# Impact of a retirement age's rise on labour market status and living standards

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**Abstract**

As governments in developed countries push back retirement ages to restore the financial stability of pension systems, it raises concerns about the potential unwanted impacts of such reforms on other social security programs, but also on income and living standards. Using administrative data on employment trajectories matched with detailed tax and social security data, we evaluate the effect of the increase in statutory eligibility age (SEA) from 60 to 62 implemented by the French government in 2010 on labor market status and income, both at the individual and the household level. Using a difference-in-difference identification strategy, we find that the reform significantly increased the employment rate at affected ages but also induced substantial spillover effects on unemployment and, to a lesser extent, inactivity. As a consequence, we document a negative effect on women's individual income and a temporary decrease in their living standard of 2.1% while men's income is not significantly affected on average. The heterogeneity analysis suggests that the income loss mainly affects households at the bottom of the distribution and single women.

# 1 Introduction

In the face of demographic changes, including ageing populations and increasing life expectancy, several developed countries have reformed retirement eligibility rules to restore the financial balance of their pension systems. Such reforms are expected to increase the employment rate of older workers and thus social contributions, while reducing the size of the wage bill by raising the retirement age. However, their effectiveness is reduced if older workers do not spend additional years in the labour force but are supported by alternative social security programs. This raises concerns about the fiscal implications of these reforms, but also about their potential impact on living standards and income distribution. Indeed, if a significant proportion of individuals spend more time out of the labour force, this may lead to a reduction in their income in the additional years before reaching the eligibility threshold. While the impact of the tightening of retirement conditions on labour market status has been widely documented, less attention has been paid to its impact on household income and living standards. However, analysing the effects at the household level provides a more complete picture of the impact on living standards and fiscal balances, as it takes into account both spousal income and household transfers.

To take this dimension into account, we use administrative data that match employment histories with social security and tax data. We are thus able to accurately distinguish different sources of income, both at individual and household level. We exploit the exogenous variation induced by the French government's 2010 reform of the private sector scheme to identify the effect of an increase in the statutory retirement age (SEA). The SEA gradually increased from 60 to 62 for cohorts born between 1951 and 1955, which allows us to use a difference-in-difference identification strategy. We first quantify the effect of the reform on the employment rate using panel data on labour force participation and document a significant increase in the employment rate of 5 percentage points for men and 13 percentage points for women for the 1953-1955 cohorts. Then, the analysis is extended to a broader set of labour market statuses based on income tax returns. We find significant spillovers on unemployment insurance's take up, accounting for a third of the total effect among women and half among men.

Tax and social data makes it possible to measure the impact on incomes at household level and to compare it to the individual level. Overall, we find that women's living standard decreases temporarily by 2.1% while men are not significantly affected. The reform also has a positive impact of around 1 percentage point on the poverty rate for both gender that does not persist over time. Finally, we discuss the heterogeneous effects of the reform depending on household income and highlight that negative income effects are concentrated at the bottom of the distribution. Finally, comparison of single and married women show evidence of couple's insurance role : singles are more negatively affected than couples at the household level while the effects are comparable at the individual level.

This analysis contributes to the growing literature on the impact of a rise in retirement eligibility age on the employment rate but also its potential spillover effects through alternative pathways taken by individuals at the end of their careers. Indeed, a fraction of individuals impacted by the reform of the retirement age may spend the additional years not employed, which can have a significant impact in terms of public finance. The additional social

contributions can be offset by the increase in other social security schemes' take-up, such as the unemployment insurance or disability programs. Using the gradual introduction of an SEA reform in Austria in 2000 and 2003, Staubli & Zweimüller (2013) estimate a causal effect of 10 percentage points on the employment rate and no effect on disability insurance. However, they also highlight a significant substitution effect on unemployment insurance take-up. Using similar reforms as natural experiments, several papers (e.g Atalay & Barrett 2015, Geyer & Welteke 2017, Cribb et al. 2016) document the existence of program substitution, although the magnitude of the employment and spillovers differs according to the institutional context. For instance, using a two years increase of women's early retirement age in England, Cribb et al. (2016) finds a moderate impact of 0,06 on the probability to be employed while Geyer & Welteke (2017) identifies an effect of 0.14 evaluating an analogous reform in the case of Germany. Rabaté et al. (2024) highlight the fact that a majority of those differences can be explained by a simple mechanical model. Those effects seem therefore to be mainly driven by passive substitution, in other words the persistence of affected individuals' status until retirement age. However, some papers find evidence of active program substitution (Carta & De Philippis 2024), although the magnitude remains relatively small. Our results documents significant effect on the employment rate and spillover effects, in particular on the unemployment insurance.

Moreover, this paper builds on existing studies of the same reform. The impact of the 2010 reform on the labour market has been evaluated by Dubois & Koubi (2017) and Rabaté & Rochut (2020). The former relies on labour Force Survey data and compares the first generations affected by the reform. Their estimation documents an increase of the employment rate by around 17 percentage points, as well as an increase in the probability of being unemployed at 61 years old of 7 percentage points. Rabaté & Rochut (2020) use administrative data from the general private sector scheme and are therefore able to select more precisely individuals who are more likely to be affected by the reform[1]. They found a positive impact on the probability of employment of 21 point, but they also document substantial substitution effects. In particular, one third of the affected individuals experience unemployment before retiring. The effect of the reform was essentially to freeze the situations in which individuals find themselves until the new AOD. We extend their analysis to more recently affected cohorts, identifying a lower total effect of the reform, due to fewer sample restrictions and interactions with early retirement exceptions, but a comparable distribution between the different labour market states.

A more recent strand of the literature extends the earlier work by assessing the impact of raising the retirement age on outcomes at the household level, such as income distribution and living standards. The existing papers rely on survey data and yield diverging results. Using the SEA increase from 60 to 63 in Germany for women born after 1951, Geyer et al. (2020) finds no significant impact on the distribution of household income, even for the most vulnerable groups such as single women, due to labour supply substitution within households and an increase in social transfers. On the contrary, Cribb & Emmerson (2019) highlight the negative impact of a similar reform in the UK for women on equalized net income (-$41 per week on average) and a significant effect on the absolute poverty rate of 6.4 percentage points. In the case of Australia, Morris (2022) also shows that a rise in the eligibility age for women has a negative impact on income, increasing the poverty rate at affected ages by 4 percentage points

[1]They exclude in particular those eligible for early pension schemes

and inequality measures by 6 to 19%. We therefore extend this analysis to the household level in the context of France, in particular when the entire population, and not just women, is affected by an increase in the retirement age.

The remaining of this paper is organized as follow. Section 2 provides an overview of the institutional context and details the 2010 reform. Sections 3 and 4 set out the data sources and descriptive statistics, while Section 5 presents the empirical strategy used to identify the causal effect of the reform. Results are described in Section 6. Finally, Section 7 concludes.

# 2 Institutional context

## 2.1 French pension system

This article focuses on the first pillar of the private sector pension scheme, called general scheme or *Régime général*, the most important public pension scheme in France as it concerns 84% of retirees in 2021 (Marino & Meinzel 2023*a*). It is a pay-as-you-go pension scheme that provides an earnings-related pension under a certain ceiling. The second pillar, not affected by the reform, consists in a mandatory point based system providing additional pension for private sector employees.

As with most existing public pension schemes, the general scheme is characterized by two main age parameters: the minimum legal age at which individuals can claim their pension and the minimum age at which they can obtain their full rate pension. In the general case, the minimum legal age is set at the statutory eligibility age (SEA), but exceptions were gradually introduced into the system. In particular, since 2003, the minimum legal age depends on employment history as individuals with longer careers are entitled to retire earlier. Early retirement for long career (ERLC) depends on three conditions :

- the age at which the individual began work
- the number of contributed years
- the number of validated years

A full-rate pension requires either that the individual reaches the normal retirement age (NRA) regardless of employment history or that (i) the individual has contributed a sufficient number of quarters and (ii) has reached the SEA.

