
Ageism and the business cycle: an exploratory approach

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Abstract

Addressing discrimination within the professional sphere is becoming ever more important in French public debate in both the legal and managerial fields. A number of the 18 grounds of discrimination recognised under French law such as gender and ethnicity have been widely discussed in the scientific literature. However, unlike studies undertaken in English-speaking countries, few French-speaking researchers have explored age discrimination. This issue warrants analysis insofar as the actual economic context has forced governments to encourage more people to remain in the labour market. This objective, however, has proven difficult to achieve. A critical question is whether age-related labour market participation gaps depend on individual characteristics. If not, other factors might come into play, including possible discrimination. First, we review the employment of older workers over time. We then use econometric methods to assess the nature of labour market participation gaps and analyse their relationship with business cycles. With regard to the latter point, our findings reveal differences between men and women.

JEL Codes: C35, J14, J18, J71

Keywords: older workers' employment, discrimination, decomposition, ageism

Introduction

The participation of older workers in the labour market is a key concern as it points to important economic issues in terms of demography and the financing of unemployment compensation and pensions.

When analysing the labour market participation of older workers in France, two major periods may be considered. The first focuses on the period between 1970 and 1990 and is characterised by the Malthusian outlook regarding the division of labour in society. During this period, older workers were encouraged to leave the labour market through early retirement schemes to facilitate youth employment. Given the ineffectiveness of these Malthusian policies and the underlying economic issues, a second period emerged in the 2000s. This period was characterised by successive employment policies put into place to change how society was organised and encourage the return or retention of older workers in employment. For instance, older workers were allowed to combine professional activities and part of their retirement pensions. Other European countries put similar changes into place as early as the 1990s. This period showed an improvement in labour market indicators among older workers. The rate of employment of workers aged 55-64 years increased by 10 points between 2003 and 2011 to stand at 42%. In 2013, this rate reached 45%. The Treaty of Lisbon advocated a senior employment rate of 50% among the population aged 55-64 by 2010. Compared to neighbouring European countries, the employment rate of older workers in France was low.

We assume that the low increase in the employment rate of older workers has been the result of two obstacles: labour supply and labour demand. Among the obstacles linked to labour supply are higher costs of labour, lower productivity and

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approaching retirement synonymous with short-term employment. Among the obstacles linked to labour demand are the constraints of some institutional measures, the stereotypes associated with older workers by virtue of their characteristics in professional situations, and the discriminatory behaviour arising from stereotypes. Moreover, based on the number of complaints (according to human rights advocates), age discrimination has increased and has become the third criterion of discrimination since 2005 despite the policies put into place to raise companies' awareness of the value of older workers in the labour market.

This chapter is divided into four sections. The first section provides an in-depth analysis of the changes that have occurred in the labour market participation of older workers in France over the long term. These changes, notably the low rate of senior employment in France compared to other European countries, can be explained by different factors that result from labour supply on the one hand, and the defined labour demand on the other. The second section measures the employment gap between the senior population and the median age of the population using a model that evaluates the probability of being employed based on data from French labour force surveys. The determinants of employment are evaluated based on age. In the third section, we measure age discrimination in employment using data from surveys. We use an extension of the Blinder-Oaxaca decomposition technique for binary dependent variables: the Fairlie decomposition method. This method enables us to respond to the following question: Can the differences between labour market participation and age be explained by individual characteristics or do they result from residuals including age discrimination? Based on the measurement of the unexplained portion of the decomposition – to which discrimination belongs, – the final section focuses on the link between the evolution of this unexplained portion and a business cycle indicator.

1. Labour market participation of older workers over time

Depending on the different conceptions of employment policies, the labour market participation of older workers has undergone many changes over time. The two periods that questioned the role of older workers in the labour market were both accompanied by public policies oriented towards their respective objectives. Two types of policies can be used: These can be perceived as “structural labour market interventions that seek either to increase the level of employment in the economy and/or to improve the functioning of the labour market (so-called active measures), or to alter the negative effects of unemployment on wellbeing (so-called passive measures)” (Erhel, 2005).

1.1. Evolutions

The years between 1970 and 1990 were characterised by an “early retirement culture” which undertook a specific organisation of professional activities seeking to adjust the employment of older workers in the event of economic changes. The retirement age initially set at 60 was therefore extended to the 55-59 population: between 1981 and 1984, the employment rate among men decreased from 80% to approximately 60-65%. This organisation was made possible by a social consensus between economic stakeholders and a relatively negative collective representation of seniors perceived, for instance, as less adaptable and less productive in the face of difficult working conditions. In the early 1980s, there was a significant increase in

unemployment (a 4-percentage-point rise and a rate of 10% in 1984). Early retirement measures were seen as a means of protecting those in the median age of the population. An early and compensated retirement was thus possible for those aged between 55 and 59 years of age (Brun-Schamme & Janod, 2007). It seems, however, that the mechanism through which the early departure of older workers was to enable the access of youth to the labour market failed to achieve its objective. Indeed, the rate of youth unemployment developed inversely to the rate of older workers' employment across the period 1970-2002 (D'Autume et al., 2005). Over the last four decades, there have been more than ten early retirement mechanisms (Appendix 1).

During the 1990s, a number of changes in the business cycle led to the reversal of employment policies. These included weak economic growth and an increase in the dependency ratio, i.e., the number of those in the labour force in relation to the number of retired persons decreased when baby boomers went into retirement. An increase in life expectancy also meant that people could remain in employment for longer periods. Moreover, with a reduced labour force, the number of contributors to the pension scheme fell yet pension payments increased. Given this context, it was thus necessary to increase the labour force by promoting the return of previously excluded groups. European policy also developed in this direction. In 2000, the Treaty of Lisbon advocated, in the member states of the European Union, a senior employment rate of 50% among the population aged 55-64 by 2010. As a result, France implemented several pension reforms (the Balladur law of 1993, the Fillon law of 2003...). The age of entry into early retirement was raised; to obtain a full pension, workers needed to contribute longer.

These policies relied on a legal framework based on two fundamental texts: The National Inter-professional Agreement of 13 October 2005 on "the employment of older workers to promote their retention and return to work" and the concerted National Action Plan for the employment of senior workers between 2006 and 2010, which applied the agreement. This plan reflected the three key issues facing French society: one of the lowest older workers' employment rates among industrialised countries; a sharp increase in the average age of the labour force; and high rates of long-term unemployment among older workers because of a shrinking working-age population from 2006. Given this context, the agreement planned to establish measures to link economic performance and age management. The objective was to show companies that it was in their best interests to associate the two measures. Title II of the agreement addressed career security through the proactive management of jobs and skills (Article 4), professional interviews during the second part of individuals' careers (Article 5), the organisation and improvement of working and employment conditions (Article 6), training approaches (an individual's right to training (DIF), training plans, personal skills assessment, accreditation of past professional experience (VAE), orientation period) and the transmission of knowledge and know-how (Article 10). The agreement also planned to address seniors' return to work by entirely phasing out the age criterion from job opportunities, encouraging professional development contracts for older workers, establishing fixed-term contracts targeting them, etc. Lastly, end-of-career management was also addressed; employees could request a retirement appraisal and the re-organisation of working hours and of the end-of-career in the event of recognised hardship.

1.2. Grounds for the reluctance to hire older workers

There are many non-discriminatory factors behind the reluctance to hire older workers. Some of these are inherent in labour supply and are based on individual behaviour in labour market participation. Labour market regulations conducted by government can modify these behaviours. Other factors associated with labour demand –and within which discriminatory behaviours fall – illustrate the social consensus that has existed among economic stakeholders on the early retirement of older workers from the labour market since the 1980s and the misconceptions faced by these workers. This social consensus has persisted in the behaviour of companies where discrimination is residual. Discrimination occurs when there is unequal treatment (for instance, in the access to employment) between two people with identical productive characteristics because of a criterion identified as a recognised source of discrimination.

1.2.1 Labour supply

Among the factors of labour supply can be found the following:

Higher labour costs than a younger working force

The systems of seniority-based wage schemes and deferred wages used in France generate a faster increase in wages relative to productivity with age. Wages are thus tools for employee retention and act as an incentive for greater effort within companies. This is in line with the personal aspirations of employees (Autume et al., 2005).

According to the 2001 statistics from the private and semi-public sectors, if we take the 30-39 age group as a reference, on average, salaries were 21% higher in the population aged 50-54, 30% higher in the population aged 55-59, and 45% higher in the population aged above 59. Moreover, the wage growth rate appeared to be higher after the age of 55 (Aubert, 2005). This was as a result of a composition effect: early retirement primarily affected low wages (Autume et al., 2005). In other European countries, wages declined with age (Autume et al., 2005).

A survey on the evolution of employers' opinions concerning older workers shows that, although their opinions have improved over time, 20% of them continue to view the higher wage costs of older workers as an obstacle to hiring (DARES, 2010). This was viewed as even more important among older unemployed people (Daniel et al., 2013).

Faster retirement

Impending retirement impacts labour supply and demand among older workers. With regard to labour supply, a number of studies have shown that some mechanisms have made early retirement more advantageous than remaining in work until retirement age, notably the exemption from seeking employment which allowed individuals to receive unemployment compensation until retirement age. Moreover, periods of unemployment were taken into account when calculating the pension contribution duration. With regard to labour demand, companies must perceive employment, including training, as an investment. All investments must generate sufficient returns for investors. To be sufficient, investments must take place over the longest possible period. This, however, is not the case in the face of impending retirement (Autume et al., 2005; Hairault et al., 2006). We analysed the impact of the distance to retirement on employment using a model estimating the probability of employment. We used the traditional determinants of the probability of employment to which we added the distance to retirement variable (age at which one receives a full pension) in relation to

the actual age. Our findings revealed a positive relationship between the distance to retirement and the probability of employment (positive, significant and increasing coefficients from 57 to 59 years old). The effect of the distance to retirement increased with age (Hairault et al., 2006).

Other studies have shown that, beyond the distance to retirement, the low rate of employment among older workers can be better explained by the distance to entry into working life (Benallah et al., 2008). These authors consider the length of a professional career as the sum of the distance to entry into working life and the distance to retirement. Using data from labour force surveys, these studies calculated the two distances for each individual. They found that the distance to entry into working life had a negative impact on the probability of employment regardless of age. The shorter the distance, to the exit from working life, the lower the likelihood of an individual, being in employment. The effect of the distance to entry into working life should be compared to labour demand and supply. With regard to labour demand, this implies the possible degradation of human capital and productivity of older workers or an economy faced with job shortages that primarily affect older workers. For labour supply, the authors refer to the existence of early retirement mechanisms created to “reward” long careers. These mechanisms have influenced the decrease in the employment of older workers. However, these explanations have not been proved empirically. A different study has shown that the distance to retirement has a significant impact on the low employment rate of older workers. Using a different definition of retirement age and more recent data, the effect of the distance to the exit from working life on the probability of employment was reinforced when compared to the previous study, even when the distance to entry into working life was controlled (experience effect) (Hairault et al., 2009).

While the government has repealed most early retirement schemes in the public sector, employees previously working with asbestos still represent a large proportion of those in early retirement (CAATA). In 2010, this sector “alone represented 81% of all early retirement in the public sector and 74% in late 2010 with a flow of approximately 5,000 entries and a stock of 30,600 beneficiaries at the end of the year” (Merlier, 2011). Moreover, early retirement within companies remained despite the tightening of its conditions of use that restricted this retirement to specific economic and employment contexts (Galtier & Merlier, 2014). Since 2003, companies using these measures – leading to a breach of contract – in contexts other than the Employment Safeguard Plan are subject to a tax. Labour supply effects are also characterised by the impact of health on labour market participation decisions. To take the health factor into account, there are early retirement schemes for long careers (since 2012, for those who began working before the age of 20) and hardship (since 2010, for those exposed to one or several recognised risks that occur repeatedly and/or are continuous throughout the professional career). These hardships are characterised as “a permanent incapacity recognised as an occupational disease or accident.”

Lower productivity whose reality is yet to be determined.

Some studies have re-examined this hypothesis. Workers’ productivity is difficult to measure. The human capital theory characterises two types of human capital: general capital that results from initial training and the capital accumulated through experience which, is defined as specific capital. Compared to younger workers, older workers have more specific human capital associated with their greater experience. This type of capital is more easily rendered obsolete by technology shocks. Productivity reflects how

individuals mobilise their human capital. The company influences this mobilisation through the work environment and the characteristics of the work station within which employees progress (Brun-Schammé et al., 2007). The productive qualities associated with older workers because of their experience can decrease following health status deterioration or poor adaptation to technological changes (Autume et al., 2005). Several studies have pursued the assumption of lower productivity of workers with age. They argue that wage increases with age are a means of rewarding increased productivity resulting from greater accumulated experience or learning effects that enable companies to assign employees better positions, thereby increasing their efficiency (Aubert & Crépon, 2003). A number of studies have focused on the relationship between productivity and wages (Aubert & Crépon, 2004; Crépon et al., 2003). We, however, focus on productivity. As no concrete definition of productivity exists, we approximated productivity by the average productivity of employee groups in relation to companies' productivity. If we take the population aged 35-39 as a reference, younger workers were less productive than older workers in all sectors. However, the coefficients of those aged 55 and above were lower, suggesting a possible reduction in productivity from this age onwards. This result, however, is not significant. Graphically, productivity profiles tend to increase until the age of 40 and then stabilise (Aubert & Crépon, 2004). The method used to measure productivity profiles is similar to the one used in a previous study that sought to measure the relationship between productivity and wages. Productivity increased slightly with age (Crépon et al., 2003).

