

Ageism and business cycle: an exploratory approach¹

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Abstract

The awareness of discriminations within the professional sphere has had a growing importance in public debate, as much as in the legal area as in the managerial area. Among the 18 discrimination criteria recognized by international law, several are widely discussed in scientific literature such as gender, ethnicity, etc. However only a very few French works – contrary to English works – deals with age discrimination. Nevertheless this matter should be delved into as the current economic context pressures the public authority to promote a rise of the population in the labor market. However this seems to be a hardly reachable objective. The question is to determine if the discrimination, in terms of age, plays a significant role in the current French labor market. After description of the senior employment in the long-term, econometric methods are used to ponder the extent of the ageism phenomenon; and to look into the existing relation with the economic conditions.

Key words: employment of older workers, discrimination, methods of decomposition

Codes JEL : C35, J14, J18, J71

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Introduction

The employment of older people is a crucial matter as it implies significant economic issues, as well related to demography and to the funding of unemployment benefits, as to retirement pensions.

Two main periods can be considered when raising the question of employment rate among older people. The first one, from 1980 to 1990, is characterized by a Malthusian philosophy of work-sharing in the society. It consisted in promoting the seniors withdrawal from the labor market, using arrangements of early retirement, so that younger people could find a job more easily. A second period, from 2000, is defined by a policy implementation of successive employments to change the society organization and to encourage the older people to return or to longer stay at work (providing for example the opportunity to have an occupation while getting a part of the retirement pension). This is mainly due to the inefficiency of the Malthusian philosophy and to the underlying economic stakes.

An improvement can be observed among the indicators concerning the older people's labor market, with a 10 points increase of the employment rate of the 55 – 64 years old, between 2003 and 2011, to reach 42%. The 50% objective of the European Union was not achieved in 2010. Two main obstacles can be presumed to explain the difficulty to reach the 50% objective: professional stereotypes assigned to the seniors, resulting from typical situations at work; and discriminatory behaviors deriving from such stereotypes. Over the years, the age discrimination has increased to become the third criteria of discrimination since 2005, based on the number of complaints (Human's right Defender). Such an evolution happened even though some policies were carried out to make the companies aware of the potential benefit that older people could bring to the labor market. To these obstacles must also be added the non-hiring objective factors, such as a higher labor cost, a lower productivity and a close proximity to retirement which is synonymous with a shorter employment length.

Two objectives are aimed with this work. First, the creation of a probability model of being employed between 1982 and 2011, based on individual characteristics such as the age; and then, the decomposition of the employment difference for two distinct populations of different age. This model would bring out an initial glimpse of the potential discrimination due to the age. In a first part, the employment of older people in the long-term will be described. Then the probability model of being an active employee will be created in terms of age, so that the determinants of employment can be determined. A final part will focus on the decomposition of the participation deviation for two distinct sub-populations of different age, in order to have an idea of the potential discrimination extent due to the age.

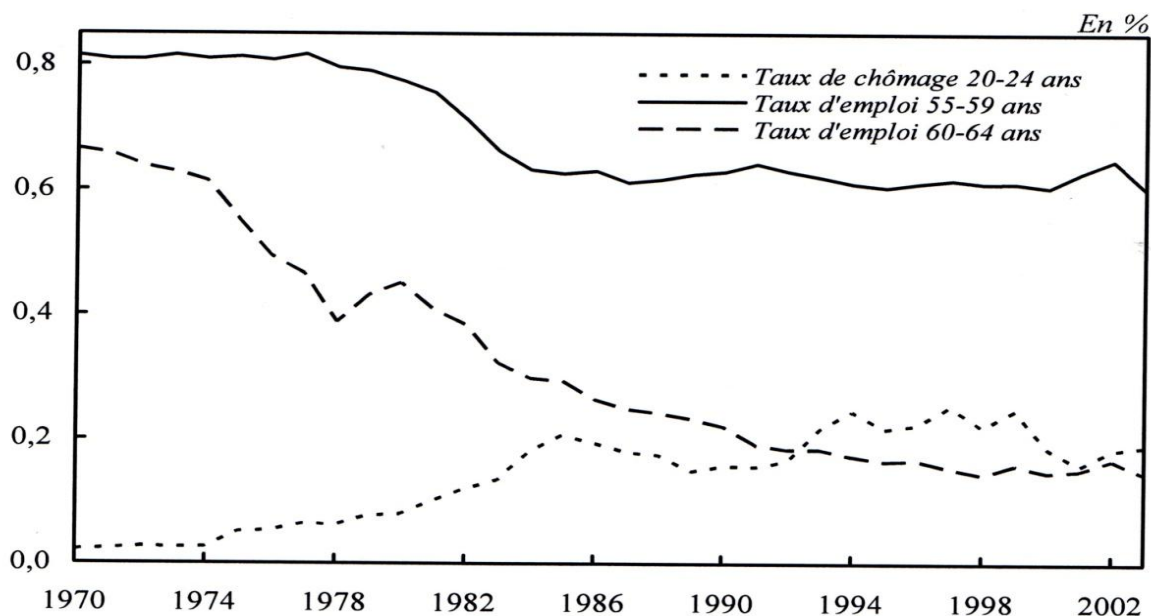
1. Employment of older people in the long-term

The employment of seniors has undergone many changes over time, due to the political views of employment. These two aspects concerning the position of the older people in the labor market come along with public policies which support the objective of each of them. Two types of public employment policies can be considered. Employment policies must be seen “such as structural intervention in the labor market, with the objective of either increasing the employment level in the economy and/or improving the performance of the labor market (called active actions), or correcting the negative impacts of unemployment on the welfare system (called passive actions)” (Erhel C. 2005).