More precisely, the retirement pension is computed as follow :

$$P = W_{ref} \times \tau \times CP$$

The benefits depend on the reference wage $W_{ref}$, which is the average of the top 25 annual earnings under the Social Security ceiling. A coefficient $CP$ (*Coefficient de proratisation*) is applied to the reference wage, computed

as the ratio of the number of contributed quarters $D$ over the reference contribution duration $D_{CD}$ and capped at 1 ($CP = min(\frac{D}{D_{CD}}, 1)$ . Finally, $\tau$ corresponds to the replacement rate and is equal to 50% for an individual retiring at the full-rate age. This replacement rate is increased by a bonus if they continue to work beyond the full-rate age. Conversely, it is reduced by a penalty if the individual retires before the full-rate age, proportional either to the number of missing quarters before the NRA or to the number of missing quarters required to reach the full-rate duration $D_{FR}$. The adjustment that is ultimately applied is the one that results in the most favorable outcome for the pensioner.

## 2.2 Alternative routes to retirement

### 2.2.1 Unemployment insurance

The unemployment benefit is based on a contributory logic: individuals must have worked, and therefore paid social security contributions during a minimum period in order to be covered. The amount of the benefit is calculated on the basis of wages received prior to job loss during a reference period. Unemployment benefit is paid for a period proportionate to the length of time worked, with a maximum duration that varies depending on age bracket. France has a relatively generous unemployment insurance system compared to other developed countries : eligibility conditions are quite flexible while the replacement rate is equal to 71% on average (Unedic 2015).

In addition, seniors workers benefit from more generous conditions : people over 50 can receive unemployment benefits for up to 3 years, against 2 years for the rest of the population. In general, they can no longer be covered by the unemployment insurance once they have reached the SEA but their rights might be extended until they reach their full rate age, under certain conditions[2], which extend their maximum benefit duration to up to 8 years.

Therefore, the insurance's design provides incentives on the workers' side to use unemployment as a pre-retirement scheme (Hairault et al. 2010). However, it is important to not that they cannot unilaterally take this decision, as they are not eligible to unemployment benefit after a resignation.

### 2.2.2 Disability

In addition to the long careers program, retirement terms are also adjusted for individuals with disabilities. People are considered disabled if they are more than two-thirds permanently unable to work after an illness or accident (not related to work). They qualify for a disability benefit, with a replacement rate that varies based on their level of incapacity and can receive their full-rate pension upon reaching the SEA, regardless of their contributing period. Individuals suffering from disability following an occupational accident may also benefit from an incapacity benefit and can retire at the SEA if their working capacity has been reduced by at least 50%.

Finally, the *Allocation aux adultes handicapés* (AAH) is a social minimum that guarantees an income for disabled insured people who do not meet the conditions for entitlement to other allowances (disability pension or incapacity

[2]They need to receive an unemployment benefit for at least a year, to have contributed to the unemployment insurance for 12 years (including at least one continuous year or 2 discontinuous years in the last 5 years) and to have validated 100 quarters for the pension scheme.

benefit). Like disabled individuals, those who benefit from AAH can also retire when they reach the SEA. As the degree of incapacity is defined by a doctor, there is little room for active substitution towards disability programs.

#### 2.2.3 Welfare benefits

Individuals that do not fall in the previously cited social security programs are entitled to non-contributory mean-tested benefits guaranteeing them a minimum income. Individuals above age 25[3] can receive the *Revenu de Solidarité Active* (RSA), regardless of whether they are looking for work or working[4]. The amount varies according to resources and the composition of the household. The reform is thus likely to extend the period when affected individuals depend on RSA, once again due to passive rather than active substitution. The old age minimum (*Allocation de solidarité aux personnes âgées*) (ASPA) is paid to retired people over age 65 with low resources. The age limit is lowered to the SEA for disabled people, so we expect the reform to have a negative impact on its take up.

### 2.3 2010 pension reform

This paper aims to analyse the effect of the reform implemented in November 2010 that induced a rapid and substantial increase in eligibility ages, taking into account the acceleration of the increase voted in 2011. The reform was implemented gradually : the SEA increased by 4 or 5 months per cohort and reached 62 for individuals born in 1955 while the NRA rose from 65 to 67 years old at the same pace. In addition, the required number of contributed years simultaneously rose by one year between the 1950 and the 1955 cohorts. The details of the reform implementation are described in Figure 1.

A rise in SEA affects individuals that are not eligible to early retirement schemes and that have already contributed at least during the required period when they reach the eligibility age. As a large share of individuals have already contributed enough to get a full-rate pension at 60, 56% of private sector workers born in 1950 retire at the SEA (Marino & Meinzel 2023*b*). The increase in the required number of contributed years however dampens the effect of the rise of SEA, as fewer individuals can retire at the SEA with a full-rate pension, but this effect is likely to be limited when we compare close cohorts.

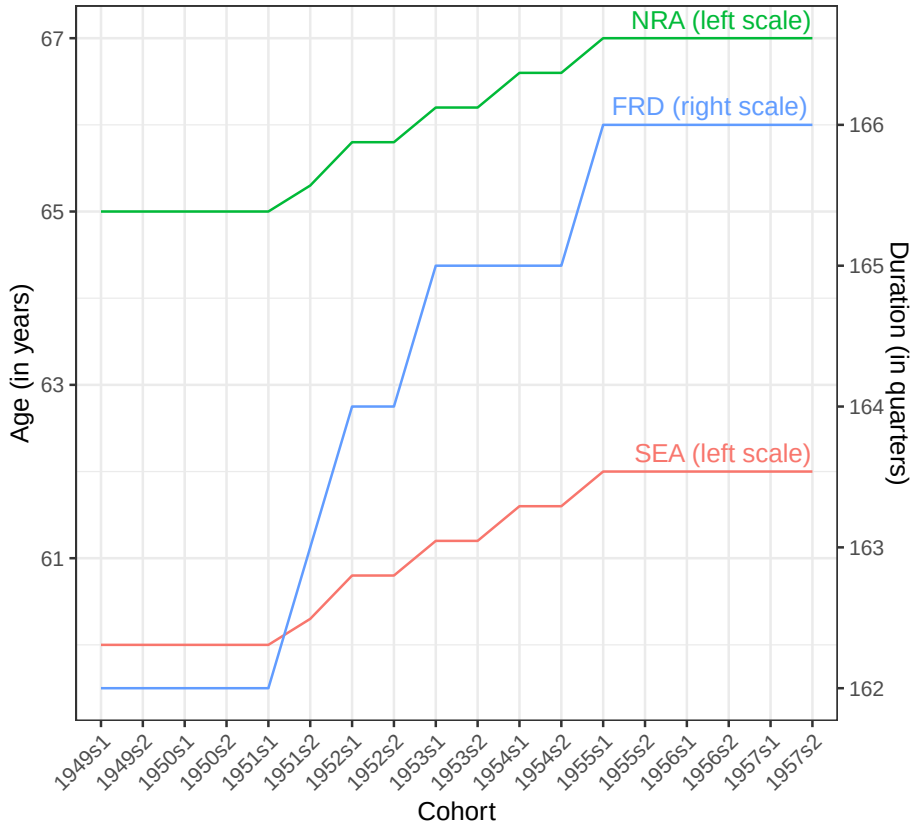
### 2.4 Interactions with other reforms

The 2010 reform renewed the early retirement scheme for individuals with long careers and has extended it to those who started working before the age of 18 against 17 in 2009. However, the extension of compulsory education until 16 years old, starting with the 1953 cohort, and the increase in the required work duration limited the number of eligible individuals until 2012. The conditions for eligibility for an early long career departure have significantly evolved since November 2012: the program is open to individuals who joined the labour force before 20 years of age. Additionally, the validated years condition have been removed while the contributed years requirement is relaxed. As a consequence, the share of individuals eligible for ERLC increased from 12% for those born in 1950 to 25% for

[3]Individuals under 25 with at least one child are also entitled

[4]The benefit initially included two components (*RSA socle* and *RSA d'activité*, we focus on the first one as the second is conditioned on the presence of earned income.

Figure 1: 2010 reform's implementation per cohort




the 1954 cohort (Marino & Meinzel 2023*c*). These additional reforms might therefore reduce the impact of the SEA increase, as individuals with long careers can deviate from SEA.