The negative effect of some institutional mechanisms such as the Delalande contribution

The Delalande contribution was introduced in 1987 and abolished in 2008. After several amendments, it was expected to increase the cost of laying off employees aged fifty and above through a tax that varied according to the age of the employee laid off. Theoretically, this measure had several advantages. Indeed, the tax collected financed unemployment insurance and decreased layoffs as companies internalised their social costs. There was thus an employee retention effect. This effect is what the measure was initially intended to achieve. The measure also had a negative impact on layoffs (threshold effect) and on the rate of hiring employees close to this age when the measure came into force (hiring freeze effect). Regarding recruitment, the rate of returning to work among those aged fifty and above was inferior to that of younger citizens both before and after the measure was modified in 1992. Regarding dismissals, the effect of employee retention (which was low) and the threshold effect were verified, notably for men. Empirically speaking, net effects on employment appear to be relatively unknown (Behaghel et al., 2004). A different study showed that there was a negative impact of approximately 25% on the hiring of unemployed people aged 50 and above (Behaghel et al., 2005).

This measure, which was synonymous with reinforced employment protection, also had an impact on the training of older workers (Messe & Rouland, 2013). Messe and Rouland analysed tax variation depending on the size of the company (a change that occurred in 1999). They found that the cost of laying off an employee aged fifty and above increased only for companies with fifty employees or more. As a result, these companies were more likely to train their older workers. Messe and Rouland used the difference-in-differences approach. Using the propensity score matching approach, they compared two groups – trained and untrained – between 1998 and 1999, before and after the measure was modified, by controlling the differences between the two groups

for some variables. They found that the 1999 reform of the measure increased the rate of training by close to 10 points among the population aged 45-49. The results were insignificant in the population aged 50-54 affected by the Delalande tax. There was therefore no incentive to train seniors given the negative impact of pending retirement. Companies were doubtful about the return on investment. Results on the population aged 45-49 corresponded to companies' anticipation of this group's imminent inclusion within the measure. Their training was thus necessary to prevent productivity shocks in their workstations.

Technological and organisational changes

A number of studies have identified a technological and organisational bias towards older workers that might explain their low employment rate. By adopting new technologies, companies put new forms of working into place to support these technologies. Internationally, this situation creates a higher demand for skilled labour at the expense of unskilled labour. While, by definition, older workers are more qualified than junior workers given their greater experience, the demand for skilled labour concerns specific and recent skills, related to technology and the international level, that older workers do not necessarily master. These changes tend to downgrade older workers' skills. Innovative companies therefore prefer a younger workforce in the industry and services sector. However, the impact of technological and organisational changes on age is not uniform (Ananian & Aubert, 2006).

Continuing education thus becomes a way around these technological and organisational biases (Behaghel et al., 2010; Behaghel et al., 2013). Although older workers do not necessarily use new technologies to a lesser extent than other employees, training – for instance in computing – is rarely proposed for the less skilled among them (Behaghel & Greenan, 2010). They receive, however, more training in new technologies than before, despite the decrease in the intensity of technological and organisational changes with time (Greenan et al., 2013). The continuous training received by older workers seems to keep them in work. An analysis of the rates reveals that although their training promotes entries, it does not confirm the intuition of limiting exits. By contrast, training does not completely erase the negative impact of technological and organisational changes as the relationship between these three variables is yet to be established (Behaghel et al., 2010). Moreover, in addition to training in new technologies, older workers require training in their principal tasks, even when new computerisation and communication techniques and new organisational practices exist (Greenan et al., 2013).

Voluntary self-censoring behaviour

Voluntary self-censoring behaviour may be related to training (Gossiaux & Pommier, 2013). One of the primary obstacles to training is associated with training costs. Older workers have less access to training when compared to younger people, and even less when they are unemployed or unskilled. After training, self-censorship may affect the search for employment. The 2012 statistics for early retirement show that the incidence of retirement among those with long careers (92,000 people, i.e., +50% in one year) and those working with asbestos (+5,000 entries in one year) remained significant (Marioni & Merlier, 2014). The latter category of factors might also be related to the subjective factors behind the refusal to hire older workers reported subsequently. Following the different objective factors in the reluctance to hire older workers, the OECD formulated a number of recommendations in its report "Live longer, work

longer” published in 2006 and based on the 2005 situation. A follow-up review of the employment policies of older workers assessed the recommendations applied – or not – in France in September 2012 (OECD, 2012). There are still improvements to be made. While a number of actions for “removing barriers to the recruitment and retention of older workers” were carried out (the abolition of the Delalande contribution or its reform into a real bonus-penalty system), others such as reviewing wage practices based on age and seniority or “reinforcing the employability of older workers” have not. Although emphasis has been placed on the professional training of all workers and the quantitative monitoring of training objectives for those aged over 45, these measures remain far from sufficient.

1.2.3. Labour demand

Ageism

The stereotypes of the elderly can be positive or negative. However, the recognised qualities have failed to offset negative stereotypes (table 1).

Table 1. Examples of positive and negative stereotypes of the elderly

Positive representations	Negative representations
Personal qualities relative to the general attitude towards employment and employers: diligence, stability, dedication, work ethics... <i>Skills and performance:</i> productivity, practical knowledge, accumulated experience, knowledge transfer...	<i>The general attitude to work:</i> reduced mobility, lack of ambition, less innovative... <i>Flexibility and adaptation:</i> lack of flexibility, resistance to change in the face of new technologies <i>Health:</i> physical decline and limitations... <i>Profitability:</i> reduced productivity and increased costs...

Source: Pijoan N. & Chevance A. (2011). « Etude des plans et accords seniors dans la région Bretagne : vers une classification des actions »

Discrimination occurs when “an otherwise identical person is treated differently by virtue of that person's race or gender, and race and gender by themselves have no direct effect on productivity.” (Heckman). Today, 20 criteria including age are defended by French law (Article 225-1 of the Criminal Code). These criteria apply to professional life (recruitment, employment contract, qualification, compensation, access to training, dismissal...). Like sexism or racism, ageism is a broad term that defines discrimination on the basis of an individual's age. From an economic perspective, two theoretical trends sum up the concept of discrimination. Becker's model of taste discrimination takes into account exogenous stereotypes or preferences used by employers to select a candidate, without making any rational economic calculation. Employers' taste for discrimination results from three different channels: employers themselves, co-workers and consumers. Taste discrimination changes a company's calculus of profit maximisation by adding costs linked to the willingness to discriminate. These additional costs can be calculated as a measure of discrimination. Given the increase in costs to a company that chooses to exercise discrimination, we can say that the company maximises a utility function rather than a profit function.

Statistical discrimination based on asymmetric information (Arrow) requires recruiters to focus on their beliefs relative to the average characteristics of the group to which a candidate belongs in order to identify the candidate's unobservable

characteristics. Put differently, recruiters use “what they think they know of individuals whose professional quality they are unfamiliar with” (Wasmer et al. 2012). Employers focus on observable characteristics such as gender, age, appearance or area of residence to assess the quality of unobservable characteristics (competence, punctuality, work effort, productivity...) they need to measure in order to decide whether to hire a particular candidate. Employers thus assume that there is a positive correlation between observable and unobservable criteria. This is intentional discrimination and can be defined as rational behaviour from an economic point of view.

The age criterion has a number of specificities. To understand how the European Union has addressed this criterion, two dimensions must be taken into account. The first is economic and addresses the rate of employment of older workers that falls within Europe’s employment strategy (see the Treaty of Lisbon). The second relates to the fight against ageism. Age discrimination is today perceived in a somewhat simplistic manner. Indeed, older people are affected by this type of discrimination more often than young people. It primarily affects the professional sphere rather than other fields such as housing, access to public services, etc. Moreover, the age criterion as a ground for discrimination was included at a rather late stage in French law: after a second reading by the National Assembly of the legislation transposing the European Directive of 2000 with regard to the fight against discriminations. This was because many public policies used the age criterion to estimate the beneficiary population, be it with regard to policies for the young people or for the older population. However, the inclusion of the age discrimination criterion in the law legitimised it. With regard to the age criterion, companies often consider the employment of older workers in terms of age management rather than discrimination. This “does away with victimhood, and thus with companies’ share of responsibility in discriminatory behaviour. [...] Rather than focusing on recruitment, it draws attention to internal age management (the organisation of workstations, improved working conditions, the motivation of employees in the second half of their career, maintaining employee employability, etc).” This places companies on familiar territory and they cease to be perceived as the accused; rather, they are seen as actors of their own destiny. Age management thus ceases to be the language of morality, denunciation or sanction against companies and becomes the language of their own economic interests (Poli A. et al., 2009).

According to a study undertaken by the association “A Compétences Egales” (Table 2), there is a significant difference in perception between older workers, recruitment consultants and companies with regard to the situation of older workers in the workplace. The age at which an employee is considered an older worker differs in the three samples analysed. Similarly, the recognised obstacles to hiring older workers differ. Globally, they all agree, however, on the origin of these obstacles and on the value of older workers. It is also worth mentioning that 79% of the older workers’ sample considered that companies’ hiring decisions were primarily based on age.

Table 2: Results of the “*A Compétence Egale*” survey

At what age do you think one is considered a senior citizen?	
Old workers' sample	48% from 45 years old
Recruitment consultants' sample	55% from 50 years old
Companies' HR sample	38% from 55 years old
Do you think that companies have barriers that prevent hiring older workers?	
Old workers' sample	91% of positive responses
Recruitment consultants' sample	26% of positive responses
Companies' HR sample	35% of positive responses
To what are these barriers linked?	
Old workers' sample	Labour costs (60%) The difficult management of older workers (34%)
Recruitment consultants' sample	The difficulty of incorporating a younger team (55%) Oversizing (44%)
Companies' HR sample	Labour costs (49%) Resistance to change (43%)
What are some of the values of older workers?	
Old workers' sample	Experience (72%), autonomy (50%)
Recruitment consultants' sample	Experience (85%), expertise (65%)
Companies' HR sample	Experience (74%) Expertise and objectivity (44% and 43%)

Following the introduction of the “Age Discrimination in Employment Act” (ADEA) in 1967, a number of studies conducted in laboratories and in the field have analysed age discrimination in access to employment to reveal the impact of age on several variables such as job search, job performance, hiring decisions and promotions. Several professions have been taken into account. Results show that age-related stereotypes persist. These results, however, must be assessed with caution as they depend on how the studies were carried out. Factors such as the characteristics of offers in relation to the characteristics of candidates might also explain the persistence of stereotypes (Morgeson et al., 2008). Experimental data have been used to measure age discrimination using the discrimination testing method: older workers are 41.2% less likely to find employment in America (Bendick M. et al., 1999), 59.6% less likely in Britain (Riach & Rich, 2007) and 64.5% less likely in Spain (Riach & Rich, 2007).

2. Model of the probability of being employed over time

After describing the evolution of the labour market participation of older workers over time and the key obstacles to recent evolution, we will now measure the probability of employment between two populations of varying age. This will be carried out in two phases: first, we will evaluate the determinants of labour market participation based on age using a model of the probability of employment over the long term. Second, we will decompose the effective participation gap between two subpopulations of varying age in order to measure the participation gap attributable to a difference in characteristics (explained gap) or a difference in performance-based characteristics (unexplained gap).

2.1. Descriptive statistics

The data used were obtained from labour force surveys between 1982 and 2011. We compared two populations: the median age (30-49 years old) and the senior age (50-59 years old) using the variables available for the entire population over the entire period. We decided to focus on these two age groups rather than on a wider age range to avoid having to account for the specificities of the under-30s group (there are large discrepancies with regard to the age at which people finish their studies) and the over-60s group (a significant proportion is already in retirement). Moreover, these two groups have a specific situation regarding employment and unemployment. After verification, observations with missing variables were removed, in a uniform manner, across groups. A weighting variable was used.

