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Pension reforms, older workers' employment and the role of job separation and finding rates in France

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Abstract. The paper aims to evaluate the effect of French pension reforms enacted since 2009 on labour market outcomes for male workers aged 55-59 years. These reforms have mainly consisted in an increase in the insurance duration to draw a pension at full rate and a rise in legal retirement age. We examine first how employment rates by age for workers aged 55-59 evolve before 2009 (cohort of workers born in 1948) and afterwards (cohort of workers born in 1954) using the French Labour Force Survey. So we look at upstream effects of pension reforms on labour force participation at earlier ages through a horizon effect. Then, we examine the relative contribution of job separation and finding rates to the employment dynamics at the end of career using the « All But One Change » (AB1C) method suggested by Choi et al., 2015. We highlight the dominant role of job finding rate in accounting for the strong increase in employment rates among workers aged 55-59 observed after the reforms. This effect is particularly high for the sub-sample of male workers who were not eligible to any early retirement scheme.

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1 Introduction

In all European countries, aging jeopardizes the sustainability of Pay-As-You-Go (PAYG) systems. In France, the population dependency ratio was 23.7% in 2012 and is expected to reach 50% in 2050. Faced with this demographic issue, many European countries chose to extend the working life duration by raising the legal retirement age. Recent evaluations show that this policy has positive effects on older workers employment via the postponement of their retirement decision (Staubli and Zweilmüller, 2013 for Autria, Cribb et al., 2013 for the UK, and Dubois and Koubi, 2015 or Rabaté and Rochut, 2017 for France, Vestad (2013) for Norway). Yet, one frequently ignored aspect of this policy is its upstream positive impact on employment at earlier ages through the distance to retirement effect. Delaying the working horizon (the retirement age) of workers could also improve employment of workers at earlier ages. This aspect of the policy could be particularly interesting to study as, in most European countries, we observe a drop in employment rate several years before the legal retirement age. France exemplifies this phenomenon : in France, in 2003, only 53% of workers between 55 and 59 years old were employed whereas the legal retirement age were 60 years old at this date. In theory, this effect called the horizon effect comes from the fact that, to the extent that there are search frictions on the labour market, the return on jobs is determined by their expected duration (Seater, 1977, Bettendorf and Broer, 2003). Therefore, as workers get closer to their working horizon (their retirement age), the return on job-related investments decreases. This affects both the job finding rate since the return of job search and therefore the workers' search effort gets smaller (Hairault et al., 2010), Ljungqvist and Sargent, 2010) and the job separation rate since as the value of the jobs decrease as the horizon (the legal retirement age) gets closer, firms can choose to dismiss seniors first after a shock (Hairault et al., 2012, Langot and Moreno-Galbis, 2012).

In this paper, we choose to test empirically this horizon effect on employment. To isolate the horizon effect, we exploit recently implemented reforms in France that present both a postponement of the legal retirement age and an increase in the number of contributive quarters. These policies delay the working horizon of workers by two years. Then, we study the respective contribution of both the re-entry into employment and the job separation to the change in employment rate due to the horizon lengthening. This paper allows to quantify the magnitude of the horizon effect on employment rate among the workers aged 55-59 years old. The stakes are important : for instance, if the horizon effect is quantitatively low, policies aiming at postponing the retirement age can become pointless. Besides, whether the effect of horizon mainly goes through the job

separation or the re-entry into employment is a useful knowledge for policy makers who search to raise older workers' employment.

Our study is related to a growing literature analysing the unemployment dynamics between outflows and inflows (Choi et al., 2015 ; Elsby et al., 2008 ; Hairault et al., 2015 ; Petrongolo and Pissarides, 2008 ; Shimer, 2012). Our empirical study applies this approach to a policy evaluation in order to isolate one particular effect : the horizon effect. Even if the literature examines the contribution of transition rates to unemployment dynamics, in this paper, it seems more relevant to investigate employment changes given the institutional context for older workers in many European countries. In these countries, the unemployment insurance is usually more generous for older workers both in level and duration. Besides, the eligibility criteria to unemployment insurance are often less strict for them. In most cases, pensions are lower than unemployment insurance benefits and compensated unemployment is taken into account in contribution record required to receive a full retirement pension. Therefore, there is good reason to suspect that unemployment insurance can be used as a pathway to retirement for older workers (Garcia-Perez and Sanchez-Martin, 2014, 2015 ; Hairault et al., 2012 ; Lammers et al., 2013 ; Giesecke and Kind, 2013). In this context, the frontier line between unemployment and inactivity is somewhat blurred, we therefore choose to focus on employment and on transitions from and to employment. Using the French Labour Force Surveys from 2003 to 2013, we examine the labour market outcomes of two cohorts of workers between 55 to 59 years old. The first cohort is born in 1948 and is affected by none of the two reforms. The second cohort is born in 1954 and is affected by the two reforms. The workers of these two cohorts, despite close in terms of birthdate, face therefore a very different institutional context. We find that the global effect of these two policies is a rise in employment rate. To investigate the channels by which they affect employment, we use the « All But One Change » (AB1C) method proposed by Choi et al. (2015). Following this method, we assess labour market transitions between employment and non employment, in which we merge unemployment and inactivity, for the two cohorts between 55 and 59 years old. Then we fix only one transition rate to its value after the implementation of the policies (second cohort), leaving the other at its value before the implementation (first cohort) and compute employment rates of workers between 55 and 59 years old in this fictive world. The aim of this method is to find out whether the change in employment results more from the change in job termination or re-entry into employment decision.

Our main findings put forward the importance of re-entry into employment in explaining the strong increase in employment rates observed before and after 2009 for workers aged 55-59 years. This result echoes the recent study of Choi et al., 2015 that shows that the low seniors' employment rate is mainly explained by the low re-entry rate into employment of the older unemployed. The negative effect of the working horizon can therefore explain the low re-entry rate into employment of older workers. Looking at heterogenous effects of the reforms on older workers' employment by exit age from the schooling system [1], we find that this holds only for workers who left the schooling system at 18 or over and who are therefore not eligible to any long-career-based early retirement scheme. In contrast, for workers who may be entitled to these early retirement schemes, the main part of the increase in employment rates before and after 2009 is explained by the sharp reduction of job separation rates at 56 and 57 as early retirement age has also increased over the period. Quantitatively, the upstream effect of the pension reforms, which delay the working horizon by two years, is strong : the employment rate of workers aged 59 years old and not eligible to the early retirement scheme has raised by about 15 percentage points.

The remainder of the paper is structured as follows. In the second section of this paper, we present the institutional context. The third section presents the results induced by the AB1C method, and the fourth section presents some robustness analysis. The fifth section concludes.

