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**Effects of the French pension reforms on living standards of
retirees: intergenerational comparisons**

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Abstract

The 1993 and 2003 reforms of the French pension system introduced less favourable rules for retirees that will influence the level of pensions. On the other side changes in productivity will lead to an increase in wages and pensions for future generations of pensioners, compared to the previous ones. It is uneasy to determine on *a priori* grounds how far this improvement can be sufficient to counterbalance the negative effects of the pension reforms on retirees' living standards. Moreover the impacts of the reforms are not likely to be the same for men and women because of differences in labour force participation over the life-cycle and differences in longevity.

The aim of this contribution is to estimate the *ex ante* effects of the French pension reforms on retirees' living standards by comparing the situation of successive generations of men and women. For this study we will use the French dynamic microsimulation model DESTINIE.

1. Introduction

Issues concerning income dispersion among retired people are becoming a matter of increasing concern. Such a concern is in line with the general theme of the "adequacy" of pension levels i.e. the efficiency of pension systems in protecting elderly people against poverty. Since the strong revalorizations of pensions that occurred during the mid seventies, the French system has been relatively successful in offering such a protection. Until this period, the prevalence of poverty among elderly people had been quite high, much higher than among other demographic groups. This situation has completely reversed, with poverty being now more widespread among the general population than among pensioners. The new question that arises is to know whether this rather favorable situation will perdure or not.

The cohorts retiring now and along the 35 next years had or will have very different socioeconomic life events from the previous cohorts.

Their labour force participation is stronger, especially for women, which could let us think that living standards of pensioners could increase in the next decades.

They will also be concerned by the increase of divorces and separations and thus by very different family life events even after retirement. For these cohorts, the life expectancies of men and women will progressively get closer, which will also lead to a change in household

compositions, and marital status of retired women and men. These demographic changes may have varied impacts on living standards of pensioners and their poverty rates. They could cause contradictory effects according to age, gender and careers. For some of the pensioners these changes may lead to a decrease of their living standards and for others to an increase.

Living standards of pensioners may also decrease, and thus poverty rates among pensioners may reincrease, resulting as well from less generous rules and changes in retirement behaviours introduced by the 1993 and the 2003 French pension system reforms as from indexation rules, with pensioners starting retirement above the poverty threshold but progressively caught back by this threshold.

The aim of this paper is to estimate the evolution of living standards of pensioners, in order to see how those socioeconomic changes will influence the pensioner's position and the consequences of the 1993 and 2003 reforms of the pension system on living standards of retirees.

To this end, the evolution of the living standards of pensioners has been simulated for a few cohorts (born between 1945 and 1962) retiring after the 2003 reform. Intra and inter generational analyzes have been made, with a particular focus on the differentiation between the evolution of living standards for men and women both between and within the different cohorts. The microsimulation model DESTINIE was used for simulating the living standards.

After a first section presenting shortly the French pension system and the microsimulation model DESTINIE, the second section reviews the evolution of living standards of pensioners from retirement until death and over the cohorts, considering the gender. The last part will show the consequences of the reforms on living standards.

2. Preamble

2.1 The French pension system: calculation of pensions amounts

In order to favor the comprehension of this paper, it is necessary to present briefly the main rules of the French pension system.

At retirement, an individual's entitlement is calculated according to a set of complex rules, which differ depending on the scheme to which person is affiliated (public sector or private sector). The pension entitlements comprise a basic pension completed by a complementary pension for the private sector employees.

As a general rule, the pension depends on the individual's period of contribution to the scheme. The contribution period includes periods actually worked for which contribution were paid, and periods for which contribution credits were awarded (periods of unemployment, illness or inactivity to raise children).

While the complementary schemes are based on the accumulation of points, the value of the basic pension is calculated by multiplying three terms: an annual reference wage (*salaire annuel moyen* or *SAM*), a proportionality coefficient and a prorating coefficient. The prorating coefficient reduces the pension in cases where the actual contribution period is shorter than the period required to obtain the full basic pension (*required duration* or *RD*). The proportionality coefficient is maximum when someone has contributed at least the required duration or when someone retires at least at 65 years old. The coefficient is then called the full rate (*le taux plein*). The contribution period required for the full rate depends on the year of birth in order to apply the different reforms of the French pension system occurred since the eighties.