The unemployment insurance has been reformed in 2009 : rules are simplified and as a consequence, are slightly less generous for workers over 50 age[5]. Job search exemptions for senior are also restricted in 2009, before being completely removed in 2012 for cohorts born after 1952. Those reforms are however likely to play a minor role in the trade-off between unemployment and employment as it does not affect financial incentives. Other alternative routes to retirement do not undergo major changes over the period studied, supporting the identification of the reform's causal effect.

## 3 Data sources and sample selection

Our analysis relies on the French Permanent Demographic Sample (EDP), a longitudinal database maintained by *INSEE* since 1968 which matches information from several sources for a sample of individuals selected according to their date of birth. In particular, this database enables administrative data relating to the employment activity of EDP individuals to be matched with social and tax data. However, the scope covered by the panel has evolved

[5]They need to contribute during 36 months to get the maximum potential duration against 27 months before the reform

over time : it follows individuals born in October of an even-numbered year from 1967 onwards and individuals born from 2 to 5 January, 1 to 4 April, 1 to 4 July and 1 to 4 October for all years since 2002. Moreover, social and tax data is only available since 2010.

The information about the employment activity comes from the *Panel tous salariés (PTS)*, that contains information about all jobs held by an individual in the private sector, aggregated at the annual frequency. This database allows to partially recover individual employment history in the private sector and provides precise information on their work characteristics : type of contract, socio-professional category, number of days work and net wage during a given year. This first source is therefore used to assess the impact of the reform on employment over a certain period of time, which makes it possible to compare pre and post reform trends. The employment status is defined as having at least work once during a given year.

Social and tax data are then used to complete the first part of the analysis. The information relies on exhaustive data from tax authorities and on data on social benefits from the old-age and family branches of the general French Social Security scheme. The scope covered is that of so-called "ordinary" tax households, i.e. those that have filed at least one income tax return and are liable for council tax[6]. It thus provides precise information about the type and the amount of income received at the individual and household levels during a given year, as tax reports allow to distinguish between :

- labour earnings
- self-employment earnings
- pensions (including life annuities, survivor's pension and invalidity's pension)
- unemployment benefit (including pre-retirement)

The labour market status is constructed from tax data. Individuals are assigned to mutually exclusive status according to the type of income received during a given year with the following order of priority : employment, unemployment, retirement and finally inactivity. The exclusive definition of labour market status makes it possible to interpret more simply the effects on employment, unemployment and inactivity in relation to the effect on retirement. Due to large definition of retirement does not allow us to distinguish retirement pension from disability pension, and thus to estimate spillovers on the disability insurance.

The following analysis is based gradually affected cohorts, i.e individuals born between 1950 and 1955. As the reform mainly concerns private sector employees, we restrict the sample to individuals who worked in the private sector at least once between 52 and 57 years old and remove public servants and private employers. We keep individual who are observed continuously in fiscal data until their 64 years old. As information about social benefits and living standards are not included in the database until 2014 for overseas territories, our sample only includes individuals living in metropolitan France. The final sample contains 29 529 men and 21 849 women, i.e. about 13

[6]In particular, it excludes individuals living in collective dwelling

000 persons per year of birth cohort. The number observations per cohort contained in tax data is detailed in Table 5.

All amounts displayed in the analysis are adjusted for inflation using the annual CPI calculated by INSEE and expressed in 2019 euros. The equalised income corresponds to household disposable income divided by the number of consumption units (CU). An household is considered poor when its disposable income is below 60% of the median disposable income computed on the exhaustive tax database, i.e all individuals living in ordinary tax households in a given year. Welfare benefits include the benefit for people born disabled (AAH), the mean-tested minimum revenue (RSA) and the old age benefit (ASPA).

# 4 Descriptive statistics

## 4.1 Summary statistics

Table 1: Summary statistics for the three groups

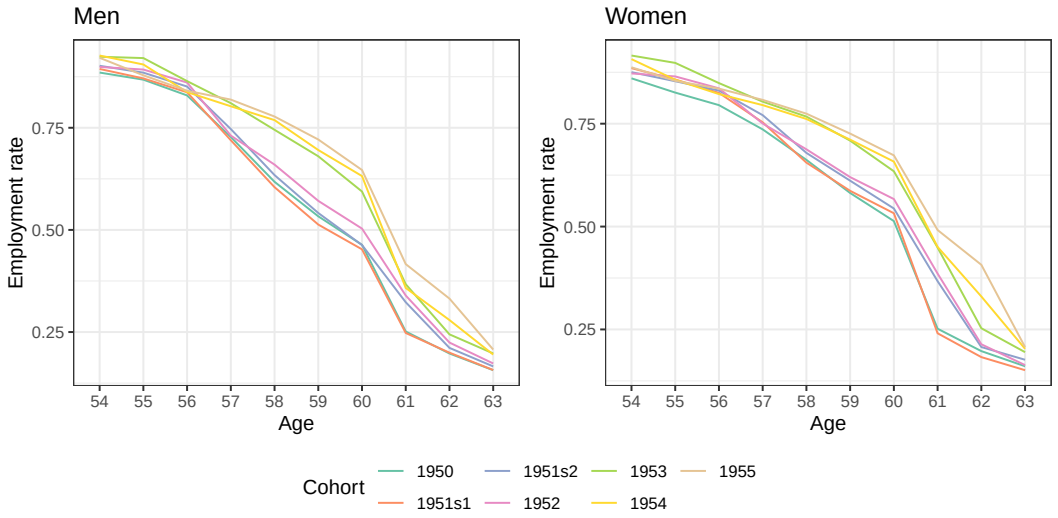
| | Women | | | Men | | |
|---|---|---|---|---|---|---|
| Group | 60 | 61 | 62 | 60 | 61 | 62 |
| **Born abroad** | | | | | | |
| | 10.3 | 11.8 | 12.8 | 13.6 | 13.2 | 14.6 |
| **Marital status** | | | | | | |
| Single | 29.5 | 30.7 | 32.1 | 21.1 | 22.9 | 24.9 |
| Married | 62.3 | 61.6 | 61.1 | 76.6 | 75.0 | 73.0 |
| Widowed | 8.2 | 7.8 | 6.8 | 2.3 | 2.1 | 2.0 |
| **CDI** | | | | | | |
| | 81.0 | 86.4 | 86.4 | 82.4 | 86.2 | 85.1 |
| **PCS** | | | | | | |
| 3 | 9.0 | 9.3 | 10.5 | 20.4 | 21.2 | 20.8 |
| 4 | 23.5 | 24.4 | 22.0 | 25.1 | 24.9 | 23.7 |
| 5 | 46.3 | 45.7 | 47.1 | 8.2 | 8.0 | 9.2 |
| 6 | 21.2 | 20.5 | 20.4 | 46.3 | 45.9 | 46.2 |
| **Labour market status** | | | | | | |
| Employed | 53.5 | 64.7 | 71.1 | 47.2 | 59.2 | 68.8 |
| Inactive | 2.7 | 7.8 | 8.7 | 0.9 | 4.3 | 4.9 |
| Retiree | 22.7 | 10.2 | 6.1 | 32.3 | 18.8 | 11.1 |
| Unemployed | 21.0 | 17.3 | 14.2 | 19.5 | 17.7 | 15.2 |
| **Poverty rate** | | | | | | |
| | 3.6 | 4.9 | 5.7 | 5.6 | 6.1 | 7.0 |
| **Dependent children** | | | | | | |
| | 2.5 | 2.8 | 3.0 | 7.6 | 8.1 | 8.3 |
| **House ownership** | | | | | | |
| 1 | 76.1 | 75.1 | 73.2 | 76.8 | 76.3 | 75.8 |
| 2 | 10.4 | 11.1 | 11.9 | 9.7 | 9.8 | 10.3 |
| 3 | 13.5 | 13.8 | 14.9 | 13.5 | 13.9 | 13.8 |

Table 1 presents summary statistics for the three groups at 60 years old. Their characteristics are similar for most of the observed variables. The share of single individuals increased for both men and women, while the share of owners decreased slightly. Women are also more likely to be born abroad and to occupy an executive

position for more recent cohorts. Overall, the three groups appear comparable, especially as we can control for these characteristics.