2 Institutional Context

In France, the computation of the pension benefits depends on two key parameters : the minimum age at which one claim a pension and the age at which workers can draw a pension at full replacement rate. Both parameters have been changed by recent reforms. We present in this section the reform that raised the legal retirement age and the reform that increased the number of required contributive quarters to obtain a pension at full rate. We also present the institutional context for older workers in France.

1. The latter is particularly important in determining retirement behaviour, given that retirement decision in France is mainly driven by the age at which individuals can draw a pension at full replacement rate, depending on the number of contributive years (Hairault et al., 2010). In addition, for individuals who started working at 17 or earlier, a specific long-career-based early retirement scheme allows to draw a pension at full rate before the legal retirement age.

2.1 The increase in the legal retirement age and in the number of contributive quarters required to obtain full pension

The Sarkozy reform is voted in 2010 yet comes into force in 2011. Before 2011, the legal retirement age was 60 years old and the age at which workers get their full pension whatever the number of contributed quarter was 65 years old. These two ages have been progressively raised, with one additional quarter for each cohort born after 1950 to reach 62 years old in 2018 of the legal retirement age and 67 in 2023 for the full pension age. Table 1 presents this progression :

TABLE 1 – The Sarkozy Reform

Birth cohort	**Legal retirement age**	**Full pension age**
1950	60 years old	65 years old
1951	60 years old + 4 months	65 years old + 4 months
1952	60 years old + 8 months	65 years old + 8 months
1953	61 years old	66 years old
1954	61 years old + 4 months	66 years old + 4 months
1955	61 years old + 8 months	66 years old + 8 months
1956	62 years old	67 years old

Lecture : Workers born in 1953 are allowed to retire at the age of 61 and get their full pension whatever their contribution to the pension system at 66.

This reform is combined with the Fillon reform, enacted in 2003, that gradually increased the number of required contributive quarters to obtain a pension at full replacement rate. Before 2008, 160 quarters (40 years) of contribution were required to draw a full pension. This reform raises gradually this duration to 164 quarters (41 years) in 2012 (for cohorts 1952) and then to 166 quarters for workers born in 1955 and later. Table 2 depicts this progressive change. Besides, the Fillon reform significantly increased the full rate insurance duration for civil servants from 2003.

The early retirement scheme. The Fillon reform also introduced a long-career-based early retirement scheme that allows individuals who started working at 17 or earlier to retire earlier than the normal retirement age, provided that they contributed to the pension system 2 years more than the number of required years to draw a full pension. Initially, individuals who started

Table 2 – The Fillon Reform

Birth cohort	**Required contributive quarters**
1948	160
1949	161
1950	162
1951	163
1952	164
1953-1954	165
1955	166

Lecture : Workers born in 1950 need to contribute 162 quarters to be allowed to receive their full pension

working at 14 could retire at 56 if they had sufficient number of contributed years. The Sarkozy reform raised this early retirement age from 56 to 58 but enlarged the access to the early retirement scheme pathway to individuals who started working at 18 and earlier. It also makes eligibility criteria stricter by removing the possibility for workers of buying-back pension quarters missed to be eligible to the scheme.

The presentation of these different measures justify our choice of cohorts. Indeed, workers in the private sector born in 1948 are affected by none of the reforms. By contrast, workers born in 1954 are affected by the increase in the legal retirement age (from 60 to 61 years old + 4 months, and from 56 to 58 years old for those who started working at 14 or 15) and in the number of contributive quarters required to obtain a full pension (from 160 to 165).

2.2 Institutional context for older workers

In France, unemployment insurance rules are particularly favorable, especially to older workers. For all workers, the level of benefits is determined by previous wages with a good replacement rate : on average unemployment insurance recipients get 69% of their previous net salary and the maximum benefit is more than 6000 euros (Unedic, 2013). Potential benefit duration depends on the worker's previous work history and age at the date of job termination. This duration is quite long compared to many other countries : the maximum benefit duration is 3 years for workers

above 50. Job search monitoring is quite low, up to 2008, seniors aged over 57,5 at the time of job loss were even granted an official exemption from active job search. This exemption can also concern senior unemployed workers aged over 55 who have exhausted their unemployment insurance rights and have limited resources or have contributed at least 160 quarters to the pension system. In 2009, the access to this exemption has been gradually cancelled. This removal could affect our sample in particular from the age of 57,5. Yet, as the job search monitoring in France remains very low for unemployed workers, even without job search exemption, its effect should remain small.

3 Data and descriptive statistics

3.1 The data

We compute worker flows using French Labour Force Surveys (FLFS hereafter) from 2003 to 2013. From 2003, in the FLFS, each individual is surveyed each quarter, six quarters in a row. However, in our study, we compute transition rates for individuals surveyed in two consecutive quarters rather than 6. This allows us to have a larger sample at each age and for each cohort studied. Contrary to Choi et al., 2015, we measure quarterly labour force transitions rather than monthly ones. While Hairault et al., 2015, consider monthly flows from the FLFS using the retrospective survey, we depart from their approach, considering that infra-quarterly transitions are less frequent in the end of career. Besides this choice is convenient since the unit of time used for retirement policies is the quarter. As we do not use retrospective data, we do not need to correct for a potential recall bias. As the quarterly survey of the FLFS only started in 2003, we do not know the workers' status in the last quarter of 2002. As we need the previous status to compute transition rates, our study only starts at the second quarter of 2003, that is for the 1948 cohort at 55 years old and 2 quarters and the same for the 1954 cohort. We exclude women from our sample, considering that their retirement choices are more driven by their husbands' retirement incentives [2] and restrict our study to male whose current or last job was in the private sector.

We follow the Choi et al., 2015's approach, adopting the same notations. We match individuals

2. This gender asymmetry in the responsiveness of retirement behavior of one spouse to the retirement choice of the other is obtained in a number of studies, see for instance Gustman and Steinmeier, 2000 ; Coile, 2004 or Bingley and Lanot, 2007.

across two consecutive quarters based on the interview identification number. In each quarter t, individuals are employed (E) or not employed (N). We define a dummy D_{it}^{XZ} equal to one if the individual i has transitioned from status $X \in \{E, N\}$ in $t-1$ to $Z \in \{E, N\}$ in t. We average these indicator variables for each quarter t for each age $a \in \{55; 59\}$ and for each cohort $c \in \{1948; 1954\}$. Let $\Upsilon(a, t, c)$ be a dummy variable that indicates whether the individual is observed in quarter t, belongs to cohort c and is a years old. We define the corresponding worker flows in the following way :