We focused on four samples: the median age and senior samples for men and women across four periods representing the decades and the recent economic crisis period (1982-1989, 1990-1999, 2000-2011 and 2007-2011) to identify evolutions over the long term. The selected variables were common variables capable of influencing labour supply behaviour: age, gender, labour market status, year of survey, place of residence, marital status, housing occupancy status, household type, area of residence, socio-professional category, highest level of education and nationality. Other variables that might influence labour supply behaviour such as the number of children in the household, the number of people in the household and their labour market status (employed, unemployed or inactive) and how long they had been in one of the three statuses were also considered. Including these variables in the model, however, considerably reduced the sample. We thus limited the number of explanatory variables of the model to those that were available over the entire 1982-2011 period and to the amount of missing observations for some variables. Adding these two elements would have significantly reduced the size of the sample analysed. We nonetheless tested the model over a shorter period in order to determine whether these additional variables might affect possible employment. Unfortunately, with regard to this point, we found non-significant and, thus, inconclusive results.

We found a significant difference in employment rates, unemployment rates and inactive rates across the two age samples analysed. This was also true for a specific age among the “men sample” (Table 3) and the “women sample” (Table 4). Close to 90% of men aged 30 to 49 were employed over the long term although there was a slight decrease over time. Older men were characterised by an employment rate close to 75% over the long term, with a slight increase over time. The lower rate may be explained by the early retirement mechanisms targeting older workers, especially as these mechanisms were highly present within some sectors such as the industry sector in which the proportion of men is high. In the 2000s, the employment rate of this population increased by 1.5 points due to the effect of policy incentives geared to keeping older workers in work that were implemented to deal with underlying economic issues. The policies sought to increase the proportion of employed people in the labour market. The proportion of the inactive population among the population aged 30-49 increased with time (from 3% to 5%). The inactive rate appeared to decrease from 20% to 19% among older men. Older workers, however, were six times more inactive than the median age of the population. With the exception of the 1980s, unemployment affected the population aged 30-49 over time. Synonymous with experience, age protected against unemployment. The situation was different for women. The employment rate for women in the median age of the population was lower than for men by approximately

30 points but increased linearly over time. The same results were observed among older women when compared to older men. Unlike with the older people's sample, the unemployment rate of women in the median age of the population was superior to that of men of the same age. However, the inactive rate was largely superior among women regardless of age but significantly decreased over time. Similarly, this rate was higher in the elderly population but was halved over time. The higher employment rate and lower inactive rate among women over time was the result of public policies concerned with the family which made it possible to reconcile work and family life.

Table 3. Status of men in the labour market according to age (on average across the entire period)

Men sample	Population aged 30-49				Population aged 50-59			
	1980-1989	1990-1999	2000-2011	2007-2011	1980-1989	1990-1999	2000-2011	2007-2011
Employment rate	92,16	89,05	89,34	89,33	75,09	73,79	75,49	76,16
Unemployment rate	4,96	7,18	6,02	6,02	5,12	6,15	4,71	4,70
Inactive rate	2,88	3,78	4,64	4,65	19,79	20,06	19,79	19,14

Source: 1982-2011 Labour Force Survey, author's calculations

Table 4. Status of women in the labour market according to age (on average across the entire period)

Women Sample	Population aged 30-49				Population aged 50-59			
	1980-1989	1990-1999	2000-2011	2007-2011	1980-1989	1990-1999	2000-2011	2007-2011
Employment rate	63,87	68,42	75,24	77,70	47,36	53,43	64,23	67,50
Unemployment rate	6,16	8,81	7,11	6,49	4,02	5,51	4,62	4,54
Inactive rate	29,97	22,77	17,65	15,81	48,62	41,06	31,15	27,96

Source: 1982-2011 Labour Force Survey, author's calculations

We then focused on the characteristics of the French workforce over the long term by applying age and gender to the model's variables (Appendix 2). Close to three quarters of the population analysed lived in an urban area regardless of age, gender and the period assessed. There were more men than women living in rural areas among the senior population but this rate decreased over time (30.53% against 28.42% in the 1980s, 27.75% against 24.99% in the 2007-2011 period). With regard to marital status, the proportion of married workers diminished over time and was higher among men (except for the most recent period) and older workers. The percentage of divorcees increased over time and age and was higher among women. Managers and higher intellectual professions formed the dominant socio-professional category, with more men than women, but there was an increase in the number of women over time. This was as a result of the "glass ceiling" that prevented women from gaining access to high-responsibility jobs. Like manual workers and farmers, craftsmen were predominantly male although their proportion decreased over time. Conversely, more women than men were employees. With regard to family status, a majority of men with a partner and children was employed compared to women: approximately 70% compared to 65%.

There were more single-parent families among women and more unattached individuals among men. Almost all participants in the two samples were French (approximately 95%). These were followed by participants from Southern Europe who supposedly represented more than one million immigrants from Spain and Italy in the 1980s. In 2008, their population was halved and has been replaced by immigrants from North Africa in recent years (+20% of Algerian immigration between 1982 and 2008 accounting for 710 000 people). There has been more recent immigration from sub-Saharan Africa and Asia (China, Lebanon, Sri Lanka...); In 2008, a large majority among them had been living in France for less than 10 years, at 43% and 40% respectively (Ined, 2011).

The proportion of higher education degrees decreased with age but increased over time; this was especially true for women compared to men. The proportion of workers with no degree was higher among older workers but decreased with time among men compared to women (respectively 19% and 15.5% in the 1980s). There were a greater number of older workers than juniors with the Certificate of Primary Education qualification, and more women compared to men. The level of qualification increased with age: a larger proportion of the active population had a higher level of qualification over the most recent period, notably the baccalaureate. The proportion of general or professional baccalaureates increased over time to reach 20% among the female population aged 30-49, 17% among the men, 13% among older men and 16% among older women in the year 2000.

2.2. Logit model

After describing the employed population in our sample, we estimated the logit model to evaluate the determinants of the probability of employment. Y_i represents a binomial probability of employment (equals 1 if an individual is in the workforce and 0 if otherwise). This probability can be explained by several individual characteristics grouped in a vector X_i and an error term ε_i in accordance with the normal distribution (using the hypothesis of non-correlation with explanatory variables, i.e., $E(X/\varepsilon) = 0$). The following equation was used: $Y_i = \alpha + \beta X_i + \varepsilon_i$. Gender has a significant impact on labour market participation behaviour. We therefore distinguished between the results for men and for women.

The logit model describes how individual characteristics, including age, influence labour market participation. Weighted regression was carried out across four periods: 1980s, 1990s, 2000s and 2007-2011. Without weighting, the number of observations was respectively 478 060 observations (men: 246 678 observations, women: 231 382 observations), 675 031 observations (men: 340 752 observations, women: 334 279 observations), 1 577 086 observations (men: 776 271 observations, women: 800 815 observations) and 820 973 observations (men: 402 273 observations, women: 418 700 observations). Table 5 points out the reference used for each explanatory variable. The odds ratio graph is presented in Appendix 3.

Table 5. Terms of reference of the explanatory variables of logit models

Variable	Reference
Senior	Not be a senior (be aged between 30-49 years old)
Nationality	Be French
Socio-professional category	Be in management or a higher intellectual profession
Marital status	Be single
Area of residence	Live in Ile de France
Municipality	Live in a rural area
Household type	Be single
Housing occupancy	Be a first time buyer or already own a house
Degree	Have a graduate or postgraduate degree

Regardless of the period, an analysis of each variable shows that older persons were less likely to be employed. The possibility of employment decreased over time, from 76% to 64% among men, and from 54% to 39% among women. As age increased, men were less likely to be working than women. This might partly be explained by the fact that men often have complete professional careers in terms of contributions to pension schemes compared to women, or by the fact that more men than women benefited from early retirement mechanisms which were more common in male-dominated sectors. For women, living in urban areas increased the chances of being employed in the 1980s and 1990s compared to living in rural areas (+5.80% and +2.60%) but similar results were not found for men. However, the possibility of being employed decreased in the 2000s and in the 2007-2011 period (-3.30% and -3.50% for women, -11% and -13% for men). This variable therefore had a greater impact for men.

Results concerning marital status were less certain. Compared to singles, all other matrimonial forms increased the possibility of employment among men but decreased it among women, except for divorced women in the most recent periods analysed (6% and 12% more likely to be working in the 2000s and 2007-2011). With regard to the socio-professional category, farmers and craftsmen were more likely to be working compared to managers and higher intellectual professionals but their proportion decreased over time, coinciding with a decline in the proportion of farmers and craftsmen in the workforce (see Annexe 2). Intermediate occupations, skilled workers and manual labourers were less likely to be employed compared to managers and higher intellectual professionals but this likelihood increased over time.

Household configurations also influenced the chances of being employed. Compared to single persons, single-parent families were less likely to be employed, especially so in the case of women. These findings point out the difficulties faced by lone parents in raising their children; these difficulties are largely influenced by public policies regarding custody rights that may influence the employment situation. Similar results were found for couples with or without children (2000s period); while men in the configuration of couples with children were more likely to be working, the same was not true for women, who were less likely to be working. If men were working, this was perhaps because women were not. Overall, owning one's house made it easier to access employment compared to being a tenant or having access to free housing, especially for women. This reveals that there is an important relationship between stable housing and access to employment. Concerning the area of residence, *Ile de France* appeared to be the most attractive area in terms of employment, as the population residing in other regions was less likely to be working.

This was especially true for Nord pas de Calais and Lorraine – victims of the progressive deindustrialisation of France – and the Languedoc Roussillon, Provence-Alpes Côte-d’Azur and Corsica regions. Being French was synonymous with being employed. Indeed, other nationalities were considerably less likely to be employed. However, there was one exception: citizens of southern European countries – women in particular – were more likely to be employed than French citizens (+51% between 2007 and 2011). Educational qualifications other than graduate or postgraduate degrees diminished the chances of working, with the exception of diplomas in the paramedical and social field, which increased women’s chances of working by 28% on average in the 2000s.

3. Decomposition of the participation gap between the two subpopulations

After evaluating the determinants of being employed based on individual characteristics including age, we will now analyse the participation gap between the two populations using the decomposition method.

3.1. Method

Among the many existing decomposition methods, we used the Fairlie decomposition method which is an extension of the Blinder-Oaxaca decomposition technique for linear models. It is a decomposition method for models with binary dependent variables. Fairlie has published several seminal papers on this method. His 1999 paper compared the black/white gap in self-employment entry and exit rates. His 2003 paper compared the black/white gap in home computer and internet use rates.

We have estimated the decomposition as follows (1):

$$\bar{Y}_i^M - \bar{Y}_i^S = \left[\sum_{i=1}^{N^M} \frac{F(X_i^M \tilde{\beta}^M)}{N^M} - \sum_{i=1}^{N^S} \frac{F(X_i^S \tilde{\beta}^M)}{N^S} \right] + \left[\sum_{i=1}^{N^S} \frac{F(X_i^S \tilde{\beta}^M)}{N^S} - \sum_{i=1}^{N^S} \frac{F(X_i^S \tilde{\beta}^S)}{N^S} \right]$$

\bar{Y}_i^k is the average probability of being employed (M exponent for the median age of the population and S for the senior population).

N^k represents the sample size for the two populations

$\tilde{\beta}^k$ are the estimated coefficients of the characteristics where $k = M$ or S

$F(\cdot)$ formulates the logistic distribution function (based on a logit model)

In our case, decomposition consists in defining the average probability of working for the median age of the population and for the senior population across several periods. This model makes it possible to describe labour market participation gaps between the two populations. The first term of the equation represents the probability of employment linked to the different characteristics observed between the two populations; it is known as the explained portion. The second term refers to the performance differences of these characteristics and is known as the unexplained

portion; it incorporates discrimination and other cumulative factors. The unexplained portion, however, is not directly synonymous with discrimination given the population observed. Indeed, the labour market participation of older workers is influenced by labour supply factors including employers' age discrimination and factors affecting labour demand such as early retirement mechanisms. The unexplained portion has elements that cannot be observed in work situations: motivation, actual capacity and potential discrimination.

It is also possible to evaluate the relative contribution of observable characteristics with regard to the employment probability gap which can be positive or negative. A negative deviation means the variable is able to decrease the gap in the probability of employment linked to the difference in distribution of observable characteristics between the two populations. This deviation would be greater if the two populations shared similar characteristics with regard to the variable considered. Conversely, a positive deviation increases the participation gap. It is worth noting that the sum of contributions relative to each characteristic corresponds to the total deviation of activity attributed to the differences of distribution of observable characteristics between the two populations. The unexplained portion of deviation implies that the two populations do not have the same effective labour market participation as the observable characteristics do not perform in the same manner even though they are similar across the two groups. Moreover, the Fairlie decomposition method does not explain the relative contribution of characteristics in the unexplained portion, i.e., the estimated coefficients associated with each observable characteristic (Berchet & Jusot, 2009). The advantage of this decomposition method is that it identifies the observable characteristics on which one can take action to reduce the participation gap between the two populations. The estimate of the contribution of an observable variable X_1 to the explained portion of the decomposition (Berchet & Jusot, 2009) can be expressed as follows (In our case, sample M. is for the median age of the population and sample S. is for the senior population) (2):

$$\frac{1}{N^S} \sum_{i=1}^{N^S} F(\widehat{\beta}_0^* + X_{1i}^M \widehat{\beta}_1^* + \dots + X_{ki}^S \widehat{\beta}_k^*) - F(\widehat{\beta}_0^* + X_{1i}^S \widehat{\beta}_1^* + \dots + X_{ki}^S \widehat{\beta}_k^*)$$

The difference in the probability of employment associated with variable X_1 is measured by the expected change in the probability of being employed within the senior population by replacing the distribution of variable X_1 of the senior population with that of the median age of the population, all things being equal.