1.1. Evolutions

Years from 1970 to 1990 are characterized by an “early retirement culture” which contributes to the emergence of a social consensus. The principle of organization concerning the labor market is to adjust the employment of older people in case of economic changes. Such an adjustment is possible thanks to a quite negative and collective depiction of the seniors. As the retirement age is 60, this adjustment has to be made with the aged 55 – 59 (from 1981 to 1984, the employment rate of men decreased from 80% to 65-60%). Such a principle was justified by the conveyed image of the seniors: lower adaptability and lower productivity resulting from work strenuousness ... Between 1979 and 1984, the unemployment strongly increased (+4 points with a 10% rate in 1984). The agreements of an early retirement can be a solution to protect median age people from unemployment. The aged 55 – 59 can accept an earlier retirement with compensation. (Brun-Schamme A. and Janod V 2007). The withdrawal of the senior workers would grant an access to the labor market to younger people. However, the process of an early withdrawal of the senior workers, which would grant an access to the labor market to younger people, does not seem to be achieved. The youth unemployment rate evolves in the opposite direction of the employment rate of seniors during the whole period from 1970-2002 (Graph. 1). From 1977 to 2003, more than tens of retirement arrangements exist. (Table. 1)

Graph 1. Youth unemployment rate and employment of seniors



Source : Calculs des auteurs, données : OCDE, Statistiques de la force de travail.

Source : les seniors et l'emploi en France (2005)

Table 1. Headcount of the early retirement arrangements over a long period

Fin Décembre	CAATA	ASFNE	CATS	ARPE	Total.	DRE	RA	Total.	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

Cessations d'activité totale : Cessation anticipée d'activité des travailleurs de l'amiante, Allocation spéciale du Fonds national de l'emploi, Cessation d'activité de certains travailleurs salariés, Allocation de remplacement pour l'emploi, Dispense de recherche d'emploi, Retrait anticipé pour carrière longue, Cessations d'activité partielle : Préretraite progressive

Source : Dares

In the 90's, several changes to the economic situation led to an inversion of the employment policies. These changes are mainly a low economic growth and a rise of the dependence rate (a lower workforce proportion due to the amount of pensioners which will hugely increase soon, as a result of the Baby-boom generation retiring. Besides, there is also a rise in life expectancy which

can give the opportunity to work for a longer time. Furthermore, because of such a decline of the active population, the number of contributors to the retirement system decreases whereas the number of pensions increases. In this situation, it appears necessary to support a rise of the active population by the return of categories which were so far excluded. The European policy has also evolved towards this idea. In 2000, the treaty of Lisbon, aims to reach a 50% employment in 2010 for the aged 55-64 and this, for each member country. In France, several reforms were established: one in 1993, before the treaty of Lisbon, and one in 2003 (respectively Balladur law and Fillon law). The required age for the early retirement arrangement is increased; to get full pension, a longer contribution is needed.

These policies exist within a legal framework, built around two fundamental texts: the Interprofessional National Agreement from the 13th of October 2005, related to “the employment of older people, to encourage them to keep working and to promote their return to work”; and the concerted Plan for the employment of seniors during the 2006-2010 period which materializes the agreement. The agreement answers to three main factors that French society is currently facing: “one of the lowest employment rate of seniors among the industrialized countries, an increasing average working age, and a significant long-term unemployment of seniors, as the working age population will decrease from 2006”. To cope with this situation, the agreement plans to establish several elements showing a relation between age management and economic performance within the companies; so that the companies can realize how much interest they have to combine these two elements. The title II of the agreement deals with safeguarding of career paths using jobs and skills anticipative management (Article 4), with professional interviews happening in the latter part of careers (Article 5), with improvement and adjustment of work and employment conditions (Article 6), with training programs (Individual Training Entitlement, training program scheme, skills assessment, VAE, professionalization period), and with the transmission of knowledge and skills (Article 10). Furthermore the agreement also plans to handle the return of older people to work by suppressing any age criteria from the job offers, by promoting professionalization contracts intended to the seniors and by creating a senior fixed-term contract among other. Besides, the management of career ending is mentioned by the employee request to the retirement balance sheet, and by the adjustment of work schedule and of the retirement in the case of recognized strenuousness at work.

1.2. Focus on stereotypes and discrimination

Stereotypes can be positive as well as negative. However there are not enough known qualities to balance the negative stereotypes (Table 2).

Table 2. Example of positive and negative stereotypes towards the seniors

Positives Representations	Negatives Representations
Personal qualities on the general attitude towards work and the employer : attendance, stability, commitment, work ethic ...	Flexibility and adaptation: lack of flexibility, resistance to change with new technologies ...
The general attitude towards work: the decline of mobility, lack of ambition, less innovation ...	The health decline and physical limitations...
Skills and performance: productivity, practical knowledge, accumulated experience, knowledge transfer ...	Profitability: lower productivity and higher costs ...

Source : Centre de Recherche en Gestion des Organisations de l'IAE de Montpellier (2008)

Discrimination can be defined as “a difference of treatment between two persons who have the same productive attribute, based on a non-productive criterion” (Heckman). Nowadays, French law stands up for 18 criteria, (article 225-1 of Penal Code) age included. The criteria affect the working life (hiring, work contract, qualification, salary, access to training, firing, etc.) Following the example of sexism or racism, ageism is an umbrella term which covers any discrimination based on the age. Two theoretical approaches sum up the discrimination concept from an economical point of view.