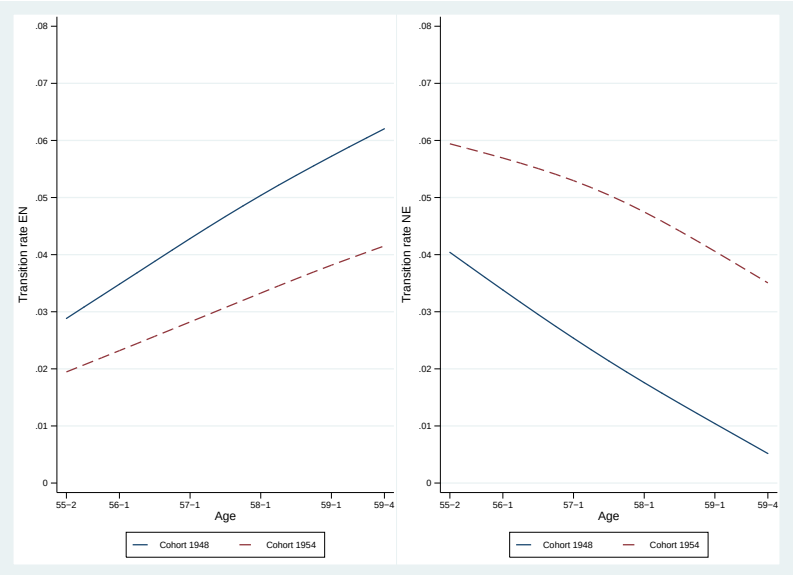
$$f_{atc}^{XZ} = \frac{\sum_{i=1}^{n} D_{it}^{XZ} \quad \Upsilon(a,t,c)}{\sum_{i=1}^{N} D_{it}^{X} \quad \Upsilon(a,t,c)}$$

where D_{it}^{X} equals 1 if the individual was in state X in $t-1$. For expositional reasons, for a given cohort c, for a given age a and a given quarter t, we denote XZ, with $X \in \{E, N\}$ and $Z \in \{E, N\}$, the quarterly transition rates from state X to state Z.

We now provide some descriptive statistics to show the differences between the cohorts 1948 and 1954. We represent the transition rates and the employment rates by age and by cohort in respectively Figure 1 and Figure 2. As in Shimer, 2012 and Hairault et al., 2015, we detrend the series of transition rates and employment rate using a HP-filter. For each type of transition, the blue solid line stands for the transition rates for workers born in 1948 and the red dashed line corresponds to transition rates of workers born in 1954.

In Figure 2, we observe a sharp increase in employment rates at each age before and after 2009. This suggests that the reforms that have lengthen the working horizon over this period has led to a rise in employment among workers aged 55-59 years. This effect is not homogenous according to the workers' age. Workers close to the age of 60 have experienced a larger rise in employment rate after the lengthening of this horizon. Employment rate at 55 and two quarters almost did not react to the lengthening of the horizon, whereas the employment rates of the 59 and four quarters has raised by more than 10 percentage points. Figure 1 shows that the increase in employment is explained by both a decrease in the separation rate and an increase in the re-entry rate into employment. Indeed, the job separation rate is significantly higher at each age for the 1948 cohort than for the 1954 cohort and the re-entry into employment lower. Besides, there again, the effect of the reforms seem stronger as workers get close to the horizon. At 55 and two quarters, job separation rate decreased by 1 percentage point and re-entry to employment rate raised by 2 percentage points when at 59 and four quarters, job separation rate decreased by 2 percentage points and re-entry rate raised by 3 percentage points.

FIGURE 1 – Gross HP-filtered quarterly workers flows from age 55 to age 59 for male workers born in 1948 and in 1954



Note : Transition rates XZ, with $XZ \in \{EN, NE\}$ correspond to the frequency of transition from state X to state Z at each age and each quarter. E stands for employment and N stands for non-employment that includes unemployment and inactivity.

Lecture : The quarterly transition rate from employment to non-employment at age 55 between the first and the second quarter (55-2) is around 2.9% for the cohort 1948 and 2% for the cohort 1954.

Source : French Labor Force Surveys (2003-2013)

4 Empirical strategy and results

4.1 Markov Chain Analysis

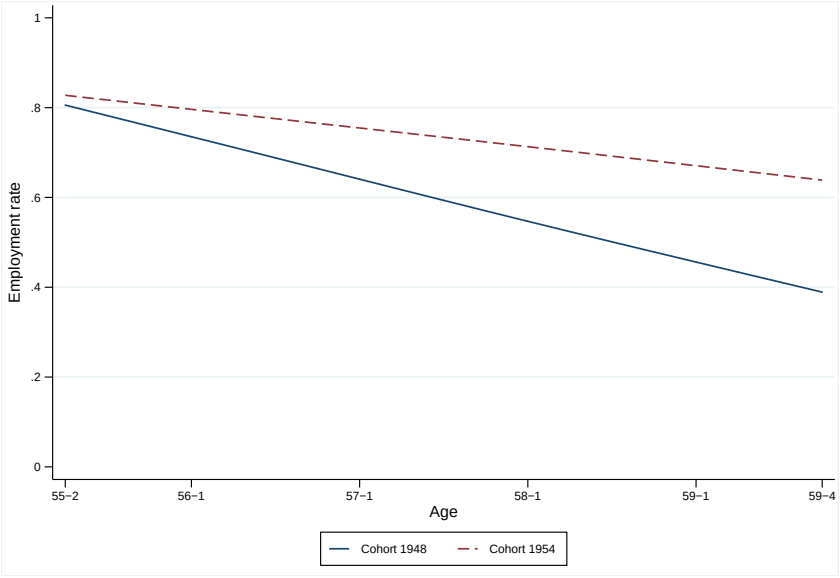
We follow the Choi et al.'s, 2015 method to measure the contribution of each worker flows to the explanation of the observed increase in employment rates before and after 2009. We construct age- and cohort-specific Markov transition matrices denoted Γ_a^c. We denote S_{55-2}^c the matrix corresponding to initial conditions on the distribution of workers among labour statuses at age 55 for each cohort c, with $c \in \{1948; 1954\}$.

$$S_{55-2}^c = \begin{pmatrix} E_{55-2}^c \\ N_{55-2}^c \end{pmatrix}$$

Then we compute the predicted labour market states one quarter after as

$$S_{55-3}^c = \Gamma_{55-2}^c \times S_{55-2}^c \quad \text{with} \quad \Gamma_{55-2}^c = \begin{pmatrix} EE_{55-2}^c & EN_{55-2}^c \\ NE_{55-2}^c & NN_{55-2}^c \end{pmatrix}$$

FIGURE 2 – Quarterly HP-filtered employment rates from age 55 to age 59 for male workers born in 1948 and in 1954



Lecture : The employment rate observed at age 55 during the second quarter (55-2) is around 80% for the cohort 1948 and 82% for the cohort 1954. At age 59 during the fourth quarter (59-4), these rates drop respectively to 40% and 63%.
Source : French Labor Force Surveys (2003-2013)

