Title

The Effects of Recent Spanish Pension Reforms on Sustainability and Adequacy of Pensions

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Abstract

The Spanish pension system has been recently reformed, mainly through the Act 27/2011, RD Law 5/2013, Act 23/2013 and Act 48/2015, as a response to the demographic challenge and with the objective of ensuring the sustainability of the pension system in the long run. The overall reforms include changes in most of the parameters of the system, a new indexation rule and a sustainability factor that links life expectancy and the first pension amount. Our goal is to analyze how these reforms affect two important features of a pension system: fiscal sustainability and adequacy. For this, we compute the real internal rate of return of the life-time contributions and benefits and the prospective gross theoretical replacement rate, both before and after the reforms. The calculations are case study-based, for a few hypothetical workers who are representative enough of the earnings and retirement patterns in Spain. The results show that the real internal rate of return is 0.7 p.p. lower and the prospective gross theoretical

replacement rate is 18 p.p. lower after the reform process for the base case of a man with an uninterrupted career of 40 years with average earnings and a retirement age of 65.

Keywords

Public pension system, pension reform, actuarial fairness, pension adequacy.

JEL Codes

H55, J11, J26

1. INTRODUCTION

The worldwide progressive ageing of population and the economic recession from 2007 forced most of these countries to reform public pension systems, with both immediate changes to satisfy the public deficit constraint and medium and long-term reforms to face a deteriorating old-age dependency ratio. In this sense, according to the green paper on pensions (European Commission, 2010), the effects of demographic ageing and economic and financial crisis on Social Security budgets were deeper than expected. In Spain, like in other European countries, these reforms were quite different from those that took place in the mid-1990s, in the sense that current pensioners and workers close to retirement were also affected.

As a result, crucial reforms in several aspects of the Spanish public pension system have been carried out since 2011, affecting the main parameters of the system and introducing two automatic adjustment mechanisms. The wave of Spanish pension reforms led to the entry into force of Act 27/2011, August 1, on the Updating, Adaptation and Modernization of the Social Security System; Royal Decree-Law 5/2013, March 15, referring to measures to promote the continuity of the working lives of older workers and promote active aging; and the Act 23/2013, December 23, regulating the Sustainability Factor and the Pension Revaluation Index. This new legislation didn't break the Spanish old-age pension system basis, a pay-as-you-go defined-benefit scheme, but changed most of the elements of the system, including a raise in the standard retirement age, new indexation rules, stricter conditions for early retirement, larger contribution periods for a full pension, an increase in the length of pensionable earnings, a new sustainability factor linking the life expectancy and the first pension amount, and so on. On the other hand, a new demographic supplement has recently entry into force, Act 48/2015, to increase the pension benefit for women depending on the number of children.

These reforms, approved to adapt and adjust the Spanish public pension system to current economic and demographic challenges, means a significant improvement in its sustainability

but, at the same time, it implies a risk of inadequacy of pensions, with a probably lower future first pension and also an indexation lower than prices, as it was shown by the studies of Herce (2013), Meneu et al. (2013), Devesa et al. (2015) or Rosado and Alonso (2015). Consequently, it is likely that future pensions will not be adequate enough to meet the future needs of pensioners, in contrast to the recommendations of the European Commission's White Paper on Pensions (2012), in which it is advised that "pensions as well as being sustainable must be adequate and sufficient." In this paper, we try to measure the depth of both effects, sustainability and adequacy, to detect whether additional measures are necessaries to reinforce the positive effects or to mitigate undesirable effects.

For this purpose, we choose two indicators to assess each one of the features of the pension system: the real internal rate of return (*IRR*) to assess the fiscal sustainability in the long run and the gross prospective theoretical replacement rate (*TRR*) to assess the income replacement capacity of the pension system (future income adequacy). Both the *IRR* and the *TRR* are case-study based calculations for a few hypothetical workers, in line with the assumptions about career length and age of retirement in the 2015 Pension Adequacy Report (European Commission, 2015c).

Other methodologies have been used to study the effects of ageing and pension reforms, from theoretical approaches through overlapping generation models (Auerbach et al., 1989, and Sinn, 2004; for example) to empirical approaches using individual panel data and surveys (Boeri et al., 2001, and Okumura and Usui, 2014; for example).