The formula to calculate one's pension at retirement can be summed-up this way:

$$P = \text{Coeff} \times \text{Min}[T/RD, 1] \times \text{SAM}$$

where T is the number of years of contribution, RD is the required duration, Coeff is the full rate, $\text{Min}[T/RD, 1]$ is the prorating coefficient.

The basic pension and the complementary one, in the private sector, are based mainly on working careers. They represent the individual's own pension. It can be completed with various entitlements considered as « non-contributory » as they do not depend on contributions paid from employment income: the survivor's benefit and the minimum allowance (the *minimum vieillesse*). They have been introduced for cases where pension entitlements remain unacceptably low.

The survivor's benefits are allocated, where relevant, after the spouse's death or an ex-spouse's death. The role of the survivor's benefits is to protect him or her from poverty and to avoid a too large loss of incomes after the spouse's death. It concerns mainly women who had short careers leading to very low pensions. The amount of the basic survivor's benefit is about 50% of the spouse's pension.

The *minimum vieillesse* is a minimal allowance for pensioners over 65, when the sum of their own pension and the incomes of the other members of their household are under a minimum level. It is a social minimum income preventing pensioners from excessively low living

standard in comparison to the rest of the population. It can be considered as a poverty threshold as it is close to the poverty threshold equal to 50% of the median living standard. The 50% median poverty rate has been most of time used in France.

2.2 The 1993 and 2003 reforms of the pension system

The 1993 and 2003 reforms included the following elements synthesized in table 1.

The 1993 reform only concerned the private sector. Its most symbolic measure was a first tightening of the 37.5 years condition: it scheduled a shift in this condition by one quarter each year until 2003, in order to reach the new value of 40 years. Although highly symbolical, this measure was not the one that was expected to have the largest effect in the short or medium run. More rapid and more decisive reductions in expenditure levels were awaited from three more technical measures:

- One was the shift in the number of years on which past wages are averaged when computing the reference wage to which the replacement rate is applied. From 10 years in pre-1993 conditions, the reform scheduled its increase each year until reaching the value of 25 years.
- The impact of this measure has been amplified by a revision of the rule according to which these past wages are reevaluated before being averaged. Pre-1993 conditions implied a reevaluation on the basis of past changes of average wages. Post-1993 conditions imply that this reevaluation is only based on prices, hence a much weaker reevaluation of wages received several years ago. This new rule considerably amplifies the impact of having shifted from an average of wages over the ten best years to the average over the twenty-five best years of one's career.
- Lastly, but this was rather a confirmation of a policy introduced in the second half of the 80s, the 1993 reform confirmed the principle consisting in indexing on-going pensions on prices rather than on wages.

Table 1: Pre and post-reform major rules for the major basic French pension schemes

	France, régime general (wage earners in the private sector)			France, public sector	
	Before the 1993 reform	Changes introduced by the 1993 reform	Changes introduced by the 2003 reform	Before the 2003 reform	Changes introduced by the 2003 reform
First age at which retirement is possible	60	No change		55 or 60 years, depending on categories	No change
Age or duration conditions for “normal” (full rate) retirement	Being 60 or more with at least N=37,5 years of contribution, or being 65 without any condition on N	Duration condition raised from 37,5 years to 40 years (in 2003)	Duration condition raised to 41 (between 2008 and 2012), and to be increased to 41,75 years in 2020*.	37,5 years	Duration condition raised to 41 (in 2012), and to be increased to 41,75 years in 2020*.
Pension level at the NRA	If N= 37,5, 50% of the average of wages, truncated to the SS ceiling, over the 10 best years of ones career. If N<37,5, this amount is prorated.	The period over which past wages are averaged is increased from 10 to 25 years . (process to take place between 1993 and 2008).	No change	75% of the last wage	No change
Penalty for retirement before the NRA	Proratization effect plus a reduction of 10% for each missing year	No change	Additional reduction reduced to 5% per missing year	Only the proratisation effect	Proratization effect plus a reduction of 5% for each missing year
Bonus for retirement after the NRA	None	No change	3% for each year of postponement	None	3% for each year of postponement

* Depending on future changes of life expectancy at 60.