Decomposition methods must be used with caution. They have two main limitations. Identification explains that the results obtained depend on the reference category chosen in the case of qualitative explanatory variables. The solution is to normalise the coefficients associated with the different qualitative variable categories that do not depend on the modality of reference. Path dependence refers to the sensitivity of results obtained as different explanatory variables are introduced. This problem only occurs in non-linear situations as, unlike in linear situations, the additivity hypothesis of the different contributions is not verified. The contribution of each explanatory variable must therefore be estimated sequentially. To this end, the ordering

of variables is randomised using a specific option when calculating the decomposition (Narcy, 2013)

3.2. Results

The decomposition results used the coefficients of the median age of the population as weights, reflecting the under-representation of older workers in the labour market. Tables of estimated decomposition models have been added in Annex 4. A negative unexplained portion implied that the unexplained portion containing discrimination explained a significant proportion of the participation gap between the two populations. By controlling the observable characteristics, the differential probability of labour market participation between “juniors” and the older population was lower than the average deviation observed. However, the explained component remained slightly negative and the participation gap therefore remained high. This component also implied that the unexplained portion would be greater than 100%.

Table 6: Contributions of explanatory variables to the employment probability gap (Male sample)

Variables	1982-1989 period	1990-1999 period	2000-2011 period	2007-2011 period
Average participation gap	0,1765	0,1528	0,1364	0,1260
Explained component	0,0036 (2,044%)	-0,0087 (-5,671%)	-0,0121 (-8,898%)	-0,0116 (-9,233%)
Unexplained component	0,1729 (97,956%)	0,1615 (105,671%)	0,1486 (108,898%)	0,1376 (109,233%)
City	NS	NS	-0,0003*** (-0,223%)	-0,0005*** (-0,429%)
Marital status	-0,0043*** (-2,407%)	-0,0120*** (-7,824%)	-0,0095*** (-6,968%)	-0,0099*** (-7,890%)
Socio-professional category	-0,0008*** (-0,457%)	-0,0018*** (-1,184%)	-0,0011*** (-0,809%)	-0,0005*** (-0,406%)
Household type	0,0064*** (3,638%)	0,0023*** (1,480%)	0,0019*** (1,404%)	0,0021*** (1,644%)
Housing occupancy status	-0,0055*** (-3,104%)	-0,0070*** (-4,573%)	-0,0099*** (-7,243%)	-0,0099*** (-7,843%)
Area of residence	0,0010*** (0,576%)	-0,0002** (-0,115%)	0,0006*** (0,405%)	0,0006*** (0,475%)
Nationality	-0,00097*** (-0,553%)	0,0023*** (1,508%)	-0,0013*** (-0,967%)	-0,0023*** (-1,844%)
Education status	0,00777*** (4,402%)	0,0077*** (5,021%)	0,0075*** (5,498%)	0,0089*** (7,033%)

Source: 1982-2011 Labour Force Survey, author's calculations, Fairlie method of decomposition. Thresholds of significance: *10%, **5%, *** 1%, NS: non-significant

Table 7: Contributions of explanatory variables to the employment probability gap (Female sample)

Variables	1982-1989 period	1990-1999 period	2000-2011 period	2007-2011 period
Average participation gap	0,1380	0,1294	0,1023	0,0925
Explained component	-0,0432 (-31,270%)	-0,0346 (-26,732%)	-0,0238 (-23,249%)	-0,0170 (-18,417%)
Unexplained component	0,1811 (131,270%)	0,1639 (126,732%)	0,1261 (123,249%)	0,1096 (118,417%)
City	NS	-0,0001** (-0,065%)	0,00003* (0.034%)	NS
Marital status	0,0023*** (1,692%)	0,0041*** (3,199%)	0,0032*** (3.117%)	0,0023*** (2,481%)
Socio-professional category	-0,0089*** (-6,465%)	-0,0072*** (-5,529%)	0,0003*** (0.297%)	0,0024*** (2.594%)
Household type	-0,0524*** (-38,006%)	-0,0308*** (-23,816%)	-0,0252*** (-24.681%)	-0,0240*** (-25.967%)
Housing occupancy status	-0,0041*** (-2,941%)	-0,0142*** (-11,015%)	-0,0161*** (-15.706%)	-0,0135*** (-14.586%)
Area of residence	-0,0002*** (-0.175%)	-0,0003*** (-0,234%)	0,0007*** (0.645%)	0,0004*** (0.390%)
Nationality	-0,0003*** (-0.220%)	-0,0028*** (-2,181%)	-0,0030*** (-2.894%)	-0,0032*** (-3.411%)
Education status	0,0206*** (14,913%)	0,0167*** (12,907%)	0,0163*** (15.960%)	0,0186*** (20.097%)

Source: 1982-2011 Labour Force Survey, author's calculations, Fairlie method of decomposition. Thresholds of significance: *10%, ** 5%, *** 1%, NS: non-significant

Tables 6 and 7 respectively group decomposition results together per period for men and women. For men, the explained component of the employment probability gap remained negative (except in the 1980s) and its percentage decreased over time (respectively -5.67%, -8.9%, -9.2%). The explained component of the employment probability gap among women also remained negative (respectively -31.3%, -26.7%, -23.2%, -18.4%). This was probably linked to the lack of variables specific to female labour supply. A larger proportion of male employment might be explained by the model's variables. The explained negative deviation which diminished over time suggests that there was an improvement in the employment rate of older workers. In contrast, the unexplained component (including possible discrimination) increased over time and remained higher than 100%. This discrimination was against older workers as the model used the coefficients of the median age of the population as weights and thus modelled the under-representation of older workers in the labour market as set out in the theory of decompositions (the example most often cited in the literature on decompositions in the case of gender-based wage discrimination is the use of male coefficients as weights if we assume that women are underpaid).

The following variables made a negative contribution over the entire period: the socio-professional category, housing occupancy status and nationality. When populations were similar with regard to these characteristics, the employment probability gap increased. The contribution of marital status and household type varied inversely for men and women (negative contribution for men and positive contribution for women for marital status and vice versa for household type). The only variable making a positive contribution that increased across the period observed was the

education status (4.4%, 5.0%, 5.5%, 7% for men and 15%, 13%, 16% and 20% for women). Populations that were similar with regard to this variable experienced a decrease in the employment probability gap that was greater for women than for men.

One of the key variables to consider when focusing on older workers' employment is the sector of activity. Owing to the differences between variables from one series of the labour survey to another, we were unable to incorporate this variable across the entire 1982-2011 period. It was possible to analyse this variable over the 1982-1993 period (the sector of activity variable had four modalities (agriculture, industry, construction and tertiary) for the three labour market statuses (employed, unemployed and inactive). When this variable was added to the decomposition, its contribution was globally significant and positive. Having different populations for this variable thus contributed to increasing the participation gap between two populations. However, the percentage of this gap was low (between 0.70% and 1.6% for men and 0.9% and 4% for women). It seemed to have a greater impact for women compared to men. Like the education status, the sector of activity is one of the variables on which governing authorities can act to diminish gaps in participation as one ages (by promoting the merging of two populations relative to this variable). These findings justify the European Union's promotion of male professions among women and vice versa (Challe, 2013). Such an action may also be undertaken with regard to age.

As the decomposition method enables one to determine the observable characteristics on which to act in order to reduce participation gaps between two populations, we focused on the variables that increased the participation gap between the two populations (positive contribution). This primarily concerned the education status variable whose contribution was positive throughout the period 1982-2011. Were the two populations to have the same education status, the participation gap would be lower. This, however, was not the case. Indeed, older workers today are characterised by a lack of basic training (low education status) and by a higher specific human capital level because of the accumulated experience with respect to their general capital level; this is in comparison to younger generations. As opposed to general human capital, few companies value specific human capital. Consequently, returning to work after losing one's job is more difficult. Older workers have greater work experience than younger generations whose entry into the labour market is recent, but this experience is not always evidenced by educational certification. To reduce the participation gap between the median age of the population and the senior population requires training, leading to the acquisition of additional certification. This is made possible by the accreditation of past professional experience (VAE). By obtaining one or several additional diplomas through VAE, older workers can increase their chances of competing on equal terms with younger generations for the same job. VAE can thus enable them to compensate for the lack of basic training. By definition, a VAE approach may accredit professional or non-professional experience of at least three years and enable one to obtain a degree, a title or a certification qualification. This differs from other training approaches as it does not lead to the acquisition of new skills but, rather, reveals workers' existing skills to employers. Certification indicates the estimated level of qualification and productivity of a potential candidate.

Compared to studies based on other grounds of discrimination, the explained portion appeared low, and the unexplained portion high. The proportion of the two components varied according to the theme addressed. Indeed, the study undertaken by Fairlie which compared gender differences in business performance (Fairlie, 2009)

found an explained component of 10% relative to profit performance and 12% relative to sales performance. A different study that compared the black/white gap in self-employment entry and exit rates in America revealed an explained portion representing 29% (coefficient of the black population) and 14% (coefficient of the white population). A study on gender wage gap determined 85% of the portion explained by individual characteristics and an unexplained portion of 15% (can be likened to discrimination). Distinguishing full-time employment increases the explained portion to 52% and the unexplained portion to 48% (Meurs & Ponthieux, 2000). Other studies found a negative explained component suggesting high discrimination. This was the case for the study on labour market participation and employment gaps between disabled and non-disabled persons in Peru. The explained portion of the probability of participation was -29%, 49% and -33.5% (using, respectively, the non-disabled population, the disabled population and both populations). The results for occupancy probability were -22%, 46% and -28% respectively (Maldonado, 2010).

4. The relationship between business cycles and the unexplained component of the employment probability gap

A final point that calls for analysis concerns the relationship between discrimination and business cycles. To the best of my knowledge, no study has analysed the relationship between age discrimination and the business cycle. On the contrary, many studies have focused on the relationship between the gender wage gap and the business cycle. A number of studies have underscored distinct mechanisms that might explain this relationship: a composition effect linked to the fact that the loss of employment among vulnerable populations such as women and minorities is more likely to be influenced by the cycle. These populations are also employed in industries where wages are low and are thus less sensitive to cyclical changes in pure wage discrimination. These studies are consistent on the cyclical nature of wage gaps (Freedman, 1973; O'Neill, 1985). Discrimination is more costly in tight labour markets (Ashenfelter, 1970). Wage discrimination against women increases as unemployment increases owing, in particular, to changes in pure discrimination rather than to a composition effect (Biddle & Hamermesh, 2013).

Studies in Latin America, in Colombia in particular, have addressed the relationship between the gender wage gap and business cycles. The study undertaken by Sabogal (2012) points to the pro-cyclical nature of this relationship based on three assumptions: the additional worker effect, changes in compositions of formal and informal workers by gender and changes in sectorial composition by gender. The additional worker effect refers to the increase in wage gaps to the advantage of men when economic situations are favourable (and the labour market participation rate of women is thus higher). As women are generally less qualified than men, men receive higher wages when economic situations are favourable. Changes in compositions of formal and informal workers by gender are non-significant and cannot explain gender wage gaps. Lastly, the sectorial composition by gender using the Duncan Segregation Index is also non-significant and fails to explain gender wage gaps despite a positive correlation between the business cycle and the segregation index.

Darby and al (1998) analysis the labour supply behaviours face up to a business cycle shock by age and gender on three continents (Europe, Japan, The United States). They highlight « the discouraged worker effect » at the time of economic crisis. The answers of participation on the labour market can vary between a favourable and

unfavourable business cycle. In France, It is more difficult to interpret these answers on cycle changes because of higher structural factors. In several countries, « the discouraged worker effect » is a female issue, particularly for senior women. The decreases of their participation are higher in recession than the rises in boom economic period. This is called the asymmetric adjustments.

Neumark and Button (2014) search to know if the existence of policies against age discrimination more strict at the level of States (in comparison with the federal law, ADEA) helped mitigate the negative impact of Great economic recession on the older workers employment. This question is asked on periods of time before crisis, during crisis and after crisis. The results do not seem clear-cut: only few elements show that a stronger protection of States behind the federal law had protected seniors during the crisis. With others parameters, these results can reverse, showing that a stronger protection makes the senior employment problem worse, more for men. The States more protectors before the crisis had the better employment rates for seniors whereas they had deteriorated during the crisis. This result shows the policies against discrimination achieve their purpose to protection of senior employment but the severe disruptions of the labour market by an unusual economic shock can suppress the success of these laws. In addition, the increase of age discrimination against senior during the crisis is the fact of a fall of hiring and no, a rise of redundancies. However, it is difficult to distinguish which are matters of discrimination, policies against discrimination, given the crisis, has been severe.