This paper is structured as follows: section 2 depicts an overview of the recent Spanish pension reforms, in section 3 the concepts of fiscal sustainability and adequacy in pension systems are presented with some indicators to measure this features, section 4 describes the methodology, section 5 shows the results and section 6 summarizes the conclusions.

2. OVERVIEW OF THE RECENT SPANISH PENSION SYSTEM REFORMS

Spanish old-age pension system has been strongly reformed since 2011 with the main objective of ensuring its financial sustainability. As a consequence of the reform process, at the end of the transitional period, the parameters of the system will be quite different from the initial ones. Here is a summary of all these changes.

Act 27/2011:

- Gradual increase in standard retirement age from 65 in 2012 to 67 in 2027. However, retirement at 65 without penalties is allowed for longer careers (38.5 years of service or more).
- Gradual increase in pensionable earnings period from last 15 years in 2012 to last 25 years in 2022.
- Gradual increase in the number of years for a full career from 35 in 2012 to 37 in 2027 with the corresponding adjustment in accrual rates.
- A new 33 years of service requirement for early retirement is legislated. The minimum age raise to 61 years in the case of non-voluntary retirement and 63 in the case of voluntary retirement.
- Higher bonus for deferred retirement depending on the years of service (4% per year for a 40 years career length, for example, from 3% before).
- Introduction of a sustainability factor from 2027.

RD Law 5/2013:

- Stricter eligibility conditions for early retirement. Only two years before the standard retirement age is allowed in the case of voluntary retirement and four years in the case of non-voluntary retirement. Maximum pension amount is reduced by 0.5% per quarter when anticipating the age of retirement. Reduction coefficients are increased in the case

of voluntary retirement (1,875% per quarter from 1,625% before for a 40 years career length, for example).

- Compatibility between retirement pension and work in the case of longer careers with a 50% of pension amount and lower contributions (promote active ageing).

Act 23/2013:

- Sustainability factor will entry into force in 2019 instead of 2027. This factor takes the form of a coefficient (usually less than one) on the first pension amount, like in Finland and Portugal. Its value depends on the dynamics of life expectancy at the age of 67 of the pensioner population, according to Social Security Office life tables. For illustrative purpose, this factor would be 0.92 in 2036 and 0.85 in 2056 using the life expectancy (average of both genders) assumptions in Europop2013 population projection for Spain.
- A new Pension Revaluation Index (*PRI*) is legislated. This index substitutes the previous Consumer Price Index (*CPI*). It is calculated annually with an 11 years data of revenues and expenses of Social Security Office: 5 past years, the present year and forecasts for the 5 next years. This new indexation rule constitutes an automatic balancing mechanism because the higher deficit in the pension budget, the lower value of the PRI, although there is a lower bound of 0.25% and an upper bound of *CPI*+0.5%.

In addition, Budget Act 48/2015 has introduced a new demographic complement for working women to recognize that having children is a type of contribution to Social Security. This complement entry into force in 2016 only for new pensioners and consists in a bonus of 5%-10%-15% of the pension amount if she had two, three or more than three children, respectively.

As a result of all these reforms, table 1 depicts the main parameters of the old-age pension system in Spain (before and after the last reforms) that could affect the level of the key indicators of sustainability and adequacy. The overall effect of such changes and the new legislated penalties and premiums for early or deferred retirement depends on career length. Then, table 1 also shows the total accrual rate results for four representative individuals, similar to those used in the 2015 Pension Adequacy Report: 40-65 (base case: an individual who retires at the age of 65 with an uninterrupted career of 40 years), 30-67, 38-63 and 42-67.