The second reform that took place in 2003 had the following main features:

- The first measure is to organize a convergence of conditions for accessing to full rate pensions rate between the public and the private sector. The duration condition should be raised to 40 years in the public sector by 2008.
- After realization of this convergence, the duration condition common to the two sectors has already been scheduled to be increased by one more year between 2008 and 2012. It should then follow a path indexed on future life expectancy gains, in order to split these gains between 2/3 of additional length of working life and 1/3 of a remaining increase in the retirement length.
- In addition and partly in compensation for this strengthening of conditions for access to full retirement, more flexibility was introduced around this normal retirement age. Before the reform, a penalty was applied by the French general regime in case of a departure before the full rate, and there were no financial incentives to postpone

retirement beyond this age. The 2003 reform corrected this double anomaly by reducing the penalty for early retirement in the private sector (and conversely increasing it in the public sector where it was much weaker than implied by actuarial neutrality) and by introducing an incentive to postpone beyond that age, through a 3% pension bonus for each year of postponement.

- At last, a series of more technical changes should lead to reductions in the levels of full rate pensions, but to a much lesser extent than it had been the case with the 1993 reform.

2.2 The dynamic microsimulation model DESTINIE

The dynamic microsimulation model DESTINIE (an acronym for economic and social demographic model for simulated individual trajectories) was developed in the early 1990s in order to simulate how the situation of retired private sector employees would evolve. It has been built to analyze the long-run situation of pensioners, accounting for the heterogeneity of careers and preferences and for changes in the labour market, as well as for the demographic structure and retirement rules. In this respect it has been used to simulate the impact of the 1993 and 2003 French Pension Reform on e.g. the age of retirement, the replacement rate as well as the long-term number of retirees or financial equilibrium of the pension system (see references for details).

To address the temporal aspect of the pension problem, a representative sample of the French population needs to be aged. DESTINIE simulates the socioeconomic trajectory up to 2040 of almost 50.000 individuals, included in the 1998 Financial Assets Survey collected by INSEE, by means of deterministic rules and behaviour assumptions, and by drawing random events.

For each individual, DESTINIE simulates a life event history including demographic events (birth, death, union formation and dissolution, etc.) and economic factors (status in the labour market, annual income, etc.). In order to study intergenerational relationships individuals from the sample are connected to each other through the artificial imputation of kinship ties. When an individual is concerned by an event, the consequences on the other family members (the spouse in case of divorce for instance) are also taken into account by the model.

Due to its longitudinal nature, DESTINIE ages each individual of the sample via the simulated events driven by various equations. Concerning the demographic events the

parameters of the equations are adjusted so that the probabilities predicted by the model fit the long-term demographic projections made by the INSEE.

The economic events are mainly the transitions on the labour market. These transitions are treated as a first-order Markovian process. The parameters of the transition equations are adjusted to account for the increasing labour force participation and to allow for changes in the macroeconomic environment (rate of unemployment in the long run). Those parameters are estimated from the 1999 Labour Force Survey and adjusted to bring them down into the line with INSEE's projections of working population. For instance, we assume a three percentage point rise (from 78.5% to 81.6%) in the participation of women aged 25-54 by 2010. Conditional on the labour market status annual wages are then imputed as a sum of a deterministic component (depending on sex, school leaving age, tenure and economic sector) and a stochastic one (including an individual fixed effect and an auto correlated residual). Lastly, the age at retirement is endogenous: it depends on a trade-off between the utility the individual can expect if he or she retires now and the one he or she can get if he or she defers her withdrawal, inspired by the Stock and Wise model (1990).