Lahey (2008) also refers to the inefficiency of federal law against age discrimination (ADEA) in the protection of senior employment. The existence of this law at the level of States reinforces the negative impact. There are fewer hiring, more retirements and fewer redundancies. The risks of lawsuits for discrimination, in case of redundancies, being facilitate by the existence of these laws force the employers to use the other tools: the hiring and the retirement. This phenomenon is also observed when we are interested in origin as criterion of discrimination. Couch and Fairlie (2010) observe on US data, in time of crisis, the discriminated population in employment (the black population in their study) is the first concerned by redundancies relating to white population. In the economic recovery, the discrimination does not reduce, because if there are fewer redundancies, there are not more hiring. The employers get around the cost of redundancies by a contraction of hiring.

To confirm these results, we conducted an econometric test by separating men and women. The literature has shown that the manner in which business cycles influence gender gaps differs depending on labour market parameters (Sabogal, 2012). We developed a simple linear model with an unexplained probability component as the dependent variable (*discr*) and a trend (coded from 1 to 30 to depict the period 1982-2011) and a business cycle variable (real GDP growth rate) as explanatory variables.

The equation can be expressed as: $Discr_t = \alpha + \beta \text{Trend} + \gamma \text{EvolPIB}_{Vol} + \varepsilon_t$

We placed men in the median age of the population and older men in one equation, and in the second equation we placed women in the median age of the population and older women. The results are presented in Figure 1. The blue and green curves represent the unexplained portion of men and women respectively. The values are on the vertical axis on the right. The red curve is associated with the business cycles'

parameter. Its value is on the vertical axis on the left. We broke down the long period into sub-periods relative to the implementation of employment policies for older workers. While some policies were related to pension reforms, others were associated with unemployment compensation rules (see Table 8). These sub-periods made it possible to observe the trends in the relationship between the unexplained portion and business cycles and to understand the potential impact of public policies on older workers.

The chosen model introduced the unexplained component of absolute value decomposition as the dependent variable. Changes in business cycles and in temporal dummy variables (portraying the six sub-periods described by the different public policies targeting older workers) were the explanatory variables. The coefficient of economic situations was negative and significant for women and there was no autocorrelation in the residuals. The estimation was non-significant for men. This indicator is therefore sensitive to business cycles over time among older women. This, however, is not the case with men. This might be explained by the fact that the jobs held by older women are often done away with during periods of recession or that it is harder for older women to find employment during these periods.

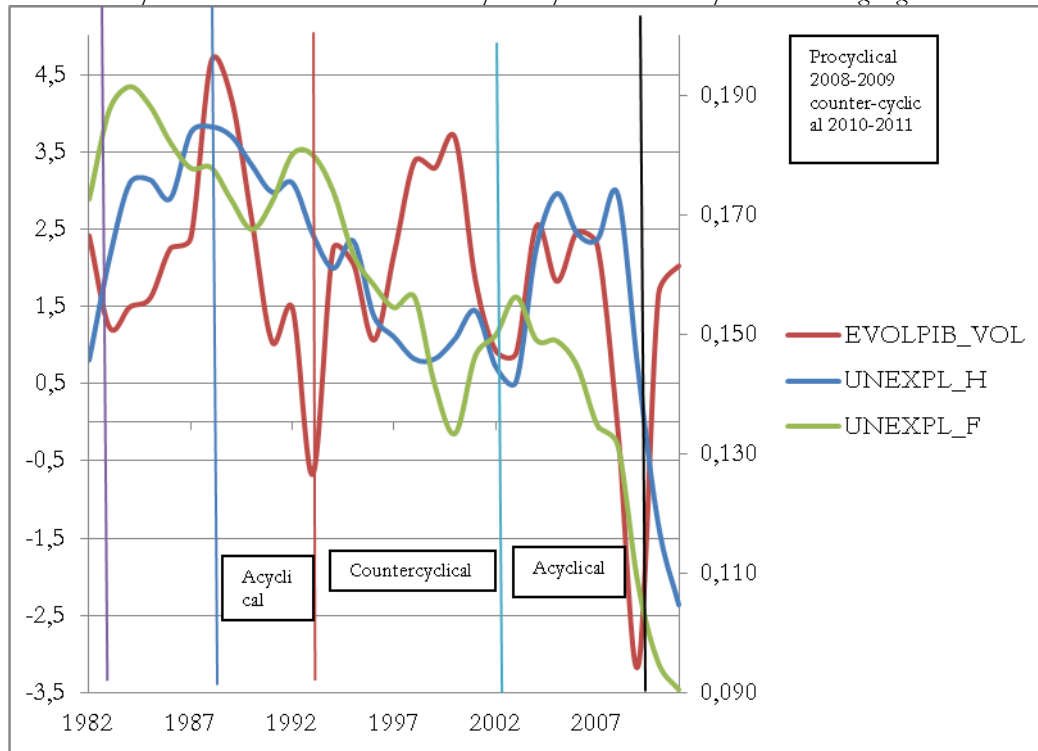
Table 8. Periods used to analyse the relationship over time

Period	Reforms
1982-1983	The legal age of retirement is lowered to 60 years
1984-1988	Creation of the exemption from seeking employment and a specific solidarity allowance
1989-1992	Laws on preventing dismissal on economic grounds and the right to convert.
1993-2000	Tightening of the conditions of retirement with full pension
2001-2006	Creation of the retirement allowance equivalent and the aligning of the public and private sectors
2007-2011	Several successive reforms of the pension scheme in a period of major crisis

We used a dynamic graph to represent the correlation between the GDP growth rate and the unexplained component of the participation gap, presented as an absolute value (Graph 1). An acyclic correlation was observed. Indeed, the relationship was either contra-cyclic (in the periods 1993-2000 and 2009-2011) or pro-cyclic (in the periods 2003-2005 and 2007-2009). The effect of the business cycle was therefore non-distinct. We also observed a negative trend in the unexplained indicator over time. Intuitively, the relationship should have been countercyclical. During periods of economic recession, the unexplained portion increases and vice versa. The underlying economic reason is as follows: when an economy has 100 available jobs, conditions for selection are lower but if only one job is available, the conditions are more demanding. During the periods 1982-1983, 1984-1988 and 1993-2000, the relationship between GDP and the unexplained portion was countercyclical for both men and women. Two acyclic periods were observed: 1989-1992 and 2001-2006; while there was a stable trend in the unexplained portion in the first period, there was a stable trend in GDP in the second period. The major crisis period must be analysed separately. Indeed, graphically, the relationship was pro-cyclical in the period 2008-2009 and countercyclical in the period 2010-2011. The crisis appeared to have changed the normal relationship between the

two variables. We thus observed a countercyclical relationship during normal business cycles and a pro-cyclical relationship during situations of crisis. We are aware that the unemployment rate of older workers rose sharply during the crisis but it remained lower than that of other age groups. Moreover, the crisis worsened unemployment rates among all age groups (Table 9). This may explain this pro-cyclical result.

Graph 1. The correlation between the unexplained portion and decomposition according to gender



We initially sought to include the unemployment rate in the analysis in order to understand the relationship between the unexplained portion and unemployment and to determine whether there were gender gaps. The intuitive argument was that, when GDP increases, unemployment decreases; however, when we used Okun's law, there was no clear relationship between these two variables. For unemployment to decrease, growth must be above a certain threshold (around 2%). Below this threshold, unemployment tends to increase. Consequently, we cannot include unemployment in our analysis. However, the observed correlation between the unexplained portion and the unemployment rate of older workers (50 to 64 years) means that the Okun law might also apply to the unexplained portion. This was verified using two separate regressions for men and women: the unexplained portion in absolute value as a dependent variable, and the unemployment rate of older workers and a trend (for temporal dynamics) as explanatory variables. Non-significant coefficients do not therefore reflect a relationship between the unemployment rates among older workers and the unexplained portion. The relationship between the business cycle and the unexplained portion was more stable for women compared to men. A rise or fall in the unexplained portion occurred over longer periods. Among men, it was common for trends to change from one year to another. A similar econometric test, but one that did not differentiate gender, verified these findings. A Durbin-Watson test for autocorrelation of residuals completed the model.

Table 9. Unemployment rate based on age, gender and period

Ages / years	Men					Women				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
30-49 years	3,07	2,69	3,48	3,65	3,61	3,48	3,29	3,75	3,93	3,89
50-59 years	2,75	2,56	3,04	3,21	3,31	2,84	2,55	3,15	3,31	3,40
30-34 years	3,68	3,18	4,28	4,43	4,57	4,24	3,66	4,21	4,60	4,50
35-39 years	3,15	2,87	3,59	3,80	3,64	3,81	3,47	3,90	3,98	4,23
40-44 years	2,92	2,42	3,27	3,53	3,49	3,13	3,20	3,70	3,97	3,79
45-49 years	2,61	2,36	2,89	2,94	2,87	2,81	2,85	3,27	3,25	3,14
50-54 years	2,71	2,61	2,80	2,78	3,13	2,97	2,61	3,13	3,26	3,32
55-59 years	2,81	2,50	3,35	3,79	3,55	2,67	2,47	3,18	3,38	3,51

Source: Author's calculations (2007-2011 Labour Force Survey)

Conclusion

An analysis of the labour market participation of older workers reveals that their employment is a reality that is becoming increasingly important in the public debate. Several economic issues associated with additional production, social issues associated with the funding of pensions and societal issues associated with an increase in life expectancy are linked to today's increase in the employment of older workers. Older workers have a significant economic impact and are an important workforce. Although some progress has been made by the methods implemented by the governing authorities to resolve the older workers issue, the impact on the employment rate of older workers has been insignificant; employment discrimination against older workers is one of the major obstacles. This discrimination is based on many negative misconceptions of this population, despite the acknowledgment of their undeniable qualities.

We first assessed the determinants of the probability of employment of two populations characterised by age differences (median age and senior age) across different periods. We found significant differences according to the period. We then analysed the perceived discrimination against older workers using the decomposition method. We obtained several results. First, the explained component was negative throughout the period analysed, suggesting that there was significant discrimination against older workers. Indeed, the unexplained component was significant over the entire period. Second, we observed a negative but weak trend linked to the discrimination indicator. The reduction in discrimination was thus limited (the coefficient associated with the trend variable was slightly negative). These findings may be interpreted as the convergence of employment rates between the median age of the population and the senior population, although this had no impact on the unexplained component of deviations (based on the fact that the unexplained portion of the total probability gap was constantly greater than 100%). Third, we found no distinct apparent cyclicity between business cycles (represented by GDP growth rate) and discrimination. Fourth, discrimination decreased significantly during the crisis period (see Graph 1). This might be interpreted as an apparent non-degradation, in relative terms, of the employment rates of older workers compared to those of workers in the median age of the population during the crisis. The decomposition method also enabled us to show that education status was the key variable on which authorities could act to reduce participation gaps. Unlike the undifferentiated analysis, differentiating the relationship between discrimination and business cycles according to gender produced

mixed results. As opposed to women, the labour market participation of older women was sensitive to business cycles. However, the econometric model had an omitted variable bias linked to the length of the analysis period which was accompanied by a major constraint in terms of data availability. The labour market participation of older workers was largely dependent on supply effects: policy variables such as early retirement mechanisms for long or difficult careers or the health effect.

As the crisis is too recent to form an objective view, few studies have addressed the relationship between the recent economic crisis situation and discrimination phenomena. However, a recent report by the International Labour Office (ILO, 2011) has shown that “the global economic and social crisis has led to a higher risk of discrimination against certain groups.” The report also states that “economically adverse times are a breeding ground for discrimination at work and in society more broadly” and that “discrimination on multiple grounds is becoming the rule rather than the exception.” Although there are several policies against discrimination, “the lack of reliable data in this context makes it difficult to assess the exact impact of these measures.” The International Labour Office has thus “called on governments to put into place human, technical and financial resources to improve data collection on discrimination at the national level”. Concerning age discrimination, a survey by the European Commission has shown that “64% of European citizens expect that the economic crisis will contribute to an increase in discrimination on the grounds of age in the labour market.” This response is subjective and shows that the crisis has not had a great impact on age discrimination. The report reveals an important change in discrimination awareness globally: although the number of complaints about age discrimination has increased, this does not necessarily reflect an increase in the phenomenon. One must thus focus on the admissibility of complaints. The report underscores the significance of policies that companies implement to fight against discriminations. These policies might “play an essential role in breaking down myths and stereotypes in relation to older workers.” Countries such as the United Kingdom have conducted “large-scale government-sponsored information campaigns to overcome the reluctance to retain and hire older workers.”