And one year after as

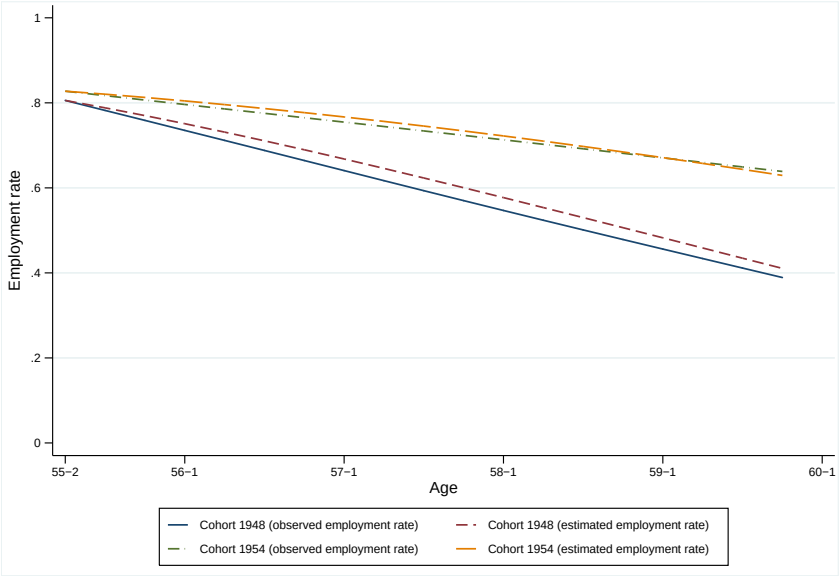
$$S^c_{56-2} = \Gamma^c_{56-1} \times \Gamma^c_{55-4} \times \Gamma^c_{55-3} \times \Gamma^c_{55-2} \times S^c_{55-2}$$

We compare the computed employment rates ($e^c_a = \frac{E^c_a}{E^c_a + N^c_a}$) to the observed employment rates for each cohort from age 55 to age 59. This quarterly employment rate is computed among workers whose labour market state is known in the next period. So, using the distribution of workers among labour markets states in the previous quarter and the quarterly transition rates, we can not exactly replicate the observed employment rate. Nevertheless, we see in figure 3 that this approach allows us to fit remarkably well the employment profiles at older ages for each cohort.

4.2 The AB1C approach

We can perform decomposition analysis to identify which worker flows generates the observed differences in employment rates between workers born in 1948 and those born in 1954. In this goal, we use the Choi et al.'s AB1C (All But One Change) method. It consists in estimating a counterfactual difference in employment rates obtained if all transition probabilities had remained

FIGURE 3 – Observed and estimated quarterly employment rates from age 55 to age 59 for both cohorts 1948 and 1954



Lecture : For the cohort 1954, the observed employment rate at 59 during the fourth quarter (59-4) is 63.9% while its counterpart estimated with our Markov Chain analysis is 62.9%. For the cohort 1948, at the same age and during the same quarter, the observed employment rate is 38.9% and the estimated one is 41.1%. For both cohorts, the difference between the observed and the estimated employment rate does not exceed 2.2 percentage points.

Source : French Labor Force Surveys (2003-2013)

invariant before and after 2009 except for one. We implement this method, fixing all transition probabilities but one at their values for cohort 1948 in our transition matrices. We consider that the "varying" transition probability is important in generating the difference in employment rates between both cohorts if the counterfactual estimated difference is close to the observed employment rate gap by age across cohorts.

We present in figure 4 the results of the AB1C method. We depict the 2 counterfactual employment differences and the observed difference between employment rates for the cohort 1954 and those for the cohort 1948 by age. We can see from these counterfactual differences that up to age 58 and four quarters, better replicates of the observed employment gap (solid blue curve) are obtained by changing only the EN transition rate (red dashed curve). It would mean that the decrease in separation rates observed between the two cohorts between 55 and two quarters and 58 and four quarters strongly explains their different employment rates. Yet, over the last year (between age 58 and four quarters and age 59 and four quarters), better replicates of the obser-

ved employment gap are obtained by changing only the NE transition rate (green dash-dotted curve). It would mean that the increase in job finding rates observed between the two cohorts better explain the rise in employment rates at ages close to the previous legal retirement age.

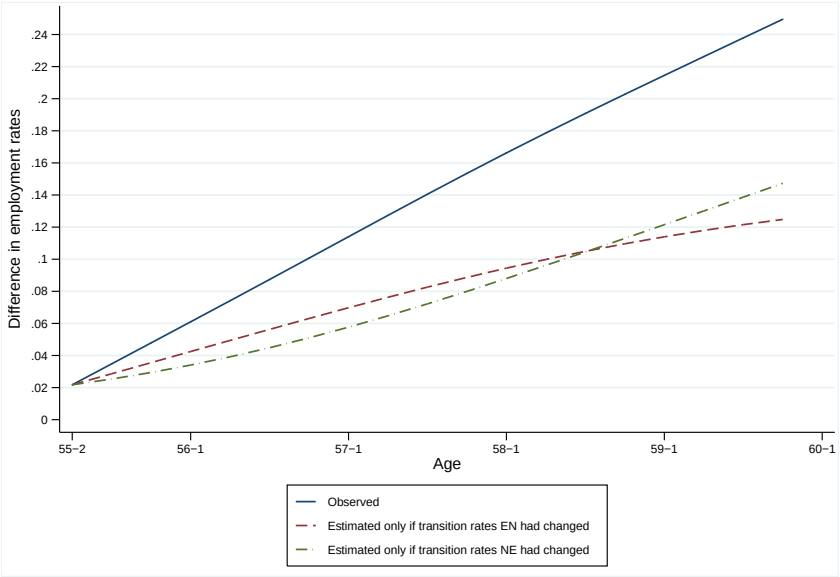
The limit of this study is the heterogeneity of the horizon of workers. Indeed, for the 1948 cohort, workers eligible to the long-career-based early retirement scheme could retire at 56 when workers not eligible to this scheme have to wait until 60. Similarly, for the 1954 cohort, workers eligible to this early retirement scheme could retire at 57 and one quarter when workers not eligible to this scheme have to wait until 62. When we study the employment rate of the 55-59 of these two cohorts, we therefore capture the effect of lengthening of the horizon of the non eligible individuals, but also the change in job separation induced directly by postponing early retirement age for the eligible ones. The effect we observe for the eligible ones is therefore not the upstream effect of the retirement policy but the retirement policy itself. In order to capture the upstream effect of the lengthening of the horizon, we therefore need to distinguish these two populations.

4.3 Analysis by eligibility to the long-career-based early retirement scheme

We compare workers of both cohorts having started working before 18 and those having started working at 18 or later. We know that the latter group of workers are not entitled to the long-career-based early retirement scheme. For both cohorts, they account for nearly half of the population of male workers in the private sector aged 55-59 years old. This means that the other half of this sample is potentially eligible to the long-career-based early retirement scheme.