The most recent uses of the model consisted in studying the ex post effects of the 2003 reform of the French pension system and the earlier one that has occurred in 1993. The main focus is on the intra and intergenerational redistribution induced by these reforms.

Although DESTINIE's primary focus is the simulation of pension the model can cope with distributional aspects of other public policies especially if one is interested in a life-cycle approach. In this regard one of the future developments of the model is to implement individual health expenditures in order to analyze the redistributive properties of the French health care system.

2.3 Methodology

The aim of this paper is to analyze the evolution of the living standards of pensioners for the cohorts born from 1945 to 1962, in both public and private sectors. These cohorts are all concerned by the last 2003 reform of the pension system, and as a result by identical regulations in terms of pension.

Living standards apply to individuals but rely on household data. The kinship ties between individuals are used to determinate and take into account the households' size and the

incomes of all the members of the household, even if they are not pensioners. But the studied population is only composed of pensioners. The unit is the individual, not the household.

Individual living standards are total resources of households to which these individuals belong, corrected from household size using OECD equivalence scales. The OCDE equivalence scales allocate different weights to the members of the household according to their ties with the pensioner: 1 to the pensioner, 0.5 to his or her spouse and 0.3 to the children still living with their parents.

Income components taken into account are pensions, wages, unemployment benefits, the *minimum vieillesse* and survivors' benefits. The levels reconstructed by the model for the current period remain partly inconsistent with usual data, due to methodological differences (e.g. the non inclusion of capital income and some of the social incomes, or of personal income taxes). As a consequence, trends rather than levels will be looked at in this paper.

3. Evolution of the living standards of pensioners

At one point in time (t), the population of pensioners includes new pensioners who have just retired and those who were already pensioners. The evolution of living standards (at $t+1$) of pensioners depends therefore on two elements: the living standards of new pensioners cohorts and the trends in living standards of those already retired.

3.1 Evolution of the living standards of pensioners during the retirement period

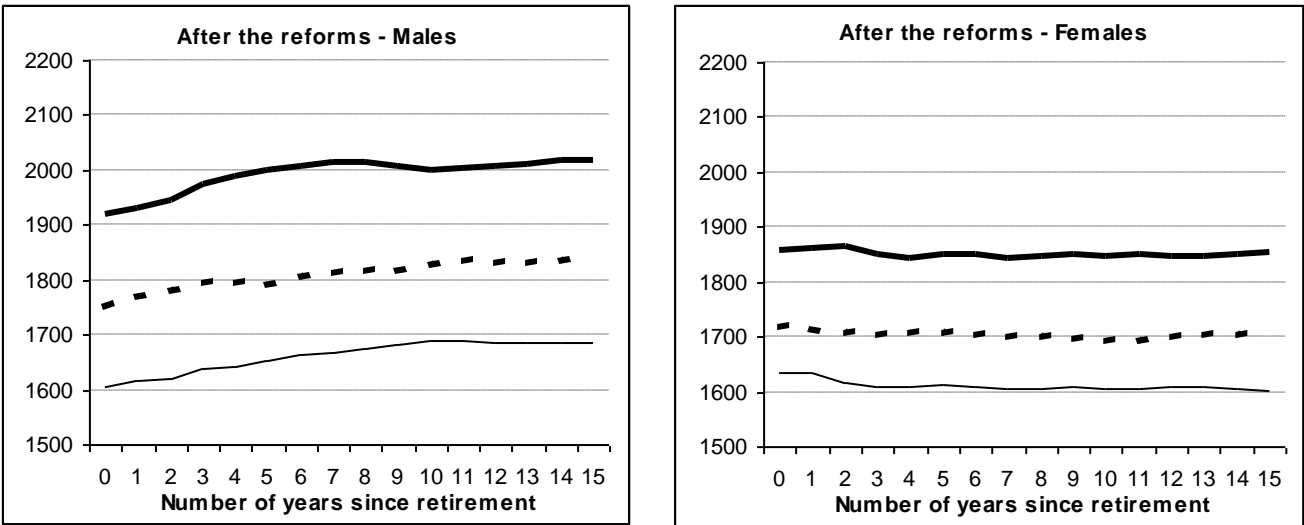
Figure 1 represents the evolution of living standards of pensioners from the 1945-1962 cohorts after retirement during 15 years. The first figure represents the trends for men and the second for women.