The *taste discrimination* of Becker takes into account stereotypes or exogenous preferences which are considered to justify the hiring of an applicant, without the employer making any rational economic consideration. The employer's taste for discrimination can have 3 different origins: the employers themselves, the employees, and the consumers. Such a taste for discrimination modifies the economic calculation for profit maximization of the company as it implies additional costs, related to this desire of discrimination. Additional costs can be determined to evaluate the discrimination. Given the increase in costs for a company in case of discrimination, it can be said that the company maximizes a function of utility more than a function of profit.

Statistical discrimination is based on asymmetrical information (Arrow). Usually applicants can be grouped according to their characteristics. In such discrimination, the employer relies on his beliefs related to the average features of the applicant group to identify the undetermined features of the applicant. In other words, the employer uses “which he thinks he knows about people whereas he only barely knows their professional skills” (Wasmer 2012). The employer relies on visible features such as gender, age, outward aspect, accommodation location, etc. which leads to the thought of other non-visible features (competence, punctuality, work effort, productivity, etc.) which are evaluated before hiring an applicant. (According to the employers, there is a positive correlation between visible and non-visible criteria). It is a deliberate discrimination. This kind of behavior can be qualified as rational from an economical point of view.

The age criterion has specifications. Two approaches have to be considered to understand how the European Union sees this criterion. One of them is an economical approach, and gives an answer to the problem of the employment rate of seniors which is included in the Europe employment strategy (with an objective of 50% employment rate of the aged 55-64, in 2010). The other approach refers to the struggle against ageism. Today, age discrimination seems to be quite restrictively sensed. Indeed seniors are the most likely affected by such discrimination, contrary to younger people. These discriminations are often related to the professional area, but not to any other fields (accommodation, access to public services, etc.) Age criterion, as a cause of discrimination, was late included in the French law implementing the European directive of 2000 to prevent discriminations. This criterion was inserted among the prohibited criteria of discrimination during the second reading of the text by the National Assembly. The insertion of the criteria within the law results in its legitimization. This situation happened because several public policies consider the age criterion to determine the beneficiary population (either policies intended for younger people or for older people). For the companies, the subject of hiring seniors based on age criterion is usually considered in terms of age management more than in terms of discrimination. This situation “clears the idea of victimhood, and so does the responsibility of the companies for discriminatory behavior. [...] It gives the opportunity to stop focusing on hiring to give more importance to internal age management (adjustment of workstation, improvement of work conditions, motivation of employees during the latter part of their carrier, preservation of their employability, etc.) This puts the companies in a friendlier environment and changes their status of accused to become agents of their own development. Thanks to age management, companies are no more run by morality, denunciation or sanction but by their own economic interest.” (Poli A., Lefrançois C., Caradec V. 2009).

For senior employees, recruitment agencies, or companies, the seniors’ situation at work is perceived much differently. A survey is carried out about this perception by the association “A Compétences Egales” (Table 3). The age from which a person is considered as a senior is different for each of the three investigated samples. The identification of the brakes on seniors hiring follows the same pattern. However there is a common agreement on the origins of these brakes and on the assets imputed to the seniors. It may be noted that for 79% of the senior sample, age is the main selection criterion for the companies.

Table 3. Results of the survey “A Compétence Egale”

From what age are you considered to be older worker?	
Old workers sample	48% from 45 years
Recrutement consultant sample	55% from 50 years
Human resource executive sample	38% from 55 years
Do you think there are obstacles in company to submit a senior candidate for employment?	
Old workers sample	Yes to 91%
Recrutement consultant sample	Yes to 26%
Human resource executive sample	Yes to 35%
Which of these elements are linked obstacles?	
Old workers sample	The labor cost (60%) The difficulty to be managed (34%)
Recrutement consultant sample	The difficulty to integrate youger team (55%) The outsize (44%)
Human resource executive sample	The labor cost (49%) The resistance to change (43%)
What advantages can be recognized for the older workers?	
Old workers sample	The experience (72%), the autonomy (50%)
Recrutement consultant sample	The experience (85%), the assessment (65%)
Human resource executive sample	The experience (74%), the assessment and the ability perspectives (44% et 43%)

2. Probability model to be an active employee in the long-term

After having described the evolution of the older people’s involvement in the labor market in the long-term, and having identified the main obstacles to recent development; the idea is now to evaluate the discrimination related to age. This evaluation will be carried out in two steps. The first step will consist in the creation of the probability model to be an active employee in the long-term. This will give the possibility to identify the determinants of employment in terms of age. The second step focuses on the deviation decomposition of the effective participation between two sub-populations of distinct age. As a result, it is possible to evaluate which part of this deviation can be related to a difference of characteristics (explained gap) or to a difference of implied characteristics (unexplained gap) which is defined as discrimination in the literature.

2.1. Data

The data used came from the Employment Surveys from 1982 to 2011. Two distinct sub-populations are compared: the aged 30-49 (median age) and the aged 50-59 (senior age), using variables previously selected and available for everybody. This choice fell on two distinct age ranges rather than on a continuous age range in order to put aside the specificities of those under 30 (heterogeneity exists in the age of end of study) and of those over 60 (for whom an important proportion is retired). The extreme ages were not considered because the situation of employment

and unemployment is specific. The observations for which a variable was missing were uniformly deleted between the age ranges after verification. A weighting variable was used.

2.2. Descriptive statistics for the sample

Three samples are considered: the overall sample (aged 30-59), the sample of median age (aged 30-49) and the senior sample (aged 50-59). These samples are chosen over 4 periods of time (1982-1989, 1990-1999, 2000-2011 and 2007-2011) to see the evolution in the long-term. The variables which are selected are the age, the gender, the status in the labor market, the year of the survey, the accommodation location, the marital status, the status of housing occupancy, the type of household, the region of residence, the socio-professional category, the highest diploma received, and the nationality. Additional variables were first selected but the high number of missing observations was too important to keep them.