We see in Figure 5 that the rise in employment rates before and after the pension reforms is strongly higher for workers having left the schooling system at 17 or earlier. This group of workers is potentially concerned by the long-career-based early retirement scheme and by the shift of the early retirement age from 56 to 58 in 2010. This shift is illustrated in Figure 6 that represents transition rates for workers of cohorts 1948 and 1954 by exit age from schooling system. Looking at workers who exit schooling before 18, we observe that the separation rate falls at age 56 before and after the reforms but then strongly increases at age 58, the new early retirement age after 2010.

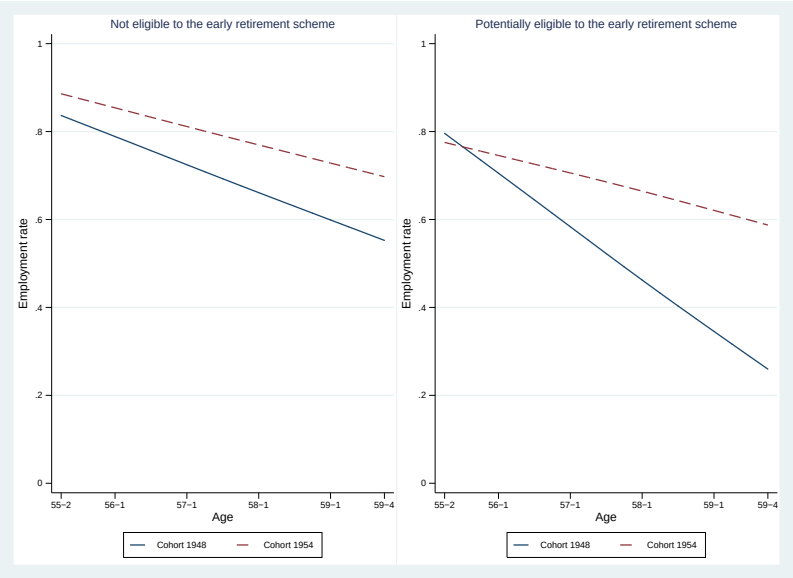
FIGURE 4 – Estimated difference in employment rates between the cohorts 1948 and 1954 using AB1C decomposition method



Lecture : If only the transition rate from employment to non-employment had changed between the cohorts 1948 and 1954, the counterfactual difference in employment rates (red dashed curve) at age 59 during the fourth quarter (59-4) between workers born in 1948 and those born in 1954 would be 12 percentage points. The corresponding observed difference (blue solid curve) is strongly higher (around 24.5 percentage points).
Source : French Labor Force Surveys (2003-2013)

We perform the same decomposition analysis as in the previous sub-section using the AB1C approach and we present the results in Figure 7. For individuals potentially eligible to the long-career-based early retirement scheme, the sharp increase in employment rates before and after 2009 is mainly explained by the decrease in job separation rates. By contrast, for individuals not eligible to this early retirement scheme, job finding rates have a strongly higher explanatory power. As upstream effects of pension reforms through the horizon effect concerns the latter sub-sample, this may suggest that the main channel of the horizon effect passes through job finding rather than through job separation rates. This is in line with the main result of Choi et al., 2015 that highlights the dominant role of low re-entry rates into employment to explain the low senior's employment rate.

FIGURE 5 – Quarterly HP-filtered employment rates from age 55 to age 59 for male workers born in 1948 and in 1954 according to their potential eligibility to the long-career-based early retirement scheme



Lecture : The employment rate observed at age 55 during the second quarter (55-2) for male workers not eligible to the long-career-based early retirement scheme (left panel) is around 83.7% for the cohort 1948 and 88.6% for the cohort 1954. At age 59 during the fourth quarter (59-4), these rates drop respectively to 55.2% and 69.7%.
Source : French Labor Force Surveys (2003-2013)

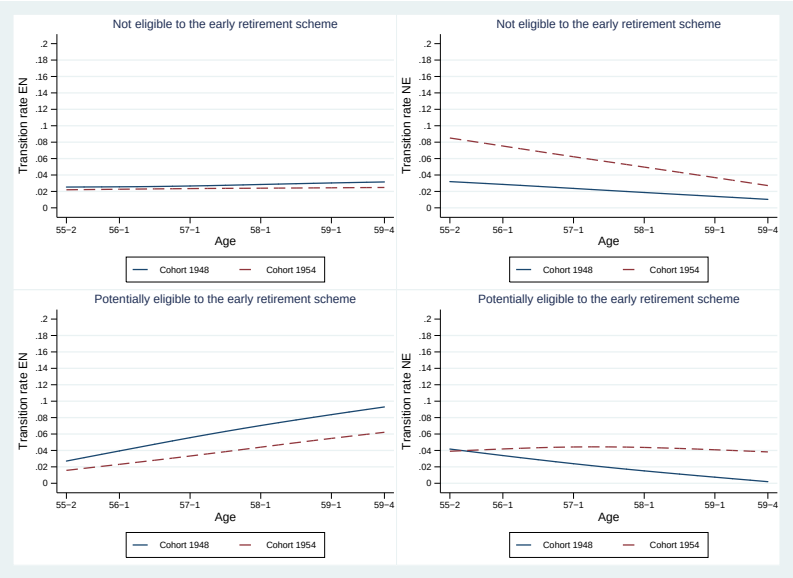
5 Robustness

For this section, we restrict our study to the sub-sample of male workers, whose current or last job was in the private sector, that are not eligible to the early retirement scheme, since this sub-sample allows us to better capture the horizon effect.

5.1 Looking at explanatory power of initial conditions

In Choi et al. (2015), the mass of workers affected by the transition rates is constantly evolving over the life-cycle, with an initial condition where no workers are employed. As we choose to focus on older workers' employment, in our case, the initial condition is the employment rate at 55 that can differ between the two cohorts. Therefore, one could argue that differences in employment rates before and after 2009 can also come from different initial employment rates at 55. Looking at employment rate curves, we can see that employment rate is slightly higher at age 55 for cohort 1954. However, the employment profile for the cohort 1948 becomes sharply steeper from age 55

FIGURE 6 – Gross HP-filtered quarterly workers flows from age 55 to age 59 for male workers born in 1948 and in 1954 according to their potential eligibility to the long-career-based early retirement scheme