Figure 1 shows that for all the cohorts the living standards of retired men slightly increase during retirement. This rise of living standards for men during retirement can be explained by two events often occurring after retirement: the spouse's retirement and the spouse's decease.

When a man is already pensioned and his spouse is inactive, she doesn't receive any own income and doesn't participate in the household resources. But when she retires, her pension is a supplementary income, which increases the living standard of the household. Among these cohorts, men are much more concerned by this occurrence and as a result by a stronger rise of living standard in the first years after retirement. Indeed it is more common for women

than for men to be inactive before retirement: 15% of the pensioned men of the 1945-1950 cohorts live with an inactive women not yet retired, while only 2% pensioned women live with an inactive men. This proportion decreases as cohorts go by, but still 10% of the men of the 1957-1962 cohorts are concerned. Women are often younger than their spouse. When a man retires, his spouse often has to wait a few years before reaching the required duration of contribution. In addition, it is more useful for inactive women than for inactive men to bring forward their age of retirement until 65. They have more often than men short careers and therefore need to wait until 65 to get the full rate.

Figure 1 Living standards during the retirement period for the 1945-1962 cohorts



Note: in order to take correctly into account the 15 years after retirement, only the pensioners still alive 15 years after retirement are included, which represents 83% of pensioners.

Population: pensioners born from 1945 to 1962 still alive 15 years after retirement

Source : dynamic microsimulation model DESTINIE

Otherwise, widowhood during the 15 first years of the retirement period concerns 7% of men. During marriage or cohabitation, the living standard is the sum of the incomes of the individual and his spouse divided by 1.5. After the spouse’s death, the living standard is equal to his own incomes. Most often when the man is the survivor, when the spouse’s incomes were very low, after her death the men’s living standard rises mechanically. He benefits of the totality of his incomes and doesn’t have to share it with his spouse any more.

On the opposite, among women, consequences of the spouse’s death are rather a loss of living standard. They receive most of the time a much lower pension. At their spouse’s death they

lose the benefit of his incomes. Women are more often concerned by widowhood. Thus, during the retirement period, women's living standards tend to decrease progressively.

Globally, the average change of living standard after the spouse's decease, is a increase of 6%. Women on average can maintain their living standard (it increases only by 3%) while men find their living standard rose by 17% (table 1). But more than one retired women in three, born from 1945 to 1962 who were married or cohabitating when they retired, are facing a strong decrease of their living standard when their spouse deceases. Among men, only one in six are facing to a decrease of their living standard in this situation. Among the women who have to face a decrease of their living standard after their spouse's death, the average change is -11%. As women are much more frequently confronted to her spouse's decease during the retirement period, this mechanically strongly influences the average trend of living standards.

Table 1 Living standards after the spouse's decease

Cohorts	Evolution of living standard		% whose living standard decreases	
	Males	Females	Males	Females
1945-1950	14,0	4,7	17,3	33,4
1951-1956	17,4	2,4	15,5	38,9
1957-1962	16,2	1,8	12,9	37,9
Total	15,9	3,0	15,4	36,8

Population: pensioners born from 1945 to 1962 cohabiting or married at retirement who are widowed.
Source : dynamic microsimulation model DESTINIE