## 4.2 Trends by cohorts

Figure 2: Employment status per cohort



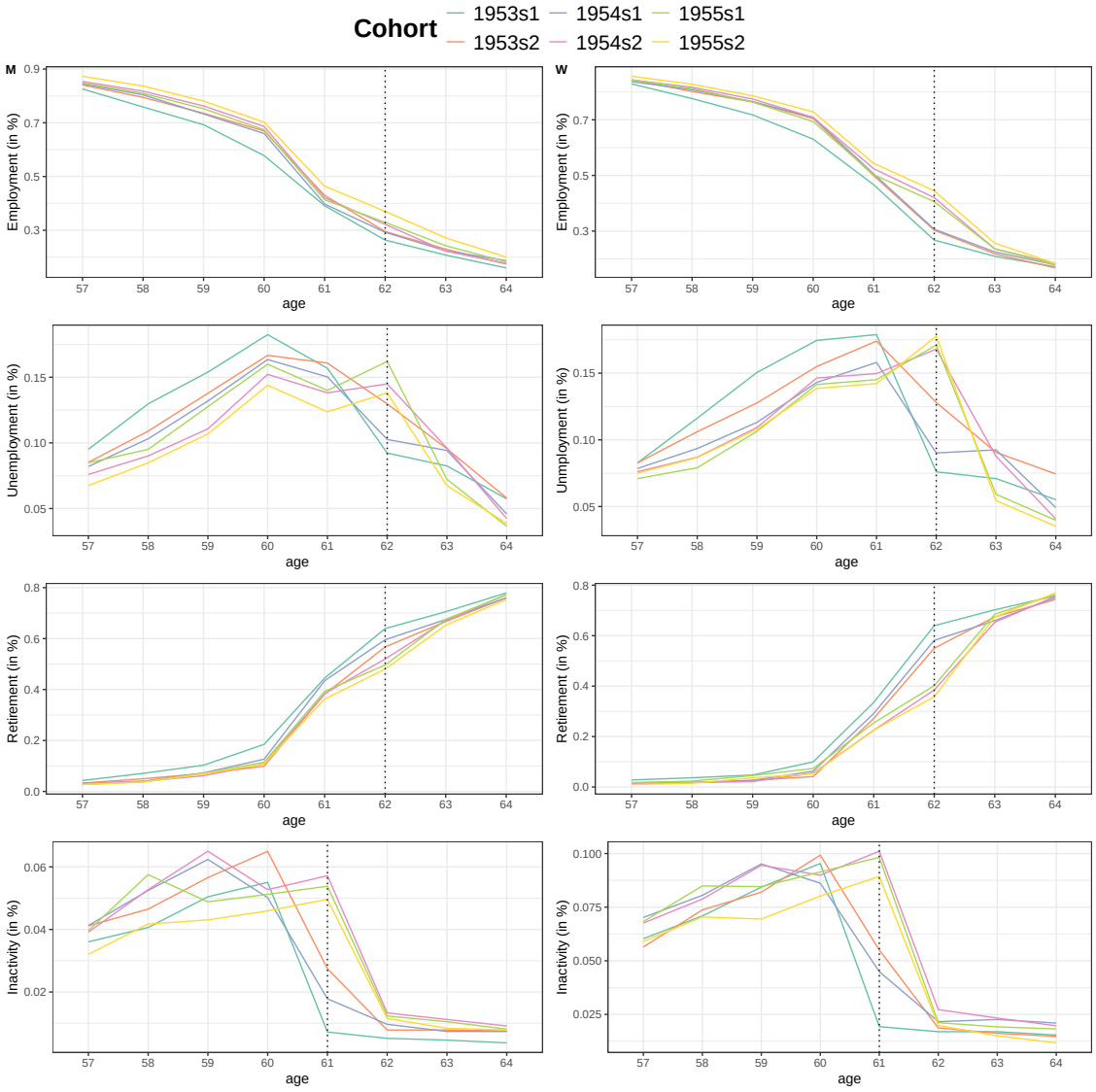

As expected, although the trends in employment rates appear parallel among the different cohorts before 57 years old, they diverge before the pre-reform SEA (60 years old) due to ERLC's reforms. The slope steepens after 56 years old among individuals born between 1950 and 1952, while the employment rate drops significantly at 60 years old for individuals born after 1953. As men are more likely to be eligible for ERLC and to be classified as disabled, the decline in employment is more noticeable for them than for women.

Therefore, it is likely that the 2012 reform interferes with the increase in the SEA if we compare all the affected cohorts. Consequently, we restrict the analysis to the 1953 to 1955 cohorts and use the first cohorts to assess the robustness of the results. An alternative is to focus on individuals born in October during an even year and to use their their age of entry into the labour market as a proxy to control of early retirement due to long career[7], but it significantly reduces statistical power.

The graph 3 compares the 1953 to 1955 cohorts from 57 to 64 years of age, separating the labour market status of men (on the left) from women (on the right). Due to the ERLC, there is a significant share of individuals who retire before the SEA: 40 % of men and 27 % of women. However, the trends are graphically parallel for the four statuses and diverge at age 61. The effect seems to be stronger for women than for men

[7]The database contains information on employment from 2002 only for the other individuals making it impossible to identify those eligible for an early retirement scheme

Figure 3: Labour market status per cohort




# 5 Empirical Strategy

The gradual implementation of the reform allows us to compare cohorts with different SEA using a difference-in-difference methodology. Following the recent literature, treatment is based on age rather than time and is defined as being under the SEA. Therefore, all cohorts are treated but the treatment occurs at different ages depending on the date of birth. The following model has been widely used in the existing literature :

$$y_{iact} = \lambda_a + \gamma_c + \delta_t + \tau 1(a < AOD_c) + \beta X_{ia} + \epsilon_{iact} \tag{1}$$

where $y_{iact}$ is the outcome variable of individual $i$ from cohort $c$ at age $a$ observed in period $t$ and $1(a < AOD_c)$ is dummy equal to 1 when the individual is under the SEA and 0 otherwise.

In order to estimate the dynamic effect of the reform, we estimate a modified version of the model, already used by Ardito (2021) :

$$y_{iact} = \lambda_a + \gamma_c + \delta_t + \sum \tau_k 1(k = a) T_a + \beta X_{iat} + \epsilon_{iact} \tag{2}$$

where $T_a$ is a dummy variable equal to one when the individual is treated in age $a$. This specification allows us to check whether the parallel trend assumption is plausible: we expect $\tau_k$ not to be significantly different from zero before the age of 60. It is also a way of assessing the persistence of the effect after the ages affected by the reform, particularly in terms of income outcomes. The treatment group's definition is based on the age in year in which a given individual reaches the eligibility age based on their date of birth. For instance an individual that is below the SEA at 60 years old but above at 61 will be assigned to group 61. Such individual will be assigned to the treatment group at 61 but will be part of the control group at 62.

The set of individual controls $X_{iat}$ contains gender, place of birth (France or abroad), relationship status, presence of children in the household, home ownership, place of residence and information about employment history between 52 and 57 years old (type of contract, socio-professional category, number of employed years, mean net wage, being employed primarily part-time).

We also want to control for age in year dummies ($\lambda_a$), cohort based on month and year of birth dummies ($\gamma_c$) and period in year dummies ($\delta_t$). As age, cohort and period fixed effects cannot be identified all together due perfect linearity, cohort dummies are drop in the main specification and replaced by a dummy for the treatment group. Alternative strategies such as modifying the period fixed effects using Deaton's approach (Deaton 1997) or keeping only the cohort fixed effects are also tested.

Because individuals are assigned to a treatment status depending on their year and month of birth cohort, the standard errors are clustered at this level.