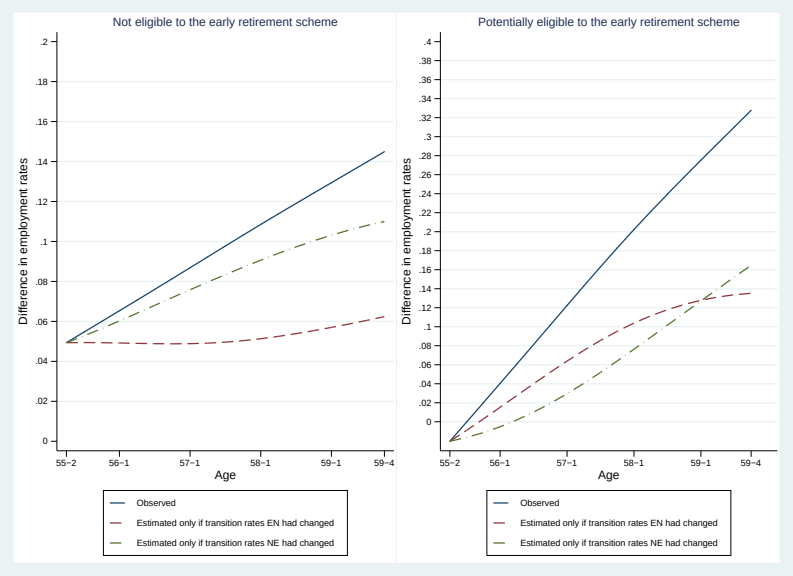
Note : Transition rates XZ, with $XZ \in \{EN, NE\}$ correspond to the frequency of transition from state X to state Z at each age and each quarter. E stands for employment and N stands for non-employment that includes unemployment and inactivity.

Lecture : The quarterly transition rate from employment to non-employment at age 55 between the first and the second quarter (55-2) for male workers not eligible to the long-career-based early retirement scheme (left panel) is around 2.5% for the cohort 1948 and 2.2% for the cohort 1954.

Source : French Labor Force Surveys (2003-2013)

to 59. This would suggest a strong explanatory power of transition rates rather than of initial conditions. To illustrate this point, we represent in figure 8 the estimated employment rates for cohort 1954, starting first from the same distribution of workers among labour market states as for cohort 1948 (blue solid curve) and then fixing the age-specific transition rates to their values for the cohort 1948 (red dashed curve). As expected, we can see that the blue solid curve allows to replicate the slighter decrease in employment rates for cohort 1954. In contrast, when fixing age-specific transition rates, we can not obtain the significant difference in employment rates between the two cohorts.

FIGURE 7 – Estimated difference in employment rates between the cohorts 1948 and 1954 using AB1C decomposition method according to the potential eligibility to the long-career-based early retirement scheme

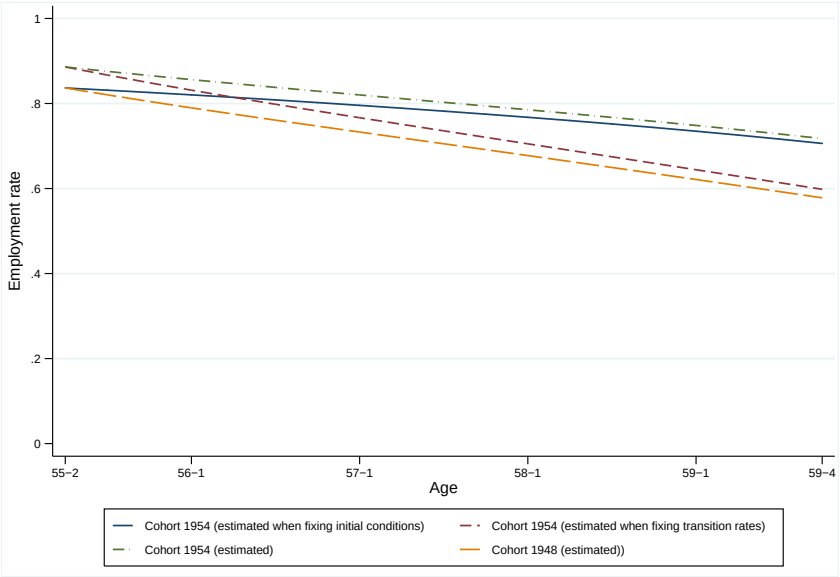


Lecture : If only the transition rate from employment to non-employment had changed between the cohorts 1948 and 1954, the counterfactual difference in employment rates for male workers not eligible to the long-career-based early retirement scheme (red dashed curve in the left panel) at age 59 during the fourth quarter (59-4) between workers born in 1948 and those born in 1954 would be around 6 percentage points. The corresponding observed difference is strongly higher (around 14.5 percentage points).
Source : French Labor Force Surveys (2003-2013)

5.2 Isolating horizon effect from business cycle impact

One could argue that the periods considered, i.e. 2003-2007 and 2009-2013 strongly differ in terms of business cycle. Indeed, the Great Recession has strongly affected the labour market and it seems difficult to disentangle these effects from the impact of pension reforms. The literature in US puts forward greater difficulties for older workers to become re-employed after the Great Recession (Coile and Levine, 2011 ; Neumark and Button, 2014). To check this, we look at the evolution of employment rates by age but considering workers aged 50-54 over the two periods of interest. Thus, we compare employment profiles of cohorts 1953, who were aged 50-54 in 2003-2007 and 1959 who were aged 50-54 in 2009-2013. Figure 9 shows that employment remains remarkably stable before and after the great recession for workers aged 50-54. One possible explanation of this stability is that the labour market outcomes of workers aged 50-54 have

FIGURE 8 – Estimated employment rates from age 55 to age 59 for both cohorts 1948 and 1954 fixing either initial conditions or transition rates

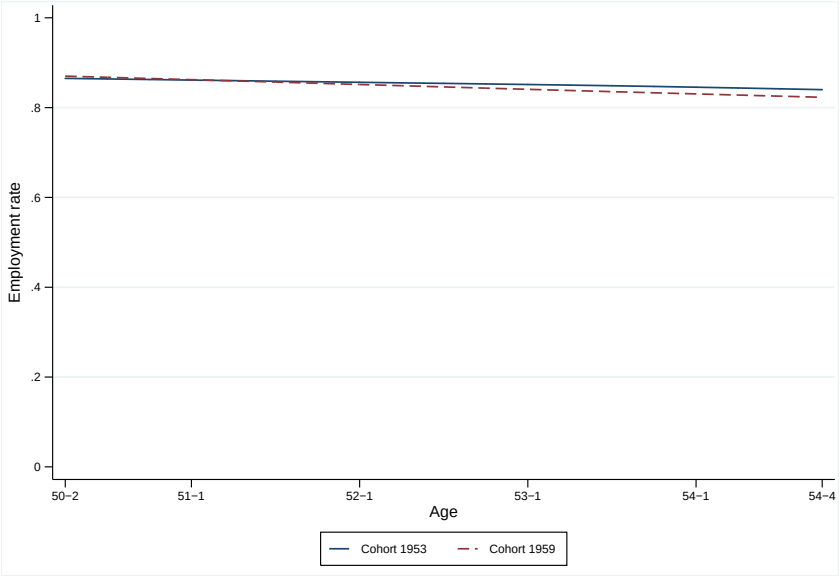


Lecture : The blue solid curve corresponds to the hypothetical employment profile if we consider the initial distribution between different labour market states for the cohort 1948 to estimate employment rates for workers born in 1954. At start, this curve is under the green dash-dotted curve that represents the estimated employment rates for the cohort 1954 without fixing initial conditions or age-specific transition rates. However, the higher the age and the closer both curves. In addition, the red dashed curve depicts the employment profile for the cohort 1954 fixing age-specific transition rates at their value for the cohort 1948. This counterfactual estimated employment profile for the cohort 1954 fail to reproduce the green dash-dotted curve and is closer to the estimated profile for the cohort 1948.
Source : French Labor Force Surveys (2003-2013)

not been affected neither negatively by the Great Recession, neither positively by the pension reforms. This would be in line with previous works of Hairault et al. (2010) that show that in France horizon effect explains the low employment rate only after age 55. The other possible explanation of this stability is that they have been affected by both, but their effects somehow compensate. In that case, this would amplify the horizon effect we highlight on the labour market outcomes of the 55-59.