3.2 Evolution of living standards of pensioners over successive cohorts

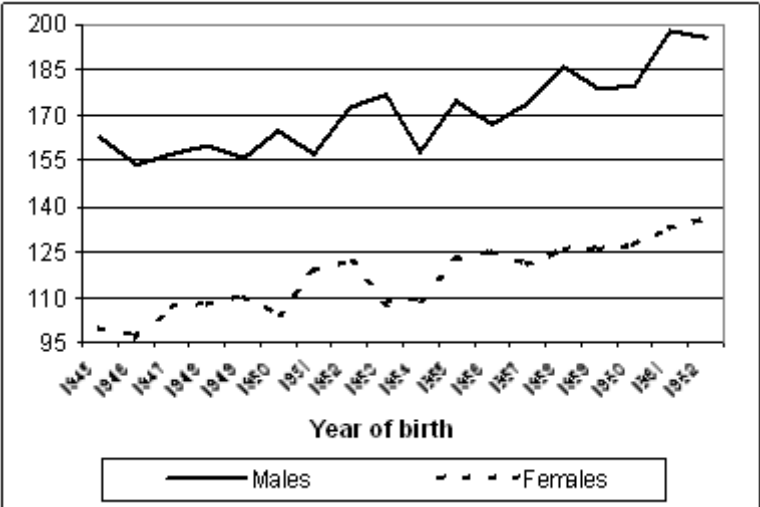
Figure 1 shows that, for men as well as for women, young cohorts have higher living standards than the previous ones. The gap at the time of retirement between the living standards of the successive cohorts are more important among men than among women. For women the difference at the time of retirement between the living standards of the successive cohorts is only 15%. The gap between men and women is the strongest from the cohorts born in the middle of the 1940s to the cohorts born in the beginning of the 1950s. The living standards are multiplied by 1.05 for women and 1.09 for men from the 1945-1950 and the 1951-1956 cohorts. From the 1951-1956 and the 1957-1962 cohorts average living standards of men and women increase in the same proportion.

This result may look surprising because women’s labour force participation rose very fast for those cohorts, while it has been quite stable for men. The contribution period for women born in 1962 is ten times higher than for the women born in 1945. But the major increase is between the 1945 cohort and those born in the beginning of the fifties.

The contribution period is one of the pillars of the pension calculation (see above). A strong increase of this duration should involve a strong increase of pensions, as it reduces the effect of the prorating coefficient. Logically the gap of living standards between the 1945-1950 and the 1951-1956 cohorts should be higher for women than for men.

But, as the figure 2 shows, the amounts of pensions received by those cohorts of pensioners at retirement do not increase much faster for women than for men over the successive cohorts. The first reason is that when women’s labour force participation rises, the increase of employment participation of women is much more modest.

Figure 2 Pension level at retirement for the 1945-1962 cohorts



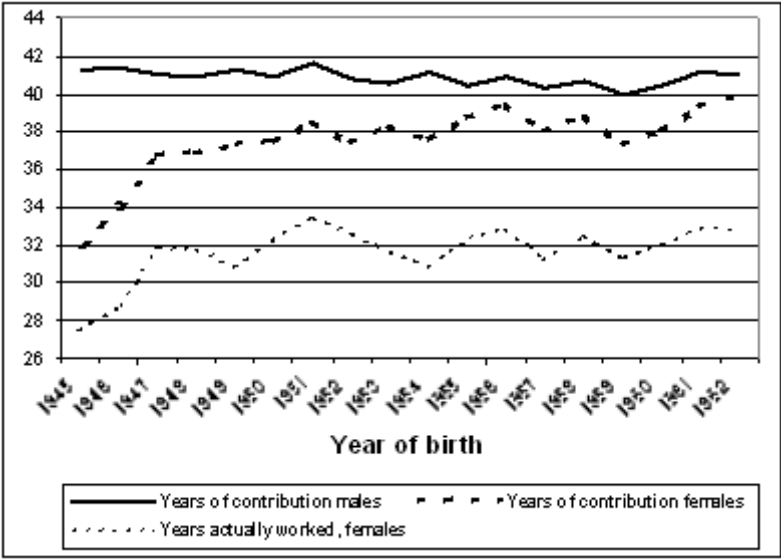
Note: base 100 = females from the 1945 cohort
 Population: pensioners born from 1945 to 1962.
 Source : *dynamic microsimulation model DESTINIE*

As one can see in figure 3, the number of years actually worked accumulated at retirement only climbs from cohort 1945 to 1948 and remains quite the same afterward. The second reason is that the women’s full time employment rate increases even more slowly than the employment rate (Afsa, Buffeteau, 2007). Thus women’s average annual reference wage (other pillar of pension calculation) doesn’t increase as much as the contribution period.