Table 1. Main parameters of Spanish pension system before and after the reforms

		Before (2012)	After (+2027)
Standard retirement age		65	67 (65 for longer careers)
Full career		35 years	37 years
Pensionable earnings reference		Last 15 years	Last 25 years
General indexation variable		CPI	PRI
Total accrual rate for each individual (after penalties and bonus for early or deferred retirement)	40-65	100%	100%
	30-67	94%	84.2%
	38-63	87%	85%
	42-67	106%	108%
Sustainability factor (2036 forecast)		1	0.9206
Sustainability factor (2056 forecast)		1	0.8508
Purchasing Power Loss 10 years after retirement if *PRI*=*CPI*-1% each year		0%	10.4%
Demographic complement (women)		0%	5% (2 children) 10% (3 children) 15% (4 or more children)

Source: Act 27/2011, RD Law 5/2013, Act 23/2013, Act 48/2015 and own elaboration.

3. SUSTAINABILITY, ADEQUACY AND KEY INDICATORS

The classical Aaron-Samuelson condition for fiscal sustainability, Aaron (1966) and Samuelson (1958), assumes that the economy is in steady state, with wages and labor input growing at a constant rate, and says that the rate of return that equalizes the present value of lifetime contributions to the present value of lifetime benefits must be lower or equal to the tax base growth, i.e. the sum of the labor productivity (wages) and labor input growth, which is the *GDP* growth from a macroeconomic point of view. So, the key indicator to assess the

sustainability of the pension system is the real internal rate of return (*IRR*). If *IRR* is not higher than the real *GDP* growth the pension system is financially sustainable.

A similar concept is actuarial fairness. In this case, the *IRR* must be compared with the rate of return of riskless asset because, according to Queisser and Whitehouse (2006), in the context of a pay-as-you-go pension scheme this is the interest rate at which the government can move money over time. So, a pension system is actuarially fair if lifetime pension entitlements are equal to lifetime pension contributions using the riskless interest rate.

When computing the *IRR* for different individuals one can verify if the pension system is neutral, that is, if any individual reaches the same *IRR*, regardless the age of retirement (intra-generational actuarial neutrality), the generational cohort (inter-generational actuarial neutrality) or the contribution effort (contributive neutrality).

With population ageing and economic recession, a pure pay-as-you-go defined-benefit pension scheme should rise the contribution rate to meet the Aaron-Samuelson fiscal sustainability condition. However, this is not the preferred way to adapt the pension system and most of the countries, and also Spain, have legislated sustainability factors, automatic balancing mechanisms and changes in some key parameters, affecting the replacement rate and hence the adequacy of pensions.

According to 2015 Pension Adequacy Report, adequacy of pensions is an important policy goal that consists in providing people with income in old age that allows them a decent living standard and protects them against poverty. Despite of the multidimensional approach to pension adequacy in that report, the most important feature is the income replacement capacity of the pension system. The 2015 Pension Adequacy Report describes several measures to assess this capacity; however, if we want to analyze the consequences of pension reforms in the long run, the most suitable indicator is the gross prospective Theoretical Replacement Rate (*TRR*),

which measures the level of pension (before income tax) in the first year after retirement as a percentage of individual pre-taxed earnings at the moment of retirement. Gross prospective *TRR* is a measure of future pension adequacy, i.e. for people who enters today in the labor market.

4. METHODOLOGY AND DATA

Both indicators to measure sustainability and adequacy, *IRR* and *TRR*, are case study-based calculations on an individual basis. Similarly to the 2015 Ageing Report (European Commission, 2015a) and the 2015 Pension Adequacy Report, the base case is a man who enters in the labor market in 2016 at the age of 25 and who retires in 2056 after 40 years of uninterrupted service, with average earnings. He is covered by the *Régimen General* scheme, the most common in Spain. Alternative cases are considered taking into account the above reports, the characteristics of Spanish pension system and the recent reforms. Table 2 shows all the cases.

Table 2. Base case and alternatives cases

Case	Career length	Exit age	Earnings	Gender	*IRP*
Base case	40	65	100% of the average	Man	*CPI*
Low earnings	40	65	66% of the average	Man	*CPI*
High earnings	40	65	Start at 100% of average and grow linearly to 200%	Man	*CPI*
Early retirement	38	63	100% of the average	Man	*CPI*
Deferred retirement	42	67	100% of the average	Man	*CPI*
Short career	30	67	100% of the average	Man	*CPI*
Woman with 2 children	40	65	100% of the average	Woman	*CPI*
Woman with 2 children, low earnings and short career	30	67	66% of the average	Woman	CPI
Low indexation	All the other cases				CPI-1%

Source: own elaboration from The 2015 Pension Adequacy Report.