This provides empirical evidence that in France workers aged 50-54 have not been affected negatively by the Great Recession. In addition, we shows that pension reforms did not affect labour market outcomes before age 55.

FIGURE 9 – Quarterly HP-filtered employment rates from age 50 to age 54 for male workers born in 1953 and in 1959



Lecture : The employment rate observed at age 50 during the second quarter (50-2) is around 87% for both cohorts 1953 and 1959. It remains remarkably stable over the period even after the Great Recession or the pension reforms.
Source : French Labor Force Surveys (2003-2013)

5.3 Discussion around a potential aggregation bias

As noted by Shimer, 2012, labour market status is observable only in a discrete manner, i.e., at the end of every month (or every quarter), but we do not observe the transitions to and from employment that occur within each period. So we could underestimate the magnitude of labor flows. To correct for this, we follow the Shimer's approach that consists in deducing instantaneous transition rates from the observed transitions. Let $e_{t+\tau}$ denote the number of employed workers at time $t+\tau$ and $ne_{t+\tau}$ the number of unemployed or inactive workers at time $t+\tau$, where τ is the duration since the last observation date.

In contrast to Shimer (2012), we focus on the dynamics of elderly employment. Let λ_t^{NE} denote the instantaneous probability of finding a job and λ_t^{EN} denote the instantaneous probability of separation, we have :

$$\dot{e}_{t+\tau} = ne_{t+\tau}\lambda_t^{NE} - e_{t+\tau}\lambda_t^{EN}$$

The goal here is to calculate quarterly probabilities Λ_t^{AB} of at least one transition from state A to

B, with $A \in E;N$ and $B \in E;N$ and $A \neq B$ during period t, using instantaneous probabilities λ_t^{AB}. Assuming that the number of transitions during period t follows a Poisson process, we deduce :

$$\Lambda_t^{AB} = 1 - e^{-\lambda_t^{AB}}$$

We first compute gross worker flows, i.e. the flow $N_t(\tau)^{AB}$ of workers who are in state A at time t and in state B at time $t+\tau$. Let $n_t^{EN}(\tau)$ ($n_t^{NE}(\tau)$) denote the share of employed workers (non-employed workers) in period t who are not employed (employed) in period $t+\tau$:

$$n_t^{EN}(\tau) = \frac{N_t^{EN}(\tau)}{E_t}$$

and

$$n_t^{NE}(\tau) = \frac{N_t^{NE}(\tau)}{NE_t}$$

where E_t and NE_t correspond to the observed stocks of employed and non-employed workers at time t. We apply Shimer's approach to deduce quarterly instantaneous transition rates from quarterly gross flows. As $N_t^{AB}(0) = 0$, the differential equation describing the evolution of $n_t^{AB}(\tau)$ is :

$$\dot{n}_t^{AB} = n_t^{AA}(\tau)\lambda_t^{AB} - n_t^{AB}(\tau)\lambda_t^{BA}$$

The solution of the differential equation is given by :

$$n_t^{AB}(1) = \lambda_t^{AB}(\frac{1 - e^{(-\lambda_t^{AB} - \lambda_t^{BA})}}{\lambda_t^{AB} + \lambda_t^{BA}})$$

and :

$$n_t^{BA}(1) = \frac{\lambda_t^{BA}}{\lambda_t^{AB}} n_t^{AB}(1)$$

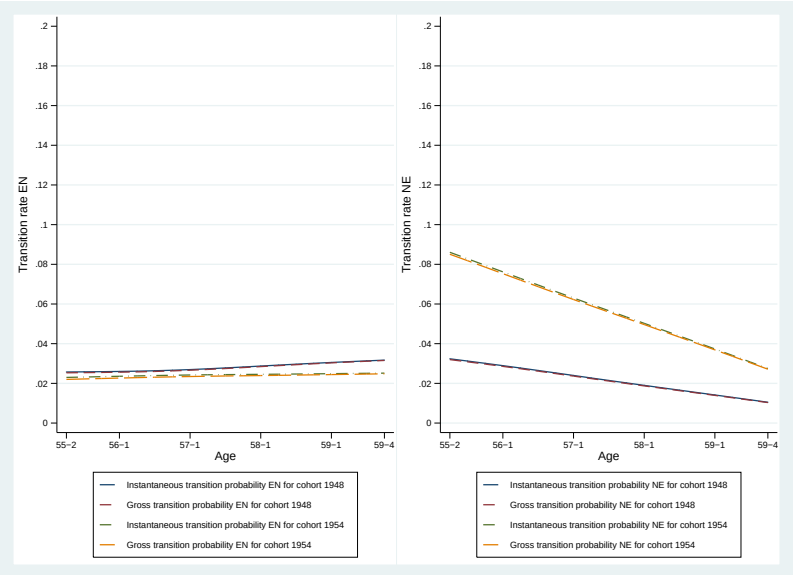
So we recover the instantaneous transition rates :

$$\lambda_t^{AB} = n_t^{AB}(1)\frac{[-log(1 - n_t^{AB}(1) - n_t^{BA}(1)}{n_t^{AB}(1) + n_t^{BA}(1)}$$

$$\lambda_t^{BA} = \frac{n_t^{BA}(1)}{n_t^{AB}(1)}\lambda_t^{AB}$$

We can measure the quarterly job finding rate Λ_t^{NE} and job separation rate Λ_t^{EN} after correcting for this aggregation bias. In Figure 10 we plot for each cohort and each type of transition the gross worker flows and the transition probabilities after correcting for aggregation bias. We see that they are remarkably similar which shows that aggregation bias is negligible when considering quarterly transition rates for workers aged 55-59. This is not surprising given the low mobility

FIGURE 10 – Gross and instantaneous transition rates from age 55 to age 59 for both cohorts 1948 and 1954



Lecture : For both cohorts and both types of transitions, gross and instantaneous transitions rates are remarkably similar. This shows that, regarding older workers, using quarterly transition rates does not generate a significant aggregation bias.
Source : French Labor Force Surveys (2003-2013)

of these workers.