In the overall sample, almost 75% of the population is working (decade 1980 and 1990). This proportion goes beyond 80% in the 2000's. This situation is consistent with a decline of the proportion of inactive people and of the unemployment rate. By breaking the overall sample into sub-samples - age median sample (aged 30-49) and seniors sample (aged 50-59) - a significant difference of employment rate, unemployment rate and inactivity rate can be observed between the two populations (Table 4). Almost 80% of the aged 30-49 have usually a job in the long-term (almost 85% between 2007 and 2011). Seniors are represented by nearby a 65% employment rate from 1980 to 1990. The arrangements for the seniors early retirement are responsible of such a decline. In the 2000s, the employment rate of this sector of the population increases by 4 points. This is due to the incentive policies which were established; as they were promoting an extension of the employment of seniors to face the economic issues with the idea of increasing the proportion of employed people. Commonly, the proportion of the non-working aged 30-49 decreases over time (13 to 18%). The senior population follows the same trend (29 to 21%). However there are twice more non-working people among the seniors than among the median age people. Unemployment mainly affects the aged 30-49 over time, except for the 1980 decade (Table 5). Age, which is a synonym of experience, keeps unemployment away.

Table 4. Status of the overall sample in the labor market

	Variable « status on the labor market » for the 30-59 years old (on average in the period)			
	1980-1989	1990-1999	2000-2011	2007-2011
Employment rate	76,68	77,77	80,28	81,36
Unemployment rate	6,63	9,00	7,09	6,69
Inactive rate	17,87	14,52	13,59	12,80

Table 5. Status of both sub-populations in the labor market

	Variable « status on the labor market » for two subpopulations (on average in the period)							
	Population 30-49 years old				Population 50-59 years old			
	1980-1989	1990-1999	2000-2011	2007-2011	1980-1989	1990-1999	2000-2011	2007-2011
Employment rate	81,18	81,32	84,27	85,25	65,62	67,41	71,77	73,44
Unemployment rate	6,52	9,19	7,40	6,97	6,94	8,35	6,29	6,03
Inactive rate	13,16	10,44	9,00	8,36	29,49	26,44	23,41	21,84

The characteristics of the active employees from the three samples, according to the age ranges and along the previously mentioned variables, are now the main focus. The proportion of farmers clearly decreased over time, and this trend is more important among the seniors (-10 points between 1980 and 2000 and only -5 points among the aged 30-49). Artisans are also a bigger proportion among the older people. But the number of artisans tends to decrease over time as they are replaced with managers, intellectual and greater professions, middle-level professions and employees, which represent 30% of the seniors and median age population. The proportion of laborer is more significant among the 30-49 years old and decreases over time.

All three samples have French nationality (about 95%). Southern Europe follows, as it consisted in “more than a million of immigrants coming from Spain or Italy” in the 80’s. In 2008, this population decreased by half. Lately immigrants from the Maghreb have taken over the ones from Southern Europe (+20% of Algerian immigration between 1982 and 2008 which corresponds to 710 000 persons). More recently, immigrants are coming from Asia and from African countries, excluding the Maghreb. In 2008, most of them have been living in France for less than 10 years, 40% and 43% respectively (Ined 2011).

The proportion of master degree and doctorate decreases with age but increases over time. Usually seniors are more likely to have either a Certificate of Primary Education or no degree at all but this proportion decreases over time (respectively 33% and 30% in the 80’s, 23% and 21% in the 90’s, and 13% and 15% in the 2000’s). The proportion of A-level degree or vocational baccalaureate increases over time to reach 16% of the aged 30-49 and 13% of the seniors in 2000.

2.3. Logit model

A logit model is calculated to evaluate the determinants of the probability to be employed. Y_i depicts the probability of being employed active using a binary format (1 if the person is employed active, 0 if the person is not). This probability is explained by several personal characteristics put together into a vector X_i , by the affiliation to a generation G_i and by an error term ε_i following a normal distribution (with a hypothesis of non-correlation with the explanatory

variables, meaning $E(X/\varepsilon) = 0$). This model gives the opportunity to describe how personal characteristics and affiliation to a generation can affect the participation to the labor market. Each explanatory variable was turned into a dichotomous variable (1 if the person fits the category, 0 if the person does not). A regression has to be made for each three period of time: 1980 decade, 1990 decade, 2000 decade and 2007-2011. The reference for each explanatory variable is introduced in table 6.

$$Y_i = \alpha + \beta X_i + \gamma G_i + \varepsilon_i$$

Table 6. Reference modalities for the explanatory variables

Variables	References
Gender	Being a men
Senior	Not being an old people
Nationality	Being french
Socio-professionnal category	Being a senior staff
Marital status	Being single
Area of résidence	Living in Ile de France
Nature of town	Living in a rural town
Type of household	Being alone in the household
Living status	Being buyer in the property or already owner
Degree	Having a 2nd or 3rd university degree

2.3.1. Simple model

Let's start with the estimation of a simple logit model, taking into account the two main control variables which are the age and the gender. This gives the possibility to be sure that there is indeed a negative impact on the probability of being employed, related to the age or to the fact of being a woman. The estimated coefficients are negative and significant: being a senior and a woman results in a negative impact on the probability to be employed active. To determine the extents of this negative impact, odds ratios - which evaluate the positive and negative odds of a person to be employed active - are calculated (depends on the measured probability).