If labour force participation cannot explain the fact that men’s living standards evolve faster than women’s, from the 1945-1950 and the 1951-1956 cohorts, demographic trends may play an important part, especially the marital status at the time of retirement. Indeed, the proportion of couples and single persons are not expected to change the same way for men and women and even when they have similar marital status, men and women don’t receive comparable living standards.

Progressively over the 1945-1962 cohorts, at retirement women are less and less widows and men are more and more often single persons. Above all, more and more men and women have never been living in couple. But the increase from the 1945-1950 to the 1951-1956 cohorts of people who have never been living in couple at the moment of retirement is higher for men than for women (respectively 43% and 16%).

Figure 3 Number of years of contribution and actually worked for the 1945-1962 cohorts



Note: The contribution period includes periods actually worked for which contribution were paid, and periods for which contribution credits were awarded (periods of unemployment, illness or inactivity to raise children).

Population: pensioners born from 1945 to 1962.

Source : dynamic microsimulation model DESTINIE

Single men have living standards at retirement that are 1.2 times higher as for single women. While the increase in the number of single persons tends to cause a decrease of women’s average living standard, the opposite is true for men.

Afterwards, during retirement, among male pensioners, the evolution of living standards over successive cohorts are quite the same (figure 1). They increase over the 15 first years after retirement by about 5% for all the cohorts. The 1957-1962 cohorts have 20% higher average living standards than the 1945-1950 cohorts. For the 1945-1950 and the 1951-1956 cohorts, the increase ends ten years after retirement. For the 1957-1962 cohorts it ends already 5 years after retirement. For this cohorts, the frequency of widowhood during the 15 first years of retirement is only 5% when it is 7% for the other cohorts.

Among women, after retirement the decrease of living standards slows down with the cohorts. For women born between 1945 and 1950, the average living standard decreases by 2%, while it decreases only by 1% for the 1951-1956 cohorts. For the 1957-1962 cohorts the living standard is quite stable during retirement. This can be explained by the fact that women become less and less widows. During their 15 first years of retirement, 23% of the women from the 1945-1947 cohorts face their spouse's death, compared to 17% from the 1960-1962 cohorts. Therefore women from young cohorts are less confronted than the older cohorts with the decrease of their living standards caused by the spouse's decease after their retirement.

4. Effects of the 1993 and 2003 pension reforms on living standards of retirees

Many studies already showed that, as expected, the consequence of the 1993 and the 2003 pensions reforms is to lower pensions for the cohorts of pensioners concerned by the reforms than if the reforms had not been applied. But what are the effects of the reforms on living standards ?

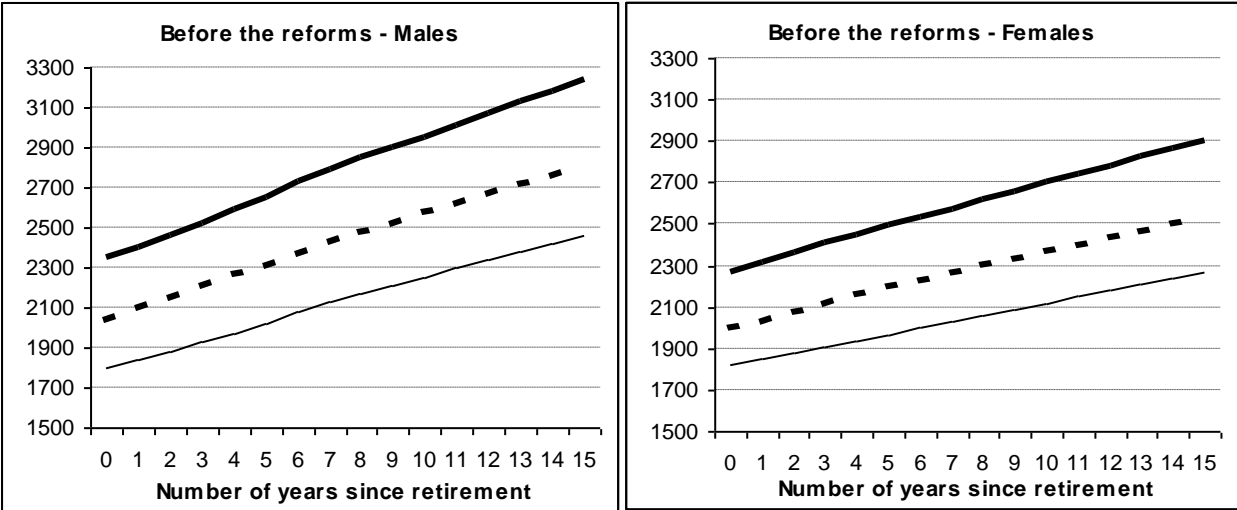
In order to analyze the effects of the reforms on living standards, we compared two scenarios with the Destinie model. The first one applies the current legislation after the reforms and the second one doesn't take into account the changes introduced by the reforms. This scenario applies the legislation in force before 1993.