Overall, there is a need for major improvement in the collection of reliable data in the fight against discrimination. Indeed, the inability to collect accurate data undermines the effectiveness of efforts to promote equality in the workplace at the national, regional and international levels. Greater availability of reliable data sources will make it much easier to understand why a large gap remains between the legislation on non-discrimination and its effective implementation. Moreover, multiple discrimination has received little attention.

A different report on the theme “the fight against discrimination at work: a collective challenge” (Pécaut-Rivolier, Mons 2013) has drawn on the studies undertaken by ILO on the relationship between business cycles and discrimination. The report notes that “group discrimination, which had fallen sharply for some groups in recent years, seems to be on the increase once again. This type of discrimination primarily affects women, older workers, mandate-holders and employees of foreign origin.”

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Appendixes

Appendix 1: Stocks of workforce in the French early retirement schemes over the long term

End of December	CAATA	ASFNE	CATS	ARPE	All (1)	DRE	RA	All (2)	PRP
2000	3 785	60 262	5 225	87 095	156 367	348 824	-	505 191	42 146
2001	9 152	46 613	9 282	72 939	137 986	364 647	-	502 633	42 708
2002	16 681	36 705	18 070	38 066	109 522	377 897	-	487 419	47 182
2003	22 838	32 301	31 213	16 218	102 570	400 266	-	502 836	50 809
2004	27 198	25 883	39 747	5 314	98 142	408 953	102 956	610 050	41 164
2005	31 368	20 940	40 431	1 052	93 791	408 703	167 325	669 819	33 599
2006	33 059	16 626	31 501	377	81 563	405 800	209 151	696 514	21 609
2007	33 909	14 200	20 867	127	69 103	383 117	242 131	694 351	11 981
2008	33 223	11 300	13 302	45	57 870	351 950	266 459	676 279	5 593
2009	32 850	9 200	6 307	27	48 384	324 300	190 799	563 483	2 350
2010	30 595	6 800	3 221	11	40 627	266 350	137 837	444 814	823
2011	28 287	5 400	1 744	-	35 431	160 690	90 889	287 010	400

All (1): Cessation anticipée d'activité des travailleurs de l'amiante (CAATA), Allocation spéciale du Fonds national de l'emploi (ASFNE), Cessation d'activité de certains travailleurs salariés (CATS), Allocation de remplacement pour l'emploi (ARPE), Dispense de recherche d'emploi (DRE), Retrait anticipé pour carrière longue (RA), Partially early retirement scheme : Preretraite progressive (PRP)

Source : (DARES: French ministry of Labour)

Appendix 2A: Descriptive statistics (Sample of working population - men)

Variables	30-49 years old				50-59 years old			
	Decade 1980	Decade 1990	Decade 2000	Period 07-2011	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
City								
Urban commune	73.46	72.10	72.31	73.33	69.47	72.64	71.34	72.25
Rural commune	26.54	27.90	27.69	26.67	30.53	27.36	28.66	27.75
Marital status								
Single	13.54	21.64	35.14	39.10	8.93	7.34	11.34	14.18
Married	81.66	72.17	58.35	54.58	85.68	84.48	76.19	72.09
Widowed	0.44	0.37	0.26	0.21	1.78	1.48	1.38	1.30
Divorced	4.37	5.82	6.25	6.12	3.61	6.69	11.09	12.42
Socio-professional category								
Farmers operating a land	4.75	3.73	2.83	2.48	12.69	6.47	4.38	3.94
Craftsmen, shopkeepers and head of companies	9.41	9.45	8.48	9.07	12.61	13.69	12.00	11.69
Executive and intellectual professions	14.46	16.54	18.95	20.39	13.51	19.50	22.29	21.71
Intermediate occupations (clerical, sales, service)	22.92	21.96	22.85	23.57	18.57	20.56	21.46	22.29
Members of staff (as white collar)	10.68	11.42	12.15	12.06	8.15	8.58	10.26	10.94
Labourers (as manual workers)	37.78	36.90	34.74	32.42	34.20	31.20	29.62	29.43
Household type								
Single person	7.42	9.91	13.72	14.90	7.67	8.45	12.22	14.04
Lone-parent families	1.58	2.87	3.34	3.56	1.46	2.51	3.19	3.71
Couples without children	11.73	11.78	12.72	12.78	38.62	36.62	35.68	34.42
Couples with children	75.59	73.75	67.90	66.40	47.91	50.51	46.32	45.02
Complex households	3.68	1.68	2.33	2.36	4.33	1.91	2.60	2.81
Housing occupancy status								
First-time buyer or owner	56.23	57.64	59.91	61.78	68.25	72.16	74.49	74.39
Tenant or subtenant	37.33	37.95	36.96	35.46	25.87	24.27	22.96	23.47
Lodged by the employer or free of charge	6.44	4.40	3.13	2.76	5.87	3.57	2.54	2.13

Variables	30-49 years old				50-59 years old			
	Decade 1980	Decade 1990	Decade 2000	Period 07-2011	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Area of residence								
Ile de France	21.20	20.48	20.15	20.21	20.36	21.04	18.97	18.26
Champagne-Ardenne	2.36	2.30	2.13	2.02	2.23	2.13	2.26	2.25
Picardie	3.14	3.00	3.18	3.11	2.93	2.98	3.12	2.95
Haute-Normandie	3.07	3.17	2.94	2.80	2.67	2.94	3.04	3.08
Centre	4.01	4.15	4.07	4.01	4.27	4.10	4.39	4.50
Basse-Normandie	2.47	2.29	2.26	2.30	2.77	2.32	2.40	2.37
Bourgogne	2.62	2.73	2.59	2.53	2.65	2.79	2.84	2.89
Nord-Pas de Calais	6.59	6.32	6.34	6.10	5.72	5.31	5.83	5.77
Lorraine	4.16	4.10	3.83	3.61	3.51	3.57	3.81	3.58
Alsace	3.38	3.11	3.34	3.28	2.98	3.17	3.15	3.43
Franche-Comté	2.01	1.93	1.94	1.86	1.84	2.12	1.93	1.80
Pays de la Loire	5.36	5.67	5.64	5.63	5.54	5.44	5.62	6.00
Bretagne	4.76	5.25	5.13	5.16	4.92	4.76	5.15	5.28
Poitou-Charentes	2.58	2.66	2.68	2.79	2.91	2.73	2.84	2.91
Aquitaine	4.54	4.96	5.03	5.09	5.07	4.93	5.47	5.54
Midi-Pyrénées	4.04	4.40	4.67	4.81	4.93	4.37	4.44	4.38
Limousin	1.11	1.13	1.13	1.14	1.53	1.24	1.20	1.14
Rhône-Alpes	9.97	9.74	9.95	10.17	9.67	10.88	10.06	9.97
Auvergne	2.40	2.17	2.07	2.09	2.63	2.21	2.22	2.11
Languedoc-Roussillon	3.20	3.29	3.54	3.61	3.34	3.60	3.77	3.78
Provence-Côte d'Azur-Corse	7.03	7.15	7.41	7.68	7.52	7.40	7.48	8.00

Variables	30-49 years old				50-59 years old			
	Decade 1980	Decade 1990	Decade 2000	Period 07-2011	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Nationality								
French	91.83	93.39	93.86	93.68	93.32	91.99	93.98	94.73
Maghreb	3.34	2.06	1.68	1.73	2.82	3.30	1.75	1.26
African	0.33	0.47	0.76	0.85	0.09	0.30	0.46	0.45
Asian	0.23	0.17	0.07	0.03	0.11	0.09	0.06	0.06
South European	3.37	2.33	1.86	1.76	2.98	3.17	2.38	2.10
East European	0.26	0.14	0.10	0.08	0.20	0.20	0.08	0.04
Other European	0.62	0.89	1.15	1.29	0.49	0.71	0.94	0.99
American, Canadian and Latinos	.	0.12	0.16	0.21	.	0.09	0.13	0.12
Other countries or stateless	.	0.42	0.36	0.37	.	0.16	0.23	0.24
Education status (last completed degree)								
2 nd or 3 rd cycle degrees (master or plus)	5.98	7.39	9.87	11.68	3.47	6.78	8.96	8.70
Other schools (undergraduate level) + top-flight schools +engineering schools	3.96	4.37	5.55	5.99	3.61	4.96	4.77	4.49
1st cycle degree (undergraduate)	1.82	1.80	1.26	1.12	0.94	1.46	1.24	1.03
Higher national diploma (BTS, DUT)	3.54	5.64	10.26	11.90	1.29	2.69	5.28	6.04
Paramedical and social diploma (bac+2)	0.84	0.99	0.91	0.87	0.33	0.64	0.98	1.01
Professional Baccaureate or professional certificate	10.55	10.73	4.62	17.09	7.52	9.24	11.63	12.94
Professional qualification (CAP, BEP), General Certificate of Secondary Education	36.23	42.28	39.45	36.32	21.94	32.47	39.66	41.46
Primary school certificate	17.83	9.04	2.18	0.99	29.64	20.01	11.23	8.16
Without diploma	19.26	17.76	15.90	14.04	31.25	21.76	16.25	16.17

Source: Labour Force Survey 1982-2011, calculations of the author

Lecture: in the 1980s, 73.46% of men in employed live in a urban commune (calculations of the author)

In the 1980s, the levels « American, Canadian and Latinos and « Other countries or stateless» of the nationality variable are absent from the sample.

Appendix 2B: Descriptive statistics (Sample of working population - women)

Variables	30-49 years old				50-59 years old			
	Decade 1980	Decade 1990	Decade 2000	Period 07-2011	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
City								
Urban commune	75.70	74.32	73.62	74.44	71.58	74.57	74.47	75.01
Rural commune	24.30	25.68	26.38	25.56	28.42	25.43	25.53	24.99
Marital status								
Single	13.15	19.04	30.83	34.19	9.67	7.95	11.63	13.53
Married	75.50	69.12	58.37	55.29	71.29	72.44	66.60	64.15
Widowed	1.96	1.48	1.03	0.88	10.77	7.42	5.06	4.53
Divorced	9.39	10.36	9.77	9.64	8.27	12.19	16.70	17.79
Socio-professional category								
Farmers operating a land	4.76	2.52	1.22	0.94	14.72	7.15	2.79	2.10
Craftsmen, shopkeepers and head of companies	7.34	5.45	3.84	3.91	10.38	8.74	5.23	4.50
Executive and intellectual professions	7.40	10.30	13.27	14.87	5.51	10.34	13.08	13.05
Intermediate occupations (clerical, sales, service)	22.73	22.38	25.14	26.72	14.36	18.22	21.68	22.51
Members of staff (as white collar)	44.49	47.24	46.50	44.98	41.39	43.97	47.58	48.50
Labourers (as manual workers)	13.38	12.11	10.03	8.59	13.64	11.58	9.64	9.35
Household type								
Single person	7.69	8.40	9.37	9.58	14.62	14.70	16.30	16.94
Lone-parent families	9.52	10.84	11.88	12.21	6.33	8.42	9.71	10.51
Couples without children	12.10	12.14	11.85	11.86	44.60	42.40	40.47	39.29
Couples with children	67.90	67.61	64.78	64.04	27.90	32.62	30.56	30.19
Complex households	2.79	1.01	2.12	2.30	6.54	1.86	2.96	3.08
Housing occupancy status								
First-time buyer or owner	58.77	60.23	62.37	64.02	67.29	72.46	73.01	72.90
Tenant or subtenant	35.42	36.00	34.96	33.72	27.53	24.28	24.74	25.16
Lodged by the employer or free of charge	5.82	3.77	2.67	2.26	5.18	3.26	2.25	1.94

Variables	30-49 years old				50-59 years old			
	Decade 1980	Decade 1990	Decade 2000	Period 07-2011	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Area of residence								
Ile de France	23.61	22.46	21.15	20.77	22.45	22.69	20.22	19.48
Champagne-Ardenne	2.28	2.16	2.08	2.02	1.90	2.06	2.26	2.33
Picardie	2.80	2.87	3.01	3.04	2.73	2.56	2.86	2.77
Haute-Normandie	2.93	3.03	2.91	2.72	2.79	2.83	2.86	2.76
Centre	4.27	4.18	4.34	4.31	4.40	4.17	4.33	4.34
Basse-Normandie	2.53	2.35	2.26	2.29	3.07	2.59	2.30	2.27
Bourgogne	2.78	2.70	2.55	2.44	2.70	2.84	2.90	3.09
Nord-Pas de Calais	5.62	5.35	5.62	5.69	4.98	4.57	5.14	5.16
Lorraine	3.29	3.69	3.65	3.49	3.02	3.25	3.59	3.59
Alsace	3.02	3.02	3.20	3.17	2.42	2.65	2.84	3.09
Franche-Comté	1.89	1.85	1.89	1.79	1.81	1.79	1.93	1.88
Pays de la Loire	5.51	5.73	5.55	5.68	5.79	5.50	5.83	5.97
Bretagne	4.83	5.19	5.17	5.11	5.87	4.88	5.18	5.37
Poitou-Charentes	2.68	2.75	2.73	2.91	2.74	2.71	2.89	2.83
Aquitaine	4.73	5.02	5.03	5.20	4.92	4.98	5.50	5.42
Midi-Pyrénées	4.15	4.43	4.62	4.69	4.81	4.79	4.45	4.56
Limousin	1.15	1.25	1.16	1.15	1.56	1.33	1.29	1.28
Rhône-Alpes	9.86	9.89	9.96	9.92	9.92	10.90	10.00	9.96
Auvergne	2.50	2.10	2.07	2.07	2.79	2.50	2.31	2.24
Languedoc-Roussillon	2.82	3.10	3.53	3.67	2.63	3.20	3.80	3.90
Provence-Côte d'Azur-Corse	6.73	6.90	7.53	7.87	6.70	7.19	7.52	7.73