Compared to the aged 30-49, a senior (50-59 years old) is 59.3% less likely (because the estimated coefficient is negative) to be employed active between 1982 and 1989 ($1-0.407 = 0.593$, either 59.3%). Compared to a man, a woman is 75.5% less likely to be employed active during the same period of time ($1-0.245 = 0.755$, either 75.5%)

From 1990 to 1999, the coefficients remain negative but they are lower. The odds ratios are higher. A senior is 54.3% less likely to have a job in comparison to a median age person; and a woman is 64% less likely in comparison to a man. The probabilities decreased compared to the ones from 1982-1989. During the period 2000-2011, the estimated coefficients are once again negative and

lower (compared to the 1990 decade), for both variables. A senior is 53.1% less likely to work; and a woman, 50.5%. These probabilities have decreased again. Indeed, several arrangements were established in 1990-2000 so that the older people could work longer or go back to work if they retired. Besides, the employment rate of women has kept increasing for several years: “Thereby, in 2002, 3 women out of 4 and aged 25-59, stated to have a job or to be looking for one; whereas only 50% were in 1970” (Afsa Essafi C. et Buffeteau S. (2006)).

A fourth period, more recent, is considered to determine if the economic crisis is visible. The odds ratios increased compared to the previous period. The coefficients are negative. A senior is 52.5% less likely to have a job. This percentage is slightly lower than the one from 2000-2011 (0.5 point lower). A woman is 44% less likely to have a job during the period 2007-2011. After having gone through the simple logit model, it is now interesting to focus on the full model with additional explanatory variables.

2.3.2. Full model

After description of the simple model with only two explanatory variables, a full model can be built from this simple model; by adding additional variables capable to justify the probability of being an employed active. The reference modalities have been previously detailed.

The analysis is carried out by progressively using one variable after the other. Independently of the period of time, seniors are less likely to be employed active, but this trend decreases over time (60% to 49%). Women are also less likely to have a job in comparison to men; but this trend also decreases over time (80% to 50%). Being a resident in an urban district gives more chance to be employed in the 80's and 90's than when living in a rural municipality (+5.5% and +1.5%). However, such chances are much lower during the 2000 and 2007-2011 decades (-4.9% and -6%). The marital status does not bring such clear results. For the 1980 decade, people who are married, widowed, or divorced are less likely to have a job in comparison to a single person (respectively 1.9%, 4.2% and 5.3% less likely). Between 1990 and 1999, the trend is reversed and these three marital statuses get more favorable to employment (respectively 12.2%, 4.3% and 14.3%). In the 2000's, as well as between 2007 and 2011, married and widowed people get again a negative chance to be employed (the percentage being higher for the widowers).

Socio-professional category can be analyzed as following: an exploiting farmer is more likely to be employed than a manager, but the percentage decreases over time; which coincide with the decline of the farmer proportion among the employed active (cf. descriptive statistics). Being an artisan increases the chance to get a job, but this is a trend declining over time (+64.1%, +62.7%, +17.2%).

Between 2007 and 2011, the probability for an artisan to have a job is lower than for a manager (-0.9%). The chances to be employed for a middle-level profession, for an employee, or for a laborer are lower than for a manager but decreases over time. The type of household also has impacts on the possibilities to have a job. In comparison to a person living alone, single-parent families have more chances in the employment field. The situation is the same for couples with or without children (2000's). The complicated households are less likely to get a job, regardless the period of time. Generally, homestead give easier access to employment than when renting or having free accommodation.

Regarding the area of residence, the Ile de France region appears to be the most attractive region in terms of employment. Indeed, people from other regions are less likely to have a job than people living in Ile de France; and this is especially true for the regions Nord pas de Calais, Lorraine (suffering from the progressive deindustrialization of France), Languedoc Roussillon and PACA. French nationality is a synonym of employment. Indeed, other nationalities give much less chances to have a job, which is confirmed by high percentages. However there is one exception: having the nationality of a Southern European country provides more chances to be employed than when having a French nationality (between 50% in 1982-1989 and 40% lately). Having a degree which is not a master degree or a doctorate decreases the chances of having a job, except if it is related to social and medical field, for which chances are in average 20% higher in 1990-2000.

3. Decomposition of the participation gap between two sub-populations

After estimation of the determinants to get a job in terms of age and individual features, an approach is now suggested to analyze the potential discriminations which could affect the seniors in the labor market.

3.1. Method

The method which is employed is the one suggested by Fairlie. It is an extension of Blinder-Oaxaca decomposition, being applied to a linear model. Fairlie decomposition is adapted to models with binary dependent variable. Several papers written by Fairlie promote this method. The paper from 1999 compares black and white population as regards to the employment rate and to the dismissal of freelance workers. The paper from 2003 compares the same populations as regards to the rate of domestic IT equipment.

Regarding our problematic, the estimation of the decomposition appears as described below:

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

\bar{Y}_i^k is the average probability of working, where J corresponds to the population “Junior: median age” and S is for “Seniors”.

N^k represents the sampling size for the two distinct populations

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

$F(\cdot)$ is the cumulative distribution function, following a logistic distribution (starting from a Logit model)

In our case, the decomposition consists in defining the average probability of being employed active for the age median population (aged 30-49) and for the senior population (aged 50-59) as cumulative distribution function with logistic distribution. The first term represents the part of deviation which is related to the difference of observable features between the two populations. This is called the explained part of the decomposition. The second term refers to the deviation attributable to the return from these same features. This is called the unexplained part and related to discrimination. This model gives the possibility to describe the differences related to employment for these two populations. The “Junior” population is chosen as a referenced by a choice of interpretation. This refers to the hypothesis of discrimination to the detriment of the seniors. However it is possible to choose the “Senior” population as a reference, but results and interpretation will end up being different.