Differences between the two scenarios could be explained as well by the changes in legislation as by changes in retirement behaviours. In order to insure that the differences between the two scenarios are essentially due to the reforms, we also simulated two scenarios with a retirement at the full rate. In these scenarios retirement behaviours don't depend on individual preferences but on similar rules. The differences between these two scenarios are

similar to the ones noticed between the two scenarios without the retirement at the full rate. Living standards are a little lower with a retirement at the full rate, which is not surprising. Therefore we only present in this paper the results of the scenarios taking into account the changes in retirement behaviours.

The figure 4 shows that without the reforms, living standards of pensioners would have been much more dynamic than it was observed after the reforms on figure 1. Due to the progressive application of the reforms, young cohorts are more concerned than older ones. Living standards at retirement of the 19945-1950 cohorts are 10% lower after the reforms than without the reforms. For the 1951-1956 cohort it is 14% lower and for the 1957-1962 cohorts it is 18% lower.

Figure 4 Evolution of living standards of pensioners during the retirement period in a scenario without the reforms



Note: in order to take correctly into account the 15 years after retirement, only the pensioners still alive 15 years after retirement are included, which represents 83% of pensioners.
Population: pensioners born from 1945 to 1962 still alive 15 years after retirement
Source : dynamic microsimulation model DESTINIE, scenario « before the reforms »

The gap between the two scenarios is much higher fifteen years after retirement. It increases progressively along the retirement period because of the indexations rules of the pensions. In the scenario after the reforms pensions are indexed on prices. Before the reforms, pensions were indexed on wages. And wage increase faster than prices. Therefore, without the reforms, pensions would have evolve all along the retirement period, when after the reforms they are almost stable during this period.

The 1993 and the 2003 reforms did not introduce particular differences between men and women in terms of living standards. But, the consequences of the spouse's decease for women is much less apparent in the scenario without the reforms. Without the reforms, after the spouse's death, the evolution of the living standard of women would just have a little slowed down. But with the reforms, due to the indexation of pensions on prices, instead of wages, women have more often to face a loss in living standard.

5. Conclusion

This paper presented a projection of pensioner's living standards in France and an analyze of the impact of the 1993 and 2003 reforms of the pension system on these living standards.

It could be completed by measure of the poverty rate (60% median of living standards for instance) or any other way to show the evolution of the position of pensioners compared to the rest of the population.

A new version of the model will very soon be available. Even if the simulation of pensions will remain one of the aims of the new version of the model, a diversification of its applications should occur in the years to come, emphasizing the two comparative advantages that it is going to keep: its ability to project households, not only individuals, and its flexibility. The new version of the model should try to put more emphasis on these two dimensions. Concerning living standards, one of the improvements of the next version of the model will be to make possible the addition of a module that could take into account a larger diversity of resources. This module would help simulating capital incomes and other social allocations (for instance housing allocations), which are not yet taken into account in the current version of the model.

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