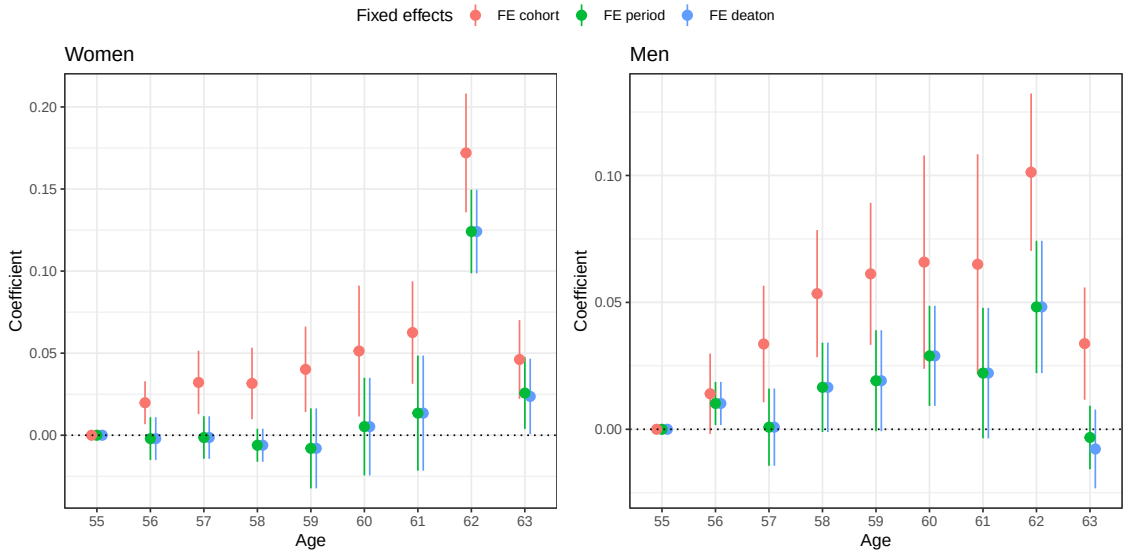
# 6 Results

## 6.1 Individual outcomes

The model (2) is first estimated on the employment status for individuals born after 1953 using different fixed effects and normalising by the effect at 55 years old. Although we cannot test it directly, the parallel trend hypothesis seems plausible for women as the effect is always insignificant before 61 years old when we control for period fixed effects. For men, we find positive and significant effects before the treated age, which could be explained either by a forward-looking behavior or by the interaction with early retirement for long careers. Due to early retirement programs, a significant portion of people are not affected by the reform and in particular men. Therefore, we estimate an impact of 13 points and 5 points respectively for women and men at the age of 61. In comparison, the same estimation in the first cohorts (1950-1952) yields higher effects on employment and less interactions with early career schemes as expected, the detailed of the results are displayed in the appendix (Figure 12). The impact

is lower than the one found in the existing literature but the difference is mainly explained by sample selection.

Figure 4: Impact on the probability to be employed




The model is then re-estimated on a more complete set of labour market statuses. The effect, normalized at age 57, is insignificant for each status until age 61 when we focus on women. For men, the treated group diverges from the control at age 60, especially when we look at employment. The impact on the probability of being in retirement represents the share of individuals who actually postpone their retirement age as a result of the reform: 9% of men and 20% of women for the cohorts considered. Reassuringly, the impact the probability to be employed is the same as the one estimated on the first database, confirming that labour market status categorisation does not affect results.

Among the women affected, almost 60 percent work an extra year, while more than a third experience unemployment. The spillover to unemployment insurance is larger for men (50% of the effect), while the increase in employment accounts for 40% of the probability of retirement. Although the magnitude of the effect is much smaller than that estimated in Rabaté & Rochut (2020), the distribution between alternative labour market statuses looks similar. In particular, they also found an increase in the employment rate that accounts for 40% of the total effect for the 1950 to 1952 cohorts.

The estimated effects on individual income are consistent with the effects on binary outcomes. As expected, labour income and annual unemployment benefits both increase for treated cohorts, while the amount of pension received decreases by around 2000 dollars on average. The total effect on individual revenue is more ambiguous: it should be positive for individuals who work longer but may be negative for those who spend more time out of work. The estimated impact is not significant at 62 years old, but there is a small negative effect at 61 years old for women of 3.6% that does not persist over time.

Figure 5: Impact on the labour market status

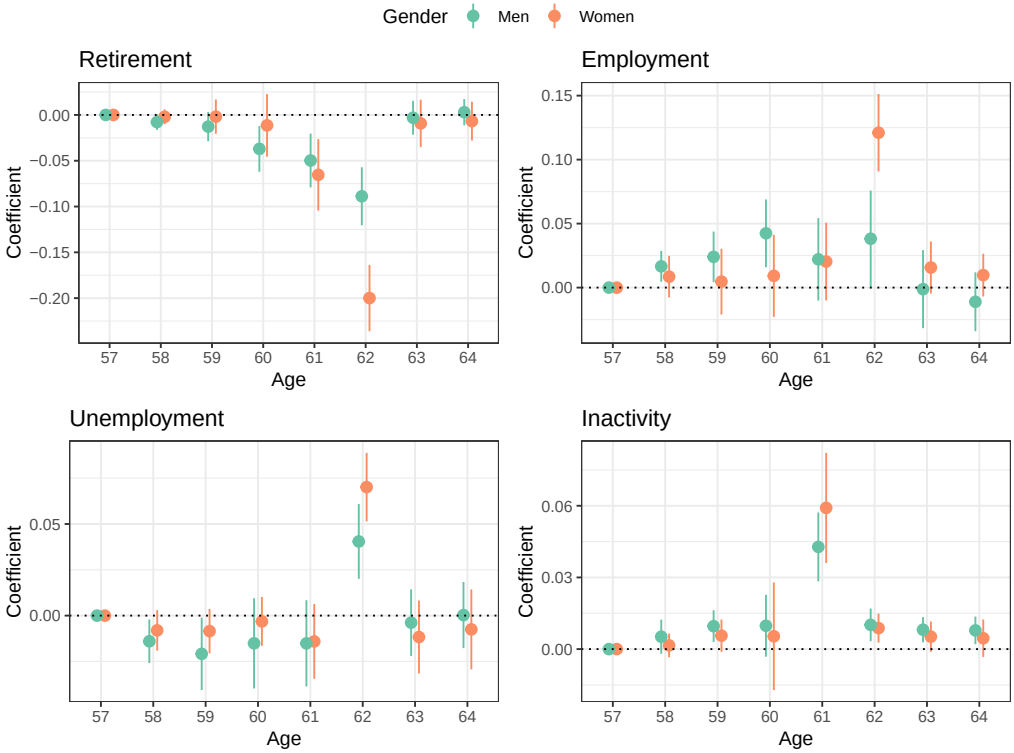
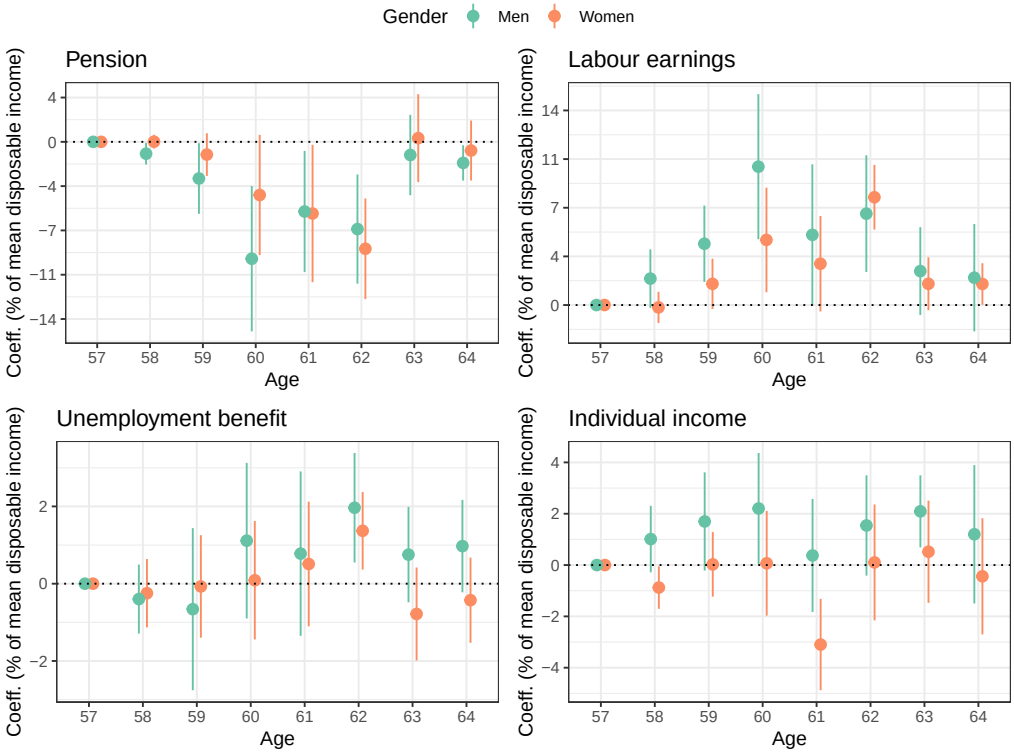