The most representative cases for new pensioners in 2014 in Spain according to the MCVL2014 (Ministerio de Empleo y Seguridad Social, 2015), a data base of more than one million people linked to Social Security system, is the base case for men and the low earnings-short career for women. This is because the averages, for new old age pensioners in 2014 for men in the *Régimen General*, are a retirement age of 64.2 years, a contribution period of 40.2 years and a regulatory base (a measure of pensionable earnings of 17 years prior to retirement) of 1.06 of the average; while the figures for women are a retirement age of 64.4 years, a contribution period of 32.8 years and a regulatory base of 0.85 of the average.

Earnings and contribution formulas during the contribution period and pension formulas along the retirement period are summarized below. For simplicity, the year of retirement is 2056 in all the cases, so the year of entry in the labor market must be adapted for each case; we assume constant monthly payments of contributions and pensions (at the end of each month) each year; average earnings grow at a yearly constant rate, then earnings profile is increasing in all cases; and we assume uninterrupted contribution careers in all cases.

The actuarial balance equation equals the cumulative value of total contributions (*VTC*) and the actuarial present value of pensions (*PVP*) at the time of retirement:

$$VTC = PVP \tag{1}$$

To establish this equation we first compute the value of total contributions:

$$VTC = c \cdot w_e \cdot V(r, \omega, j, e) \tag{2}$$

Where c is the contribution rate, w_e is the first monthly wage and $V(r, \omega, j, e)$ is the cumulative value, at retirement age j, of one unit monthly wage at age e (when entering the system) increased each year by the rate ω and valued at an interest rate r.

Then, we build the actuarial present value of the pension flow:

$$PVP = p_j \cdot A(r, \lambda, s, j, T) \tag{3}$$

Where p_j is the amount of the first monthly pension and $A(r, \lambda, s, j, T)$ is the actuarial present value at age j of a unit pension (annuity factor) at the time of retirement, increased yearly by the rate λ (pension indexation) and valued at an interest rate r, where T is the last age in the mortality tables and s the probability vector of being alive at each age conditional of being alive at the retirement age.

Under the Spanish earnings-related defined-benefit pension scheme, the amount of the first monthly pension, is a percentage, a, of the regulatory base, RB, a measure of the average pensionable earnings:

$$p_j = a \cdot RB \tag{4}$$

The regulatory base calculation formula moves with the reform process from an average of the contribution bases (monthly earned income within thresholds) of last 180 months before the retirement to an average of the contribution bases of last 300 months. In both cases, the 24 months just prior to retirement are computed in nominal terms and the other are valorized with *CPI* until the 25th month before the retirement. So, the value of the regulatory base depends on the first monthly wage, the rate wage and the *CPI*. Table 3 shows the results for the *RB* with the old and new legislations using a monthly economy-wide average wage of 1,920 € in 2016, a *CPI* of 2% and a rate wage of 3.4% for average earnings, data of the 2015 Ageing Report for Spain (European Commission, 2015a, 2015b).

On the other hand, the percentage of the regulatory base also has changed with the reforms depending on the retirement age, the contribution period and the sustainability factor. In addition, a demographic supplement between 5% and 15% must be added after the last reform for women with two or more children. Table 3 shows the percentage of the regulatory base before and after de reforms (in 2056) for each individual case of the table 2 (see also table 1 for the results of the total accrual rate and sustainability factor projections).

Table 3. Percentage (*a*) of the regulatory base and regulatory base (*RB*) in € of 2016 for each case.

Case	Legislation before reforms		Legislation after reforms (2056)	
	a	*RB*	*a*	*RB*
Base case	100%	2,838	85.08%	2,656
Low earnings	100%	1,873	85.08%	1,753
High earnings	100%	4,974	85.08%	4,254
Early retirement	87%	2,838	72.32%	2,656
Deferred retirement	106%	2,838	93.08%	2,656
Short career	94%	2,838	71.64%	2,656
Woman with 2 children	100%	2,838	89.33%	2,656
Woman with 2 children, low earnings and short career	94%	1,873	75.22%	1,753

Source: own elaboration.