It is also possible to evaluate the relative contribution of the observable features to the probability deviation, which can be either positive or negative. If the contribution is negative, it means that the variable can lower the difference in activity, which is linked to the distribution difference of the observable features between the two populations. The sum of the relative contributions of each feature corresponds to the total deviation of activities, assigned to the distribution differences of observable features between the two populations. The unexplained part of the deviation means that the two populations do not have the same effective participation to the labor market because the observable features do not provide the same results even though they are similar for the two groups. Furthermore, the Fairlie decomposition does not explain the relative contribution of the characteristics from the unexplained part and so neither the assigned coefficient to each observable characteristic (Berchet C., Jusot F. (2009)). But this is not our concern. The objective is to evaluate the explained and unexplained parts of the probability deviation to be employed active, to understand the extent of the discrimination existing against seniors in the labor market.

However the methods of decomposition have to be carefully used. They are run by two main limits: “the path dependence” and “the identification”. The first mentioned limit refers to the obtained results, which are sensitive to the introduction sequence of the different explicative variables. This problem occurs only in the non-linear case because, contrary to the linear case, the additivity assumption is not true. That is why it is necessary to evaluate the contribution of each explicative variable from a sequential path. To do so, the introduction sequence of explicative variables is randomized thanks to a specific option used during the decomposition calculation. The second mentioned limit explains why the obtained results depend on the chosen reference modality in the case of qualitative explicative variables. This dependence is even stronger when the unexplained part is decomposed (Narcy M., Ecole Thématique Evaluation des Politiques Publiques d’Aussois (2013)).

3.2. Results

The results about the decompositions are based on the coefficients of the median age population, used as a weight and considered as an under-representation of seniors in the labor market. A negative explained part means that the unexplained part, related to discrimination, tends to explain most of the differences of participation between the two populations. This negativity also means that the unexplained part will be higher than 100%. Positive and negative values can be observed when considering the results of contribution of the different explicative variables. A positive sign means that the differences of distribution between the variable modalities contribute to the lowering of the deviation if the two populations had the same features corresponding to the explicative variables. When a negative sign is associated to an explicative variable, it means that the deviation of employment probability would be higher for populations with similar features.

Table 7 shows the main results. For the 1980 decade, the explained part of the deviation corresponds to -6.8% of the total participation deviation. The unexplained part reaches 106.8%. Positive contributions appear for the type of municipality, the marital status, the region of residence and the degree (respectively 0.04%, 0.5%, 0.28% and 9.5%). The degree lowers the deviation. Negative contributions appear for the gender, the socio-professional category, the type of household, the occupancy status, and the nationality (respectively -2.8%, -2.3%, -9.1%, -2.5%, -0.4%). So, the type of household enhances more the deviation.

Concerning the 1990 decade, the explained part reaches -11.2% of the overall employment difference (and the other part is 111.2%). The contributions of the explicative variables are negative, except for the variable ‘degree’. This means that this variable lowers the deviation in the

case of similar population for this specific characteristic. On the contrary, the contribution of the variable 'gender' reaches -0.0021 (or -1.5%). Then it tends to increase the probability deviation of being employed. For the other variables such as type of municipality, marital status, socio-professional category, occupancy status, region of residence, nationality, and degree; the contributions are respectively -0.01%, -1.7%, -3.7%, -5.4%, -7.3%, -0.02%, -0.5% and 9%. The last previously mentioned variable tends to lower the overall deviation of being employed. Then, the variables which lead to a higher deviation are the occupancy status, followed by the type of household and the socio-professional category.

The results from the 2000 decade are slightly different. The explained part is still negative, with a value of -9.8% of the overall difference of employment; and the unexplained part reaches 109.8%. Contrary to the previous periods of time, the variable 'gender' has a positive contribution equal to 1.3%; but it still remains low. As a consequence, it reduces the probability deviation of being employed in the case of similar populations. Regarding the municipality, the marital status, the socio-professional category, the type of household, and the occupancy status, the contributions are negative and higher for the housing occupancy and the type of household (respectively -11.3% and -5.4%). The contribution of the remaining mentioned variables is negligible, which enhances the overall deviation. The degree keeps a high and positive contribution (10.1%). The last results focus on the 2007-2011 period, related to the recent economic crisis. The explained part is lower than what it was during the whole 2000 decade. It is the same for the potential discrimination (108.1%). This suggests a higher unexplained part of the probability deviation to be employed. The discrimination can be more present. The variables gender, socio-professional category and the region of residence slightly and positively contribute to the explained part (respectively up to 0.6%, 0.5% and 0.45%). However the distribution difference between the modalities for the variable 'degree' keeps a strong explanatory capacity, even higher than during the previous periods of time (the percentage evolves from 9% to 12%). The remaining variables have a lower negative contribution for the municipality, the nationality and the marital status (respectively -0.17%, -2.4% and -2.9%). As before, the type of household and the occupancy status both contribute more negatively, up to -5.7% and -11.2%. Therefore, they enhance the deviation in case of two similar populations.