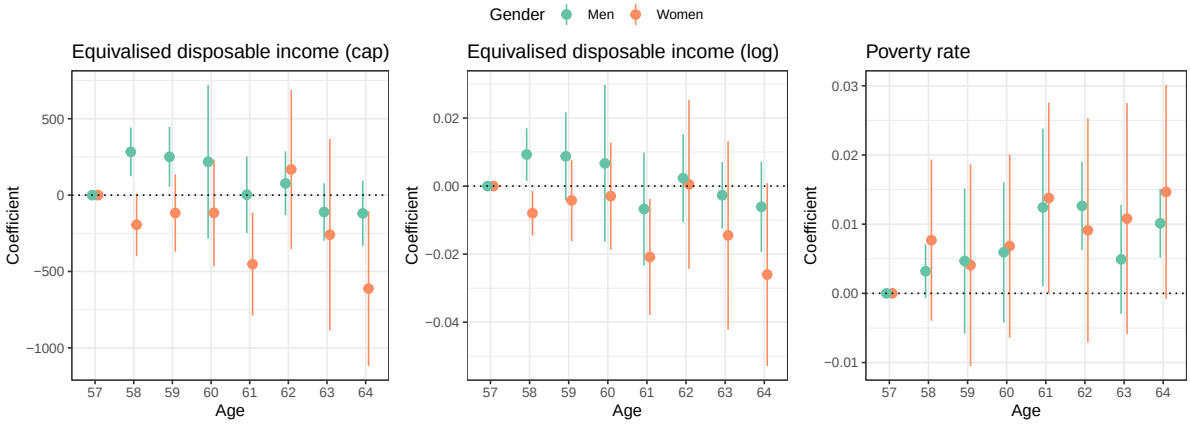

Figure 6: Impact on outcome variables at the individual level



## 6.2 Household income

The richness of our data makes it possible to extend the analysis at the household level. The reform's dynamic impact both on equalised disposable income and poverty rate is depicted in Figure 7. For men, there is no significant impact on disposable income on average, but there is a 2.1 % negative effect on women aged 61 that disappears after that point. The reform also has a positive impact of around 1 percentage point on the relative poverty rate at 61 for both men and women, but this effect is once again not persistent. This last result suggests that the average impact on disposable income masks heterogeneous effects depending on income distribution's position.

Figure 7: Impact on living standard and poverty rate




The difference is due to the fact that men are less affected by the reform for the reasons already mentioned. As a consequence, their reported individual income does not decrease significantly, which has less of an impact on their reported income at household level. Interestingly, the decomposition of the effect at household level in Table 2 shows a positive significant effect on social benefits for men, but not for women. Each social minimum benefit's coefficient is of the expected sign for men, although not significant, while there are all negative, but very close to 0 for RSA and AAH, when we look at women.

Table 2: Decomposition of household income effect at 61

| | Women | | | Men | | |
|---|---|---|---|---|---|---|
| Outcome | Coef. | Norm. coef | Mean control | Coef. | Norm. coef | Mean control |
| **Household income** | | | | | | |
| Pension | -1471.59 (821.223) | -0.08 | 19073.49 | -1689.975* (772.924) | -0.10 | 16736.86 |
| Earnings | 582.265 (517.413) | 0.03 | 18170.72 | 1357.402 (759.667) | 0.06 | 23287.35 |
| Unemployment | 40.46 (340.853) | 0.02 | 2300.83 | 262.404 (264.375) | 0.10 | 2731.91 |
| Reported income | -145.085 (693.382) | 0.00 | 44230.46 | 457.393 (668.015) | 0.01 | 46801.23 |
| **Living standard** | | | | | | |
| Living standard | -53.92 (258.817) | 0.00 | 27061.50 | 147.752 (266.324) | 0.01 | 26587.80 |
| Living standard (log) | -0.021** (0.008) | 0.00 | 10.09 | -0.007 (0.008) | 0.00 | 10.06 |
| Living standard (capped) | -452.387** (153.557) | -0.02 | 26363.47 | 2.568 (113.719) | 0.00 | 25960.23 |
| **Benefits** | | | | | | |
| Social benefits | -44.474 (27.849) | -0.09 | 524.48 | 74.663** (23.696) | 0.11 | 667.15 |
| Minimum benefits | -21.578 (24.905) | -0.08 | 259.46 | 36.149 (24.316) | 0.12 | 309.06 |
| Minv | -21.578** (4.645) | -1.00 | 21.49 | -4.037 (2.783) | -0.23 | 17.22 |
| RSA | -7.178 (11.284) | -0.06 | 130.07 | 21.681 (17.184) | 0.17 | 130.71 |
| AAH | 7.178 (15.546) | 0.07 | 107.91 | 18.505 (13.903) | 0.12 | 161.12 |
| **Poverty** | | | | | | |
| Poverty rate (50%) | 0.016** (0.003) | 0.74 | 0.02 | 0.009* (0.004) | 0.29 | 0.03 |
| Poverty rate (60%) | 0.014* (0.006) | 0.32 | 0.04 | 0.012** (0.005) | 0.22 | 0.06 |

*Note:*
Standard errors in parenthesis, ** significant at the 5% level, * significant at the 10% level
Mean control : average in the control group at the same age
Norm. coef : ratio of the estimated coefficient over the average in the control group at the same age
Number of observations : 139 216 women and 178 176 men