Variables	30-49 years old				50-59 years old			
	Decade 1980	Decade 1990	Decade 2000	Period 07-2011	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Nationality								
French	95.90	95.73	95.32	95.19	97.33	96.36	95.99	95.90
Maghreb	0.66	0.92	0.85	0.75	0.27	0.53	0.88	0.90
African	0.12	0.27	0.68	0.78	0.01	0.05	0.26	0.37
Asian	0.18	0.13	0.06	0.06	0.03	0.04	0.04	0.04
South European	2.55	1.89	1.48	1.39	2.00	2.32	1.89	1.65
East European	0.25	0.13	0.12	0.10	0.19	0.13	0.06	0.06
Other European	0.35	0.57	0.92	1.06	0.17	0.37	0.60	0.74
American, Canadian and Latinos	.	0.12	0.22	0.29	.	0.08	0.12	0.14
Other countries or stateless	.	0.23	0.35	0.38	.	0.12	0.16	0.20
Education status (last completed degree)								
2 nd or 3 rd cycle degrees (master or plus)	7.12	9.10	14.36	17.18	2.99	6.65	9.34	9.45
Other schools (undergraduate level) + top-flight schools + engineering schools	0.66	1.34	2.78	3.19	0.42	0.66	1.19	1.35
1st cycle degree (undergraduate)	4.11	3.43	2.24	1.88	1.82	2.99	2.32	2.03
Higher national diploma (BTS, DUT)	2.35	4.77	9.71	11.49	0.77	1.63	3.97	4.75
Paramedical and social diploma (bac+2)	4.61	5.54	5.29	5.21	2.15	3.28	4.96	5.20
Professional Baccalaureate or professional certificate	11.66	13.89	18.32	19.99	6.75	9.08	13.99	15.77
Professional qualification (CAP, BEP), General Certificate of Secondary Education	31.24	35.67	32.23	29.39	20.36	28.58	33.98	35.57
Primary school certificate	22.78	11.89	2.54	0.97	37.00	27.86	15.52	11.37
Without diploma	15.46	14.38	12.52	10.70	27.75	19.26	14.72	14.52

Source: Labour Force Survey 1982-2011, calculations of the author

Lecture: in the 1980s, 75.70% of men in employed live in a urban commune (calculations of the author)

In the 1980s, the levels « American, Canadian and Latinos and « Other countries or stateless» of the nationality variable are absent from the sample.

Appendix 3A: Comparison of chances to be in employed by periods of time (Sample men)

Variables	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Ref = younger (30-49 years old)				
Senior (50-59 years old) 1	- 75,5*** (<0.0001)	- 69,70*** (<0.0001)	- 66.70*** (<0.0001)	- 63,70*** (<0.0001)
Ref = Living in a rural commune				
Urban commune 1	NS	- 5,90*** (<0.0001)	- 11.30*** (<0.0001)	- 13,00*** (<0.0001)
Ref = being single				
Married	+ 85,10*** (<0.0001)	+ 93,30*** (<0.0001)	+ 35,60*** (<0.0001)	+28,90*** (<0.0001)
Widowed	NS	+ 25,60*** (<0.0001)	- 6,40* (0.0934)	- 12,90** (0.0173)
Divorced	- 5,70** (0,0756)	+ 12,60*** (<0.0001)	+ 21,40*** (<0.0001)	+ 22,50*** (<0.0001)
Ref = Executive and intellectual professions				
Farmers operating a land	+ 296.80*** (<0.0001)	+ 211,20*** (<0.0001)	+ 226,50*** (<0.0001)	+ 182,00*** (<0.0001)
Craftsmen, shopkeepers and head of companies	+ 41,40*** (<0.0001)	+ 57,60*** (<0.0001)	+ 28,80*** (<0.0001)	+ 7,70** (0.0114)
Intermediate occupations (clerical, sales, service)	- 24,80 (<0.0001)	- 12,00*** (<0.0001)	- 10,60*** (<0.0001)	- 14,80*** (<0.0001)
Members of staff (as white collar)	- 37,50*** (<0.0001)	- 33.80*** (<0.0001)	- 23,90*** (<0.0001)	- 24,20*** (<0.0001)
Labourers (as manual workers)	- 54,10*** (<0.0001)	- 35,80*** (<0.0001)	- 31,80*** (<0.0001)	- 38,90*** (<0.0001)
Ref = being a single person				
Lone-parent families	NS	- 13,70*** (<0.0001)	- 12,20*** (<0.0001)	- 9,70*** (<0.0001)
Couples without children	- 27,40*** (<0.0001)	- 9,80*** (<0.0001)	+9,50*** (<0.0001)	+ 8,70*** (<0.0001)
Couples with children	+ 38,20*** (<0.0001)	+ 47,60*** (<0.0001)	+ 97,40*** (<0.0001)	+ 99,80*** (<0.0001)
Complex households	- 15,60*** (<0.0001)	- 14,40*** (<0.0001)	NS	- 6,50** (0.0260)
Ref = First-time buyer or owner				
Tenant or subtenant	- 33,90*** (<0.0001)	- 34,40*** (<0.0001)	- 38 ,40*** (<0.0001)	- 40,60*** (<0.0001)
Lodged by the employer or free of charge	+ 21,10*** (<0.0001)	NS	NS	- 6,90*** (0.0561)
Ref = living in Ile de France				
Champagne-Ardenne	- 29,70*** (<0.0001)	- 18,40*** (<0.0001)	- 8,20*** (0.0003)	- 13,40*** (<0.0001)
Picardie	- 32,50*** (<0.0001)	- 21,10*** (<0.0001)	- 18,30*** (<0.0001)	- 25,00*** (<0.0001)

Variables	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Haute-Normandie	- 23,30*** (<0.0001)	- 17,40*** (<0.0001)	- 12,70*** (<0.0001)	- 11,30*** (<0.0001)
Centre	- 13,50*** (0.0004)	- 5,80*** (0.0649)	- 8,50*** (0.0002)	- 8,60*** (0.0063)
Basse-Normandie	- 36,70*** (<0.0001)	- 19,00*** (<0.0001)	- 14,20*** (<0.0001)	- 15,60*** (<0.0001)
Bourgogne	- 39,70*** (<0.0001)	- 15,00*** (<0.0001)	- 9,40*** (<0.0001)	- 15,10*** (<0.0001)
Nord-Pas de Calais	- 58,80*** (<0.0001)	- 50,50*** (<0.0001)	- 35,80*** (<0.0001)	- 37,00*** (<0.0001)
Lorraine	- 43,80*** (<0.0001)	- 28,10*** (<0.0001)	- 24,30 *** (<0.0001)	- 26,90*** (<0.0001)
Alsace	- 19,40*** (<0.0001)	+ 14,00*** (0.0002)	+ 5,10 (0.0400)	NS
Franche-Comté	- 14,80*** (0.0028)	+ 8,90*** (0.0212)	NS	- 6,80** (0.0484)
Pays de la Loire	- 35,00*** (<0.0001)	- 18,80*** (<0.0001)	- 16,10*** (<0.0001)	- 17,90*** (<0.0001)
Bretagne	- 51,70*** (<0.0001)	- 32,00*** (<0.0001)	- 24,20*** (<0.0001)	- 23,00*** (<0.0001)
Poitou-Charentes	- 35,80*** (<0.0001)	- 21,50*** (<0.0001)	- 21,10*** (<0.0001)	- 25,20*** (<0.0001)
Aquitaine	- 33,50*** (<0.0001)	- 24,70*** (<0.0001)	- 21,10*** (<0.0001)	- 17,10*** (<0.0001)
Midi-Pyrénées	- 23,50*** (<0.0001)	- 30,50*** (<0.0001)	- 11,00*** (<0.0001)	- 9,90*** (0.0020)
Limousin	- 33,30*** (<0.0001)	- 23,20*** (<0.0001)	- 16,40*** (<0.0001)	- 22,50*** (<0.0001)
Rhône-Alpes	- 16,30*** (<0.0001)	NS	NS	NS
Auvergne	- 32,40*** (<0.0001)	- 23,70*** (<0.0001)	- 23,90*** (<0.0001)	- 26,70*** (<0.0001)
Languedoc-Roussillon	- 50,40*** (<0.0001)	- 47,40*** (<0.0001)	- 42,70*** (<0.0001)	- 43,70*** (<0.0001)
Provence-Côte d'Azur-Corse	- 43,00*** (<0.0001)	- 39,40*** (<0.0001)	- 30,00*** (<0.0001)	- 20,70*** (<0.0001)
Ref = French				
Maghreb	- 31,90*** (<0.0001)	- 50,30*** (<0.0001)	- 56,40*** (<0.0001)	- 57,70*** (<0.0001)
African	- 60,40*** (<0.0001)	- 66,70*** (<0.0001)	- 52,80*** (<0.0001)	- 44,20*** (<0.0001)
Asian	- 52,90*** (<0.0001)	- 35,60*** (0.0002)	- 32,90*** (0.0022)	- 47,50*** (0.0023)
South European	+ 9,50** (0.0151)	+ 10,00*** (0.0062)	+ 44,60*** (<0.0001)	+ 49,30*** (<0.0001)
East European	- 36,70*** (<0.0001)	- 48,90*** (<0.0001)	- 50,00*** (<0.0001)	- 63,10*** (<0.0001)
Other European	*	- 45,20*** (<0.0001)	- 64,70*** (<0.0001)	- 61,50*** (<0.0001)

Variables	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
American, Canadian and Latinos	*	- 44,80** (0.0173)	- 42,90*** (0.0014)	- 33,70* (0.0587)
Other countries or stateless	*	- 63,90*** (<0.0001)	- 58,90*** (<0.0001)	- 45,40*** (<0.0001)
Ref = 2nd or 3rd cycle degrees (master or plus)				
Other schools (undergraduate level) + top-flight schools +engineering schools	- 36,30*** (<0.0001)	- 23,70*** (<0.0001)	- 10,30*** (0.0003)	- 6,90*** (0.0785)
1st cycle degree (undergraduate)	- 19,40*** (0.0246)	- 30,30*** (<0.0001)	- 40,80*** (<0.0001)	- 47,80*** (<0.0001)
Higher national diploma (BTS, DUT)	- 32,80*** (<0.0001)	- 33,30*** (<0.0001)	- 10,50*** (<0.0001)	NS
Paramedical and social diploma (bac+2)	NS	+ 65,40*** (<0.0001)	NS	NS
Professional Baccalaureate or professional certificate	- 40,10*** (<0.0001)	- 39,70*** (<0.0001)	- 30,20*** (<0.0001)	- 25,40*** (<0.0001)
Professional qualification (CAP, BEP), General Certificate of Secondary Education	- 44,50*** (<0.0001)	- 42,40*** (<0.0001)	- 38,10*** (<0.0001)	- 36,40*** (<0.0001)
Primary school certificate	- 57,10*** (<0.0001)	- 58,90*** (<0.0001)	- 61,20*** (<0.0001)	- 63,40*** (<0.0001)
Without diploma	- 63,30*** (<0.0001)	- 65,20*** (<0.0001)	- 60,70*** (<0.0001)	- 58,40*** (<0.0001)

In the 1980s, the levels « American, Canadian and Latinos and « Other countries or stateless » of the nationality variable are absent from the sample and the level « Other European » are suppress of the regression for colinearity with the others levels of the nationality variable

Lecture: in the 1980s, a senior man (50-59 years old) has a 75.5% smaller chance of have a job than a younger man (30-49 years old) on the same period of time. The p-value of kbi2 test is marked in brackets (robustness check), NS: no significant

*Thresholds of significance: * 10%, ** 5%, *** 1%*

Appendix 3B: Comparison of chances to be in employed by periods of time (Sample women)