Table 3 shows that first pension amount will fall with the reforms due to a decline in the regulatory base (6.4%) and in the total accrual rate, *a*, (14.9% in the base case), resulting in a 20.4% cut in the base case if lower and upper limits are not applicable. This adjust is higher in the case of early retirement or short careers and lower in the case of deferred retirement. Table 3 also shows that women with two children and with the same characteristics than the base case reach higher pensions than men because of the demographic complement. But, as we have said before, the most representative case for women is the last one, so if gender gap in earnings and career length remains as now, gender gap in first pension amount can even increase.

Substituting equations (2)-(4) in (1), the actuarial balance equation becomes:

$$c \cdot w_e \cdot V(r, \omega, j, e) = a \cdot RB \cdot A(r, \lambda, s, j, T) \qquad (5)$$

The value of *r* in equation (5) is the internal rate of return (*IRR*), the sustainability indicator. It depends, for each individual case (see table 3), on the contribution rate, the mortality rates after the retirement (*s*) and the indexation of pensions (λ). The contribution rate in Spain is equal to 0.283 and includes early and old-age, survivor and disability pensions. We assume a

contribution rate in equation (5) of c=19.4% for early and old-age pensions according to the ratio of public pensions spending in these type of pensions and public pensions contributions for 2013 (2015 Ageing Report). On the other hand, we use the mortality rates for men and women from Eurostat population projections for Spain (European Commission, 2014) and two scenarios of indexation of pensions after the reforms $\lambda=CPI$ and $\lambda=CPI$-1%.

The adequacy indicator is the gross prospective theoretical replacement rate in 2056 (*TRR*), which measures the future income replacement capacity of the pension system. As we have said in section 3, it is the ratio of the pension income in the first year after retirement and individual earnings in the year before the retirement, both valuated in the same year:

$$TRR^{2056} = \frac{{p_j}^{2056}}{w_{j-1}^{2055} \cdot (1 + CPI)}$$

We also compute the 10 years after retirement theoretical replacement rate, which shows the income adequacy for pensioners as they age. According to the 2015 Pension Adequacy Report, this is a measure of the security of pension adequacy. This indicator captures the risk of an inadequate indexation rule. For each individual case, it is calculated considering the value of individual's pension 10 years after retirement relative to the wage of another worker with the same characteristics in that year:

$$TRR_{10}^{2066} = \frac{p_{j+10}^{2066}}{w^{2066}} = \frac{p_j^{2056}(1+\lambda)^{10}}{w_{j-1}^{2055}(1+\omega)^{11}} = TRR^{2056}\frac{(1+CPI)(1+\lambda)^{10}}{(1+\omega)^{11}}$$

Following the 2015 Pension Adequacy Report, this helps to provide an assessment of the pension erosion in terms of the evolution of the relative income position of the individual once retired compared to the general level of wages over the same period.

To finish this section, here are the summary of the data for the *TRR* and *IRR* calculations:

- Year of retirement: 2056 in all cases.

- Year of entry in the labor market, contribution period, earnings, retirement age and gender: consistent values with each case in table 2.

- Average monthly earnings: 1,920 € in the year 2016. So, the first wage, w_e, must be adapted for each individual case according to the age of entry.

- Annual average earnings growth in nominal terms: 3.4%.

- Inflation rate: *CPI* = 2%.

- Indexation of pensions: λ = 2%. With the reform process, the new pension revaluation index could be lower than *CPI*, so we also show the results if λ = 1% (*CPI*-1%).

- Life expectancy / mortality tables: Europop2013 by gender for Spain. However, life expectancy at the age of 67, average of both genders, is used when computing the sustainability factor.

- Contribution rate: *c* = 19.4%.

- Limits on contribution bases: minimum of 764.40 € and maximum of 3,642.00 € in 2016, growing as average earnings. Only maximum contribution base limit is effective in our calculations for the high earnings case.