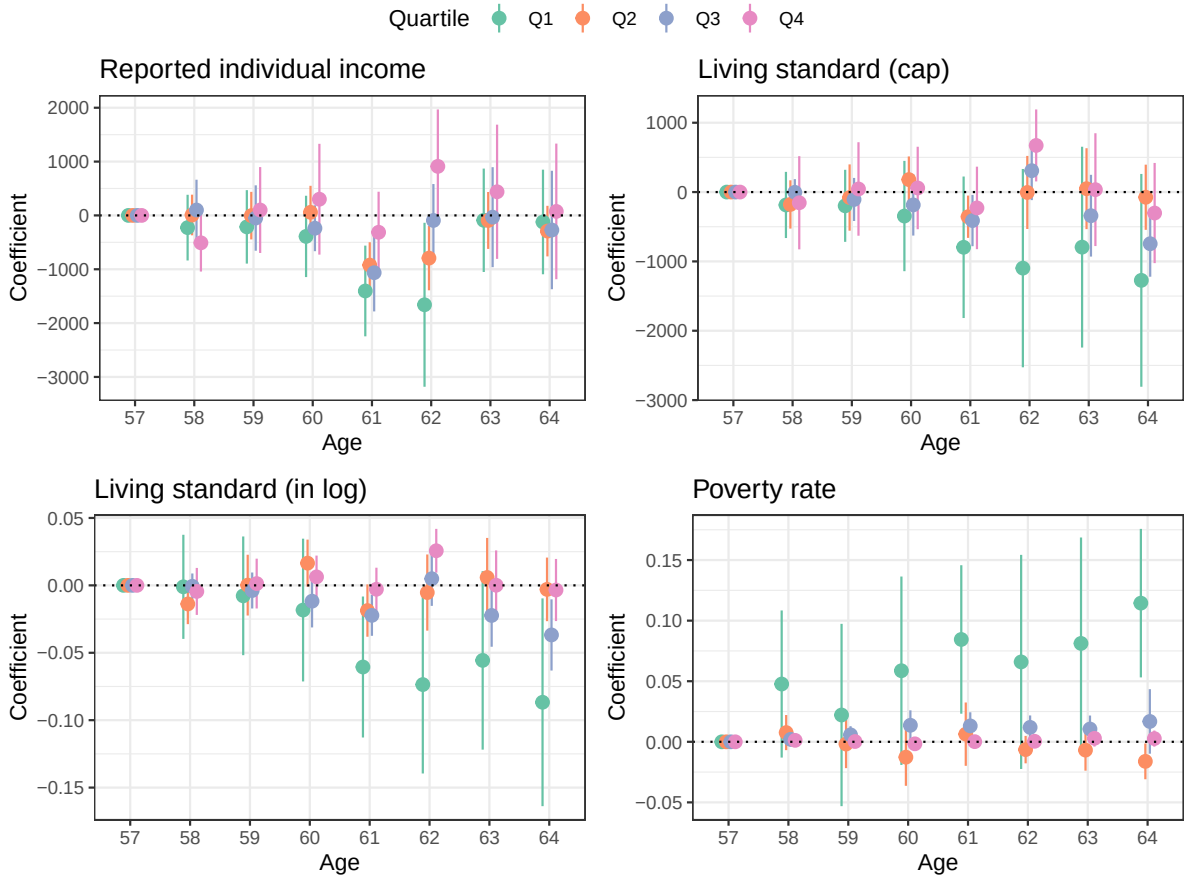
## 6.3 Heterogeneity

As the average results on poverty rates and living standards suggest that the effects of the reform are likely to be heterogeneous, we compare the estimation for different sub-samples, focusing on women, as they are less affected by early retirement for long careers.

### 6.3.1 Distribution of household equalised income

In order to study the effects of the reform beyond the average, the model is therefore estimated separately for individuals in each living standard's quartile, computed on the exhaustive tax data at 57 for each household. Looking first at individual income, women in the bottom of the distribution are relatively more negatively affected. The effect of the reform on living standards also appears uneven: it is not significant for women at the top 50% at 61 and slightly positive at 62 while it decreases by more than 5% for women in the first quartile. In addition, the effect seems to be more persistent for the latter, even if it is only significant at the 10% level due to the lack of statistical power. Finally, the poverty rate increases significantly at the affected age only for the bottom of the distribution.

Figure 8: Impact on living standard and poverty rate per quartile of equalised disposable income - Women




These discrepancies can partially be explained by the different paths taken before retiring as displayed in Table 3. Indeed, the impact of the reform is roughly the same for each group although it is slightly decreasing according to disposable income, but its distribution between alternative labour market statuses is very different. The employment effect's share of total effect is increasing according to the position in income distribution, while inactivity's share goes down. For instance, 83 % affected women at the top of the distribution are employed against 5% in the first quartile. Conversely, the effect on inactivity is only significant for women a the bottom of the distribution, while unemployment represents 75 % of the effect.

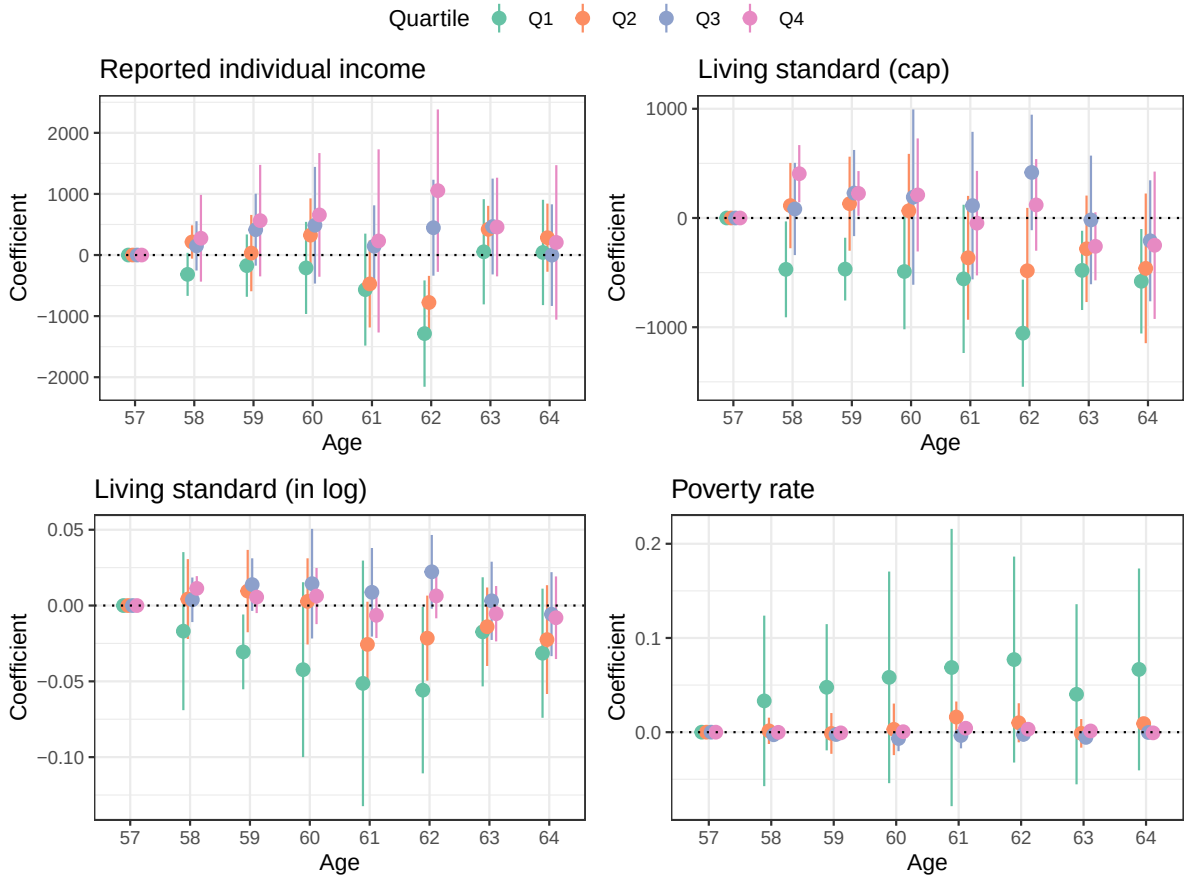
Table 3: Labour status effects per quartile of equalised disposable income - Women

| | Retirement | Employment | Unemployment | Inactivity |
|---|---|---|---|---|
| **Q1** | | | | |
| Coef. | -0.234** (0.036) | 0.012 (0.026) | 0.176** (0.048) | 0.046* (0.021) |
| Mean control | 0.59 | 0.25 | 0.10 | 0.07 |
| Share of total effect | -1.000 | 0.051 | 0.750 | 0.200 |
| N. obs | 13848 | 13848 | 13848 | 13848 |
| **Q2** | | | | |
| Coef. | -0.222** (0.031) | 0.087** (0.018) | 0.123** (0.031) | 0.012 (0.007) |
| Mean control | 0.60 | 0.30 | 0.08 | 0.02 |
| Share of total effect | -1.000 | 0.390 | 0.550 | 0.055 |
| N. obs | 25024 | 25024 | 25024 | 25024 |
| **Q3** | | | | |
| Coef. | -0.197** (0.041) | 0.14** (0.041) | 0.052** (0.018) | 0.006 (0.005) |
| Mean control | 0.62 | 0.28 | 0.09 | 0.01 |
| Share of total effect | -1.000 | 0.710 | 0.260 | 0.029 |
| N. obs | 40944 | 40944 | 40944 | 40944 |
| **Q4** | | | | |
| Coef. | -0.183** (0.02) | 0.151** (0.014) | 0.032** (0.008) | 0 (0.004) |
| Mean control | 0.57 | 0.31 | 0.11 | 0.01 |
| Share of total effect | -1.000 | 0.830 | 0.170 | -0.001 |
| N. obs | 59400 | 59400 | 59400 | 59400 |