Variables	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Ref = younger (30-49 years old)				
Senior (50-59 years old) 1	- 54,10*** (<0.0001)	- 50,00*** (<0.0001)	- 41,80*** (<0.0001)	- 39,40*** (<0.0001)
Ref = living in a rural commune				
Urban commune 1	+ 5,80*** (<0.0001)	+ 2,60** (0.0102)	- 3,30*** (<0.0001)	- 3,50*** (0.0029)
Ref = being single				
Married	- 44,10*** (<0.0001)	- 25,50*** (<0.0001)	- 22,30*** (<0.0001)	- 21,40*** (<0.0001)
Widowed	- 48,20*** (<0.0001)	- 35,60*** (<0.0001)	- 33,90*** (<0.0001)	- 35,20*** (<0.0001)
Divorced	- 29,20*** (<0.0001)	NS	+ 5,90*** (<0.0001)	+ 11,70*** (<0.0001)
Ref = Executive and intellectual professions				
Farmers operating a land	+ 209,60*** (<0.0001)	+ 236,20*** (<0.0001)	+ 168,80*** (<0.0001)	+ 108,40*** (<0.0001)
Craftsmen, shopkeepers and head of companies	+ 84,70*** (<0.0001)	+ 74,00*** (<0.0001)	+ 10,20*** (<0.0001)	- 5,70* (0.0568)
Intermediate occupations (clerical, sales, service)	NS	- 6,30*** (0.0028)	- 9,60*** (<0.0001)	- 17,40*** (<0.0001)
Members of staff (as white collar)	- 35,60*** (<0.0001)	- 23,00*** (<0.0001)	- 20,70*** (<0.0001)	- 29,60*** (<0.0001)
Labourers (as manual workers)	- 63,30*** (<0.0001)	- 48,70*** (<0.0001)	- 48,90*** (<0.0001)	- 57,80*** (<0.0001)
Ref = being a single person				
Lone-parent families	- 19,20*** (<0.0001)	- 17,30*** (<0.0001)	- 12,70*** (<0.0001)	- 13,30*** (<0.0001)
Couples without children	- 46,30*** (<0.0001)	- 36,20*** (<0.0001)	- 20,50*** (<0.0001)	- 15,80*** (<0.0001)
Couples with children	- 58,70*** (<0.0001)	- 43,20*** (<0.0001)	- 19,00*** (<0.0001)	- 15,20*** (<0.0001)
Complex households	- 31,20*** (<0.0001)	- 21,80*** (<0.0001)	- 22,60*** (<0.0001)	- 29,50*** (<0.0001)
Ref = First-time buyer or owner				
Tenant or subtenant	- 20,40*** (<0.0001)	- 35,00*** (<0.0001)	- 39,00*** (<0.0001)	- 42,40*** (<0.0001)
Lodged by the employer or free of charge	- 4,90** (0.0165)	- 21,40*** (<0.0001)	- 18,80*** (<0.0001)	- 19,90*** (<0.0001)
Ref = living in Ile de France				
Champagne-Ardenne	- 23,60*** (<0.0001)	- 28,80*** (<0.0001)	- 14,20*** (<0.0001)	- 11,90*** (<0.0001)

Variables	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
Picardie	- 26,20*** (<0.0001)	- 31,40*** (<0.0001)	- 27,60*** (<0.0001)	- 25,10*** (<0.0001)
Haute-Normandie	- 28,30*** (<0.0001)	- 27,60*** (<0.0001)	- 21,90*** (<0.0001)	- 29,30*** (<0.0001)
Centre	- 7,30*** (0.0042)	- 11,60*** (<0.0001)	- 3,80** (0.0346)	NS
Basse-Normandie	- 17,90*** (<0.0001)	- 12,50*** (<0.0001)	- 14,30*** (<0.0001)	- 13,000*** (<0.0001)
Bourgogne	- 21,00*** (<0.0001)	- 22,60*** (<0.0001)	- 12,80*** (<0.0001)	- 8,20*** (0.0017)
Nord-Pas de Calais	- 49,90*** (<0.0001)	- 53,20*** (<0.0001)	- 46,10*** (<0.0001)	- 42,90*** (<0.0001)
Lorraine	- 45,90*** (<0.0001)	- 37,50*** (<0.0001)	- 28,40*** (<0.0001)	- 25,70*** (<0.0001)
Alsace	- 36,20*** (<0.0001)	- 17,20*** (<0.0001)	- 10,90*** (<0.0001)	- 17,20*** (<0.0001)
Franche-Comté	- 24,80*** (<0.0001)	- 24,50*** (<0.0001)	- 13,00*** (<0.0001)	- 16,70*** (<0.0001)
Pays de la Loire	- 21,80*** (<0.0001)	- 19,70*** (<0.0001)	- 15,10*** (<0.0001)	- 11,90*** (<0.0001)
Bretagne	- 24,50*** (<0.0001)	- 27,60*** (<0.0001)	- 17,30*** (<0.0001)	- 11,90*** (<0.0001)
Poitou-Charentes	- 7,50** (0.0226)	- 19,30*** (<0.0001)	- 10,80*** (<0.0001)	- 8,80*** (0.0023)
Aquitaine	- 22,90*** (<0.0001)	- 33,90*** (<0.0001)	- 27,30*** (<0.0001)	- 21,60*** (<0.0001)
Midi-Pyrénées	- 23,00*** (<0.0001)	- 27,20*** (<0.0001)	- 21,30*** (<0.0001)	- 20,50*** (<0.0001)
Limousin	- 19,80*** (<0.0001)	- 7,20** (0.0165)	NS	- 7,60** (0.0142)
Rhône-Alpes	- 21,80*** (<0.0001)	- 21,00*** (<0.0001)	- 14,00*** (<0.0001)	- 17,00*** (<0.0001)
Auvergne	- 16,30*** (<0.0001)	- 26,50*** (<0.0001)	- 21,80*** (<0.0001)	- 20,90*** (<0.0001)
Languedoc-Roussillon	- 48,40*** (<0.0001)	- 53,60*** (<0.0001)	- 43,10*** (<0.0001)	- 40,50*** (<0.0001)
Provence-Côte d'Azur-Corse	- 46,40*** (<0.0001)	- 47,10*** (<0.0001)	- 34,80 (<0.0001)	- 30,00*** (<0.0001)
Ref = French				
Maghreb	38,30*** (<0.0001)	- 50,90*** (<0.0001)	- 51,10*** (<0.0001)	- 53,20*** (<0.0001)
African	- 69,00*** (<0.0001)	- 61,30*** (<0.0001)	- 40,80*** (<0.0001)	- 41,30*** (<0.0001)
Asian	- 37,00*** (0.0002)	- 22,90** (0.0193)	- 32,50*** (0.0003)	NS
South European	+ 95,80*** (<0.0001)	+ 77,60*** (<0.0001)	+ 45,60*** (<0.0001)	+ 51,40*** (<0.0001)

Variables	Decade 1980	Decade 1990	Decade 2000	Period 07-2011
East European	+ 46,60*** (0.0006)	- 39,00*** (<0.0001)	- 45,80*** (<0.0001)	- 39,80*** (0.0001)
Other European	*	- 49,60*** (<0.0001)	- 66,00*** (<0.0001)	- 65,00*** (<0.0001)
American, Canadian and Latinos	*	- 75,10*** (<0.0001)	- 69,20*** (<0.0001)	- 71,70*** (<0.0001)
Other countries or stateless	*	- 67,60*** (<0.0001)	- 57,70*** (<0.0001)	- 56,30*** (<0.0001)
Ref = 2nd or 3rd cycle degrees (master or plus)				
Other schools (undergraduate level) + top-flight schools +engineering schools	- 36,60*** (<0.0001)	- 21,30*** (<0.0001)	- 18,20*** (<0.0001)	- 21,60*** (<0.0001)
1st cycle degree (undergraduate)	NS	NS	- 29,20*** (<0.0001)	- 31,90*** (<0.0001)
Higher national diploma (BTS, DUT)	- 39,70*** (<0.0001)	- 29,80*** (<0.0001)	- 10,20*** (<0.0001)	- 5,70** (0.0208)
Paramedical and social diploma (bac+2)	- 22,30*** (<0.0001)	+ 17,70*** (<0.0001)	+ 28,70*** (<0.0001)	+ 20,60*** (<0.0001)
Professional Baccaureate or professional certificate	- 32,10*** (<0.0001)	- 26,30*** (<0.0001)	- 26,50*** (<0.0001)	- 25,30*** (<0.0001)
Professional qualification (CAP, BEP), General Certificate of Secondary Education	- 35,80*** (<0.0001)	- 36,40*** (<0.0001)	- 32,70*** (<0.0001)	- 27,00*** (<0.0001)
Primary school certificate	- 45,10*** (<0.0001)	- 48,10*** (<0.0001)	- 50,30*** (<0.0001)	- 52,50*** (<0.0001)
Without diploma	- 56,90*** (<0.0001)	- 60,30*** (<0.0001)	- 55,40*** (<0.0001)	- 51,50*** (<0.0001)

In the 1980s, the levels « American, Canadian and Latinos and « Other countries or stateless » of the nationality variable are absent from the sample and the level « Other European » are suppress of the regression for colinearity with the others levels of the nationality variable

Lecture: in the 1980s, a senior woman (50-59 years old) has a 54.10% smaller chance of have a job than a younger woman (30-49 years old) on the same period of time. The p-value of khi2 test is marked in brackets (robustness check), NS: no significant

*Thresholds of significance: * 10%, ** 5%, *** 1%*

Appendix 4A: Estimates of decomposition by periods of time (sample men)

Period 1982-1989

Actocc	Coefficient	P-value
Commune	-0,0000949	0,212
Matri	-0,0042501	0,000
Csp	-0,0008063	0,000
Typmenage	0,0064222	0,000
Sol	-0,0054804	0,000
Reg	0,0010176	0,000
Nation	-0,0009755	0,000
Diplôme	0,0077713	0,000
Difference	0,17654834	
Total explained	0,00360938	

Period 1990-1999

Actocc	Coefficient	P-value
Commune	-0,0000109	0,697
Matri	-0,0119549	0,000
Csp	-0,0018085	0,000
Typmenage	0,0022614	0,000
Sol	-0,0069871	0,000
Reg	-0,0001754	0,022
Nation	0,0023043	0,000
Diplôme	0,0076723	0,000
Difference	0,15279696	
Total explained	-0,00866529	

Period 2000-2011

Actocc	Coefficient	P-value
Commune	-0,0003043	0,000
Matri	-0,0095056	0,000
Csp	-0,0011036	0,000
Typmenage	0,0019159	0,000
Sol	-0,0098809	0,000
Reg	0,0005529	0,000
Nation	-0,0013189	0,000
Diplôme	0,0075004	0,000
Difference	0,13641644	
Total explained	-0,01213895	

Period 2000-2007

Actocc	Coefficient	P-value
Commune	-0,0005408	0,000
Matri	-0,0099399	0,000
Csp	-0,0005114	0,000
Typmenage	0,0020713	0,000
Sol	-0,0098815	0,000
Reg	0,0005987	0,000
Nation	-0,0023226	0,000
Diplôme	0,00886	0,000
Difference	0,12598544	
Total explained	-0,01163211	

Annex 4B: Estimates of decomposition by periods of time (sample women)

Period 1982-1989

Actocc	Coefficient	P > Z
Commune	0,0000163	0,727
Matri	0,0023349	0,002
Csp	-0,0089208	0,000
Typmenage	-0,0524461	0,000
Sol	-0,0040589	0,000
Reg	-0,0002414	0,007
Nation	-0,0003037	0,005
Diplôme	0,0205786	0,000
Difference	0,13799464	
Total explained	-0,04315105	

Period 1990-1999

Actocc	Coefficient	P > Z
Commune	-0,0000839	0,016
Matri	0,0041386	0,000
Csp	-0,0071525	0,000
Typmenage	-0,0308076	0,000
Sol	-0,014249	0,000
Reg	-0,0003032	0,000
Nation	-0,0028218	0,000
Diplôme	0,0166964	0,000
Difference	0,12935454	
Total explained	-0,03457853	

Period 2000-2011

Actocc	Coefficient	P > Z
Commune	0,0000346	0,053
Matri	0,0031885	0,000
Csp	0,0003036	0,000
Typmenage	-0,0252492	0,000
Sol	-0,0160676	0,000
Reg	0,0006598	0,000
Nation	-0,0029602	0,000
Diplôme	0,0163276	0,000
Difference	0,10230029	
Total explained	-0,02378374	

Period 2000-2007

Actocc	Coefficient	P > Z
Commune	-0,00000225	0,933
Matri	0,0022955	0,000
Csp	0,0024004	0,000
Typmenage	-0,0240291	0,000
Sol	-0,0134975	0,000
Reg	0,0003609	0,000
Nation	-0,0031563	0,000
Diplôme	0,0185976	0,000
Difference	0,09253782	
Total explained	-0,01704312	