Now we compare the periods of time which were analyzed. The explained part of the probability deviation to have a job is always negative and its percentage decreases over time. On the contrary, the unexplained part (potential discrimination) increases overtime and is always higher than 100%. This suggests a high discrimination between the two populations. The discrimination seems to be higher and higher overtime. This discrimination affects the seniors because the model was weighted

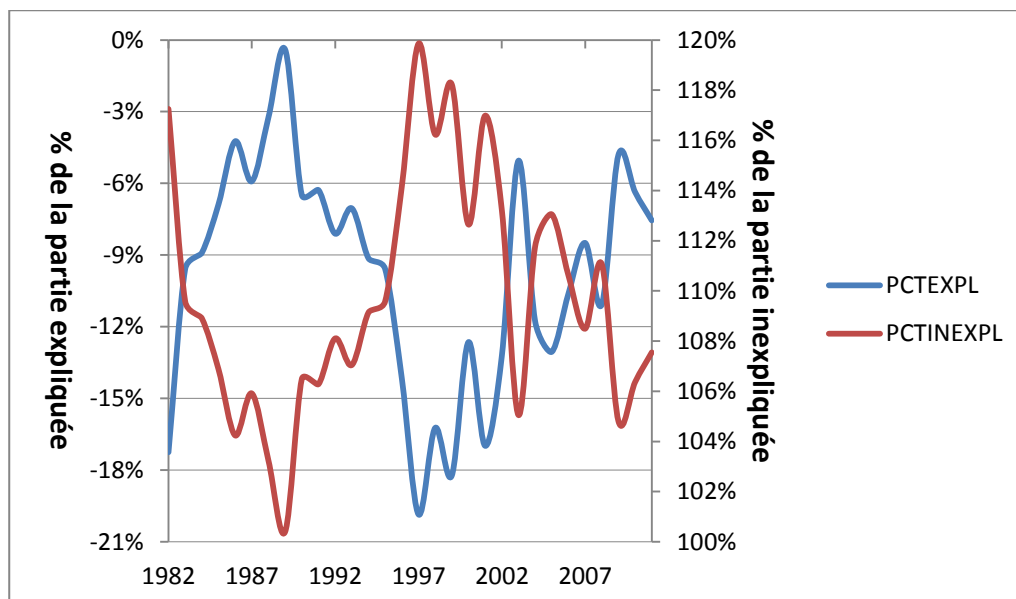
with the coefficients of the median age population, and so it under-represents the senior population in the labor market; as it was explained in the decomposition theory (in the literature discussing decompositions, the most common example which is mentioned corresponds to the wage discrimination based on gender. In this case, the weight is made using male coefficient if an underpayment of the females is assumed). The contribution of the variable ‘degree’ is always positive and increasing. Along with the type of household and the occupancy status, it takes part to a group of variables for which the contribution to the probability deviation is the highest. The other variables seem to play a minor role in the probability deviation of having a job, between the median age and senior populations. The variable ‘gender’ has a contribution which evolved from negative to positive. For a while, the distribution differences between males and females enhanced the deviation in case of similar population (negative contribution from 1982 to 1999). Lately, this variable has contributed to decrease the deviation (positive contribution from 2000 to 2011). The variables type of household, occupancy status and nationality always have a negative contribution. This contribution increases overtime for the type of household whereas it decreases for the two other variables. The contribution of the variable type of municipality and marital status evolve from positive (1982-1989) to negative (1990-2011). A reverse trend is observed for the socio-professional category, as the contribution is first negative (1982-2011) and then positive (2007-2011)

Table 7. Contribution of the explicative variables to the probability gap to be employed

Variables	1982-1989	1990-1999	2000-2011	2007-2011
Difference of participation	0,156	0,139	0.119	0.109
Explained gap	-0.011 (-6.8%)	- 0.0156 (-11,2%)	-0.0117 (-9.8%)	-0.0088 (-8.1%)
Unexplained gap	0,167 (106,8%)	0,155 (111,2%)	0,130 (109,8%)	0,118 (108,1%)
Gender	-0.0044 (-2.8%)	-0.0021 (-1.5%)	0.0015 (1.3%)	0.0007 (0.6%)
Town	0.000065 (0.04%)	- 0,00002 (-0,01%)	-0.00008 (-0.06%)	-0.0002 (-0.17%)
Matrial status	0.00082 (0.5%)	-0,0024 (-1,7%)	-0.0025 (-2.08%)	-0.0032 (-2.9%)
Socio-professional category	-0.0036 (-2.3%)	-0,0052 (-3,7%)	-0.0013 (-1.09%)	0.0005 (0.5%)
Type of household	-0.0142 (-9.1%)	-0,0075 (-5,4%)	-0.0064 (-5.4%)	-0.0062 (-5.7%)
Living status	-0.0038 (-2.5%)	-0,0102 (-7,3%)	-0.0134 (-11.3%)	-0.122 (-11.2%)
Area of résidence	0.0004 (0.28%)	-0,000032 (-0,02%)	0.0006 (0.54%)	0.0005 (0.45%)
Nationality	-0.0006 (-0.4%)	-0,00073 (-0,5%)	-0.0021 (-1.81%)	-0.0026 (-2.4%)
Degree	0.0148 (9.5%)	0,0125 (9%)	0.012 (10.1%)	0.0138 (12.1%)

