syouth = GDP, DGDP, MW.

Table 4A.3 **Regressions in level with mean school leaving age, α = 0.3**

	(1)	(2)	(3)	(4)	(5)
Uyouth	**–0.123**	**–0.065**	**–0.077**	0.018	***–0.093***
	(0.029)	(0.032)	(0.031)	(0.037)	(0.049)
Eyouth	**–0.160**	–0.056	**–0.091**	**–0.141**	**–0.167**
	(0.037)	(0.045)	(0.045)	(0.056)	(0.042)
Causality tests					
Uyouth → ibar	yes	yes	yes	yes	yes
Ibar → Uyouth	yes	yes	yes	no	yes
Eyouth → ibar	no	no	no	no	no
Ibar → Eyouth	no	no	no	yes	no

Notes: (1): GDP, DGDP, MS. (2): GDP, DGDP, MS, MW. (3): GDP, MS, MW. (4): GDP, DGDP, MW. (5): GDP, DGDP.

Table 4A.4 **Regressions in level with mean school leaving age, α = 0.7**

	(1)	(2)	(3)	(4)	(5)
Uyouth	**–0.152**	**–0.091**	**–0.103**	–0.004	**–0.153**
	(0.031)	(0.038)	(0.036)	(0.049)	(0.052)
Eyouth	**–0.193**	–0.071	**–0.113**	**–0.165**	**–0.191**
	(0.044)	(0.055)	(0.054)	(0.071)	(0.048)
Causality tests					
Uyouth → ibar	yes	yes	yes	yes	yes
Ibar → Uyouth	yes	yes	no	no	yes
Eyouth → ibar	no	no	no	no	no
Ibar → Eyouth	no	no	no	yes	no

Notes: (1): GDP, DGDP, MS. (2): GDP, DGDP, MS, MW. (3): GDP, MS, MW. (4): GDP, DGDP, MW. (5): GDP, DGDP.

pension index in one hand and the substitutability with unemployment in the other hand.

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