After correcting for aggregation bias, Hairault et al., 2015 suggest a methodology to assess the relative contribution of job finding and separation rates to the unemployment dynamics. As explained previously, we are interested in employment dynamics but we can apply their method to measure the respective contribution of workers flows to the fluctuations of elderly employment before and after pension reforms. First, we compute the employment rate among workers aged a and born in year c. This employment rate at time $t+1$, where t stands for a quarter, is equal to :

$$e_{t+1} = n_t^{NE} + e^{-\lambda_t^{EN}} * e^{-\lambda_t^{NE}} e_t$$

Indeed, the employment rate at time $t+1$ equals the share of workers who were non-employed at time t and who are employed at time $t+1$ plus the employment rate at time t times the probability that there have been no transitions (to and from employment) between t and $t+1$.

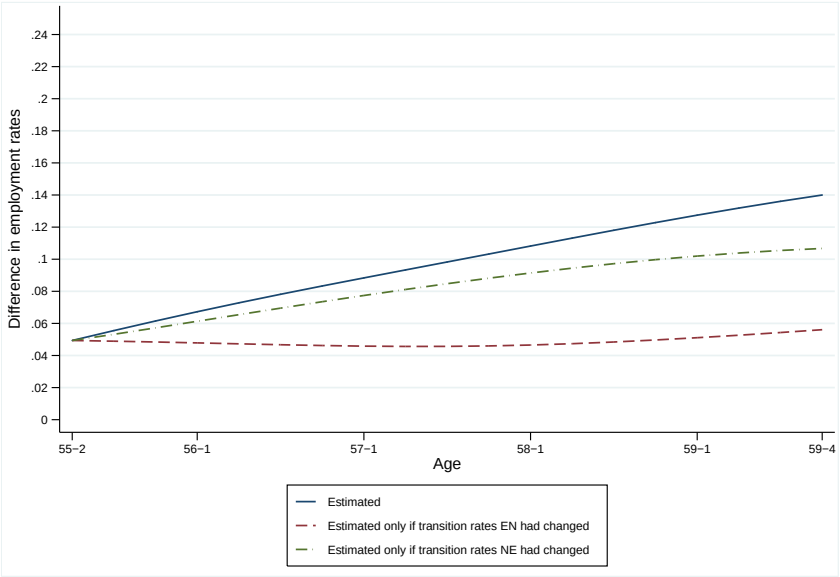
Substituting n_t^{NE} by its expression, we get :

$$e_{t+1} = \lambda_t^{NE}(\frac{1 - e^{(-\lambda_t^{NE} - \lambda_t^{EN})}}{\lambda_t^{NE} + \lambda_t^{EN}}) + e^{-\lambda_t^{EN}} * e^{-\lambda_t^{NE}} e_t$$

So starting from initial conditions, we can reproduce the employment profiles by age for both cohorts 1948 and 1954. The principle is the same as in the Markov-Chain analysis presented previously : we deduce the law of motion of employment rate using quarterly job finding and separation rates. However, in this case, we use the instantaneous transition probabilities rather than gross worker flows.

This allows us to assess the hypothetical evolution of employment rates by age after pension reforms if only one transition probability had changed holding the other constant between the two cohorts of study. Similarly to the AB1C approach, we consider that the "varying" transition probability has a higher contribution to explain the rise in employment rates between both cohorts if the counterfactual estimated difference is close to the observed employment rate gap by age across cohorts. Figure 11 is strongly similar as Figure 7 when considering the subsample of male workers having left the schooling system at 18 or later and therefore not eligible to the long-career based early retirement scheme. We find again that for this group of individuals, the increase in employment rates at ages 55-59 observed after pension reforms is better explained by a rise in job finding rates for the cohort 1954.

FIGURE 11 – Estimated contributions of separations and re-entry rates to the difference in employment rates between the cohorts 1948 and 1954 using instantaneous transition rates



Lecture : If only the transition rate from employment to non-employment had changed between the cohorts 1948 and 1954, the counterfactual difference in employment rates for male workers not eligible to the long-career-based early retirement scheme (red dashed curve) at age 59 during the fourth quarter (59-4) between workers born in 1948 and those born in 1954 would be around 6 percentage points. The corresponding observed difference is strongly higher (around 14.5 percentage points).
Source : French Labor Force Surveys (2003-2013)

6 Conclusion

In this paper we have investigated employment dynamics for workers aged 55-59 years before and after a series of pension reforms set over the period 2009-2012. Rather than unraveling the respective effect of an increase in the legal retirement age and of an increase in the number of required contributive quarters, we have evaluated the effect of this bulk of reforms because they both aim at raising the horizon of workers. To carry out this evaluation we use two cohorts of workers, one that is not affected born in 1948 and the other that is affected by these measures born in 1954. We have shown first the strong positive effect of these reforms on employment rates among male workers aged 55-59. This may suggest that the horizon effect is quantitatively high in the French case, that is in line with previous findings of Hairault et al., 2010.

In addition, we have assessed the relative contribution of worker flows in explaining the rise in

employment rates observed before and after 2009 using the AB1C decomposition analysis. We have highlighted the dominant role of job finding rate to explain the positive impact of French pension reforms on employment. We have also shown that employment dynamics in the end of career are mainly driven by job finding considerations for workers who left the schooling system at 18 or earlier so who are not eligible to the long-career-based early retirement scheme. By contrast, job separation rates play a stronger role for workers who quit the schooling system at an earlier age and who are potentially eligible to this early retirement scheme. We interpret this result, a difference in exposure to the shift of the early retirement age from 56 to 58 implied by the reforms. Consequently, job separation have a higher explanatory power when looking at direct effect of postponing retirement age. However, when investigating upstream effects of lengthening the working horizon, our results may suggest that job finding rates better explain the impact on employment.

We can compare this finding with the results obtained by Rabaté and Rochut, 2017. Investigating the effect of the Sarkozy reform on labour market outcomes among workers close to the previous legal retirement age, i.e. 60, they exhibit some evidence of substitution effect from non-work to work, especially from sickness leave (the corresponding transition rate between ages 59 and 60 is 23%), from unemployment (6%) and disability (3%). However, they do not look at upstream effects on these transition rates which may explain why the estimated rise in job finding rates that results from the Sarkozy reform is not of primary interest in their study. Yet, our database limits our study of the substitution effects since within the status of inactivity it does not distinguish retirement, from sick leave and from disability.

As it stands, this study is mostly descriptive and allows to set the basis of developed theoretical framework, that may allow to disentangle the respective effects of the different measures on employment, unemployment and retirement decisions. We leave this issue for further investigation.

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