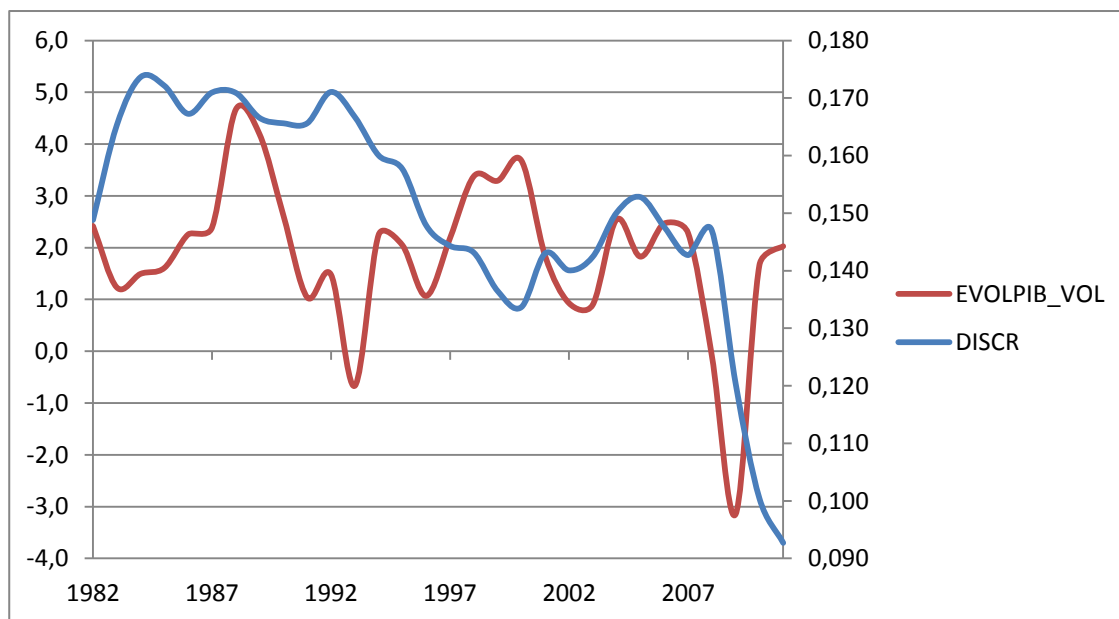
Compared to other surveys based on other discrimination criteria, the explained part appears low while the unexplained part seems to be high. According to the chosen thematic, the proportion of these two parts is more or less high. Indeed, the survey from Fairlie, which compares men and women within the economic performance (Fairlie 2009) shows an explained part up to 10% for the profit performance, up to 12% for the sales performance... An additional survey based on the difference of entries and withdrawal flows for the status of freelance worker between Black and White in the USA, shows an explained part up to 29% (coefficient of the Black population) and up to 14% (coefficient of White population) (Fairlie 1999). A survey based on wage discrimination between men and women finds an explained part of 85% based on individual features, and an unexplained part up to 15% (comparable to discrimination). If full-time job is taken into account, the explained part reaches 52% and the unexplained part 48% (Meurs et Ponthieux, 2000). Other studies found a negative explained part, which suggests a high discrimination. This is for example what is shown in a study dealing with the participation difference to the labor market, between disabled and non-disabled people, in Peru. Based on the participation probability, the explained part is up to -29%, 49% and -33.5% (by respectively using the coefficients of the population with disability, without disability and then both populations). Based on the activity probability, the results are respectively -22%, 46% and -28% (Maldonado 2010). In order to get a more precise idea of the evolution of the two parts of the probability deviation, it is possible to plot them against time, for the years 1982 to 2011 (graph 2). The explained part is always negative, which suggests that if the median age group would have the characteristics of the senior population, their employment rate would be lower. The unexplained part remains high over the whole period of time (higher than 100%).

Graph 2. Evolution of the explained and unexplained parts over time



A last aspect, concerning the relation between discrimination and economic situation, needs to be analyzed. It is possible to plot the correlation between GDP and discrimination, in absolute value, through a temporal dynamic graph (graph 3). The correlation appears acyclic. Indeed, the relation is either countercyclical (in 1993-2000 and in 2009-2011) or pro-cyclical (in 2003-2005 and in 2007-2009). Then, there is no clear impact of general economic conditions. A negative Trend of discrimination can also be observed over a long period of time. Overall, the discrimination has decreased.

Graph 3. Correlation between GDP and discrimination over time



An econometric test is conducted to confirm these results. A simple linear model is determined, using the unexplained part of probability (discrimination) as a dependent variable; a Trend (coded from 1 to 30 to depict the years 1982-2011) as explicative variable; and a variable of economic condition (evolution of GDP in volume).

$$Discr_t = \alpha + \beta Trend + \gamma EvolPIB_Vol + \varepsilon_t$$

The coefficient of the variable Trend is negative but low (-0.00181) and significant up to 5%. The variable GDP is not significant. Over a long period of time, no correlation between GDP and the discrimination indicator can be observed. These results confirm the interpretation which was made from the previous graph: the trend of a discrimination decline, and the acyclic relation.

Conclusion

Through the analysis of the senior involvement in the labor market, it appears that the problem of senior employment is a reality that gains importance into public debate. Several economic issues in terms of additional production, social, pension funding, and even in societal terms such as the

increase of life expectancy, are responsible of a rise of senior employment. They have a high economic weight and labor force. Even though public authorities established arrangements which are slowly working, the senior employment rate has difficulties to increase. A main obstacle to this situation is the employment discrimination existing towards the seniors. This discrimination comes from several negative prejudices towards that population, in the professional area. However they undoubtedly do have qualities. Firstly, it was necessary to determine the determinants of the probability to be employed active for two populations characterized by an age difference (median age and senior population), and over different periods of time. Significant differences are observed according to the periods of time. Secondly, the method of decompositions was used to make a first evaluation of the supposed discrimination towards the seniors. This method brought out a few results. Firstly, the explained part is negative over the whole considered period of time; which suggests a strong discrimination towards the seniors. Besides, the unexplained part is high over that period of time. The discrimination decline is limited (the coefficient associated to the Trend variable is slightly negative). This result can be interpreted as an employment rate convergence between median age and senior populations, which however does not affect the unexplained part of the deviation (based on the fact that the unexplained part, expressed as a percentage of the overall probability deviation, is always higher than 100%). Thirdly, no clear apparent cyclicity can be observed between economic conditions (depicted by the GDP evolution, in volume) and discrimination. Fourthly, a strong lowering of discrimination during the crisis can be seen (cf. graph 3). In relative terms, this result can be interpreted as an apparent non degradation of senior employment rate, compared to the median age population, during the crisis.

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