*Note:*

Standard errors in parenthesis, ** significant at the 5% level, * significant at the 10% level
Mean control : average in the control group at the same age
Share of total effect : ratio of coefficient over retirment probability's coefficent

Figure 9: Impact on living standard and poverty rate per quartile of equalised disposable income - Men

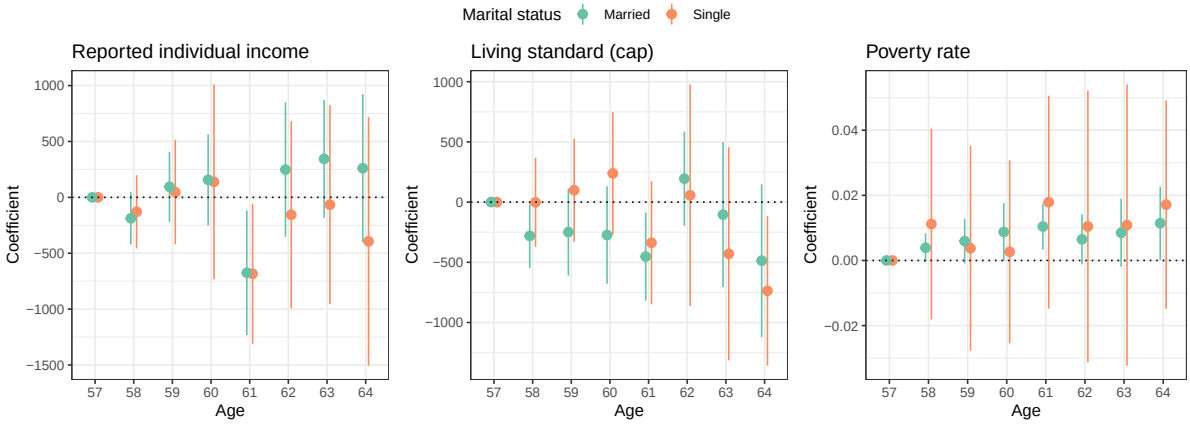



### 6.3.2 Marital status

The model is then estimated separately for single individuals and couples in order to highlight the insurance's role of couples. Although the negative impact on reported individual income before redistribution is similar for the two populations[8], single women are slightly more negatively affected than married women when we compare the impact on equalized disposable income (in logarithm). However, the coefficient is only significant a the 10% level due to sample size reduction.

[8] 3.2% for single women and 3.6% for women in couple

Figure 10: Impact on living standard and poverty rate per marital status - Women




The decomposition of the effect at the household level shows that if the effect on reported income is negative for single women, it is not the case for married women, suggesting that the income of the spouse compensates for decrease in individual income. The impact on equalised disposable income is still negative for both groups and relatively higher for married women, but the relative impact is larger for singles when we compare living standard in logarithm.

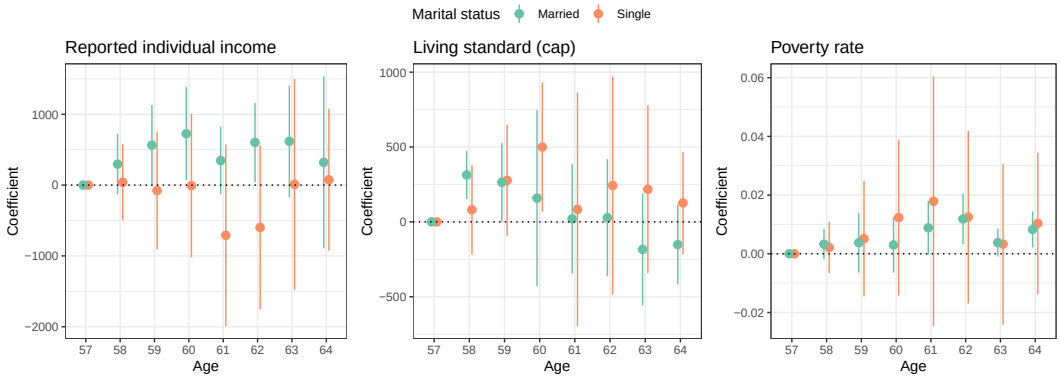
Table 4: Effect on household income per marital status at 61

| | Single | | | Married | | |
|---|---|---|---|---|---|---|
| Outcome | Coef. | Norm. coef | Mean control | Coef. | Norm. coef | Mean control |
| **Individual income** | | | | | | |
| Reported income (ind.) | -683.828** (284.826) | -0.03 | 21496.65 | -674.575** (253.158) | -0.04 | 18523.05 |
| **Household income** | | | | | | |
| Pension | -1631.559** (524.843) | -0.17 | 9606.39 | -1446.703 (1017.678) | -0.06 | 24362.74 |
| Earnings | 495.302 (614.166) | 0.03 | 16650.76 | 933.76 (712.393) | 0.05 | 19778.98 |
| Unemployment | 248.453 (192.558) | 0.12 | 2056.92 | -46.584 (433.218) | -0.02 | 2483.87 |
| Reported income | -345.194 (688.506) | -0.01 | 30880.03 | 349.188 (720.772) | 0.01 | 52677.09 |
| **Living standard** | | | | | | |
| Living standard | -378.844 (310.119) | -0.02 | 23105.70 | 242.024 (376.92) | 0.01 | 29470.17 |
| Living standard (log) | -0.023* (0.013) | 0.00 | 9.93 | -0.018** (0.007) | 0.00 | 10.18 |
| Living standard (capped) | -337.817 (232.179) | -0.01 | 22843.72 | -452.487** (166.097) | -0.02 | 28480.64 |
| **Benefits** | | | | | | |
| Social benefits | 24.819 (58.305) | 0.03 | 834.70 | -90.563* (42.043) | -0.26 | 352.26 |
| Welfare benefits | 8.262 (38.548) | 0.02 | 365.75 | -34.086 (27.029) | -0.17 | 199.70 |
| **Poverty** | | | | | | |
| Poverty rate (50%) | 0.026** (0.01) | 0.61 | 0.04 | 0.009** (0.003) | 0.97 | 0.01 |
| Poverty rate (60%) | 0.018 (0.015) | 0.20 | 0.09 | 0.01** (0.003) | 0.52 | 0.02 |

*Note:*

Standard errors in parenthesis, ** significant at the 5% level, * significant at the 10% level
Single women : 43 683 observations
Married women : 85 262 observations

Figure 11: Impact on living standard and poverty rate per marital status - Men




# 7 Conclusion

TBC

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# A Appendix

Table 5: Number of individuals par cohort and per age in fiscal data

| | Women | | | | | | Men | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 |
| 57 | 0 | 0 | 0 | 5289 | 6006 | 6107 | 0 | 0 | 0 | 7004 | 7706 | 7562 |
| 58 | 0 | 0 | 5462 | 5289 | 6006 | 6107 | 0 | 0 | 7417 | 7004 | 7706 | 7562 |
| 59 | 0 | 5442 | 5462 | 5289 | 6006 | 6107 | 0 | 7228 | 7417 | 7004 | 7706 | 7562 |
| 60 | 5656 | 5442 | 5462 | 5289 | 6006 | 6107 | 7880 | 7228 | 7417 | 7004 | 7706 | 7562 |
| 61 | 5656 | 5442 | 5462 | 5289 | 6006 | 6107 | 7880 | 7228 | 7417 | 7004 | 7706 | 7562 |
| 62 | 5656 | 5442 | 5462 | 5289 | 6006 | 6107 | 7880 | 7228 | 7417 | 7004 | 7706 | 7562 |
| 63 | 5656 | 5442 | 5462 | 5289 | 6006 | 6107 | 7880 | 7228 | 7417 | 7004 | 7706 | 7562 |
| 64 | 5656 | 5442 | 5462 | 5289 | 6006 | 6107 | 7880 | 7228 | 7417 | 7004 | 7706 | 7562 |
| Observations | 28280 | 32652 | 38234 | 42312 | 48048 | 48856 | 39400 | 43368 | 51919 | 56032 | 61648 | 60496 |

Figure 12: Impact on the probability to be employed for the first affected cohorts