- Limits on monthly pension amount (12 payments): minimum of 704.10 € and maximum of 2,995.16 € in 2016, growing like indexation of pensions. Maximum pension limit is effective in the high earnings case and also in other cases if indexation of pensions is λ = 1%.

5. RESULTS

The results for *IRR*, *r* in equation (5), and *TRR* in 2056 with both the legislation before and after the recent reform process in Spain for the individual cases is summarized in table 4 for two scenarios of indexation of pensions.

Table 4. Results for the sustainability and adequacy indicators.

Case	Legislation before reforms		Legislation after reforms if λ = 2%		Legislation after reforms if λ = 1% (*CPI*-1%)	
	IRR	TRR^{2056}	*IRR*	TRR^{2056}	*IRR*	TRR^{2056}
Base case	3.70%	86.9%	2.98%	69.2%	2.31%	61.8%
Low earnings	3.70%	86.9%	2.98%	69.2%	2.67%	69.2%
High earnings	2.70%	45.8%	2.70%	45.8%	0.98%	30.9%
Early retirement	3.66%	75.6%	2.86%	58.8%	2.52%	58.8%
Deferred retirement	3.49%	92.6%	2.87%	75.7%	2.19%	66.8%
Short career	4.87%	81.6%	3.54%	58.2%	3.19%	58.2%
Woman with 2 children	4.01%	86.9%	3.47%	72.6%	2.73%	63.5%
Woman with 2 children, low earnings and short career	5.25%	81.6%	4.15%	61.1%	3.79%	61.1%

Source: own elaboration.

The results in table 4 indicate that pension reforms in Spain improves the sustainability indicator, real *IRR*, by 0.7 p.p. in the base case, from 3.70% to 2.98%. The decline in this indicator is higher in the case of short careers and early retirement than in the case of deferred retirement because the reforms have established a better relationship between contributive effort and pension benefits and have also promoted the active ageing. The value of the sustainability indicator for the overall pension system depends on the representativeness of each individual case but in any case it is still clearly higher than the potential *GDP* growth assumption for Spain in the 2015 Ageing Report, 1.4% annual average in 2013-2060 period, resulting in a fiscally unsustainable system. As a consequence, is quite plausible that the automatic balancing mechanism of the new pension revaluation index will lead to indexations under *CPI* during a long period of time, with an additional improve of the sustainability by 0.7 p.p. in the base case, from 2.98% to 2.31%, if indexation is equal to *CPI*-1%.

Table 4 also shows another feature of the Spanish pension system: the lack of neutrality. One can assume a higher *IRR* for women due to longevity but it's more difficult to accept different *IRR* depending of career length or retirement age. The Spanish pension system should establish the same accrual rate for each year of service (contributive neutrality) and should

compute the penalties and bonus for early and deferred retirement in an actuarially neutral way (actuarial neutrality). Even so, the reforms have improved the system neutrality: the coefficient of variation of the *IRR* of the eight cases in table 4 moves from 19.2% before the reforms to 14.3% after the reforms, which shows less dispersion in *TRR* across individuals.

On the other hand, the results in table 4 reveal the worsening of the adequacy indicator, gross *TRR*, from 86.9% to 69.2% in the base case. This is the counterpart of the sustainability improving. Despite this drop, the gross *TRR* in Spain is the third highest of the EU28 in 2013 and the prospective gross *TRR* in 2053 is the second highest in the base case according to the 2015 Pension Adequacy Report (European Commission, 2015d).

The decrease is mitigated in the case of women due to the demographic complement, diminishing the gender gap in pension income if earnings and career length are the same that in the base case.

In addition, there would be an additional decrease in *TRR* in the base case (and also in the high earnings and deferred retirement cases) if indexation was lower than *CPI* because the pension amount would achieve the maximum limit. So, in the long run, most of the new pensioners would reach the same (maximum) pension in the case of a broad difference between the growth rate of maximum pension and the wage rate. This leads to a pension scheme quite different from today's system, with a very low percentage of pensioners reaching the maximum pension. The most vulnerable groups (with low earnings and/or short careers) will not suffer more cuts in *TRR* if indexation of pensions is lower than *CPI* because their pensions will remain under the maximum limit.

However, to assess the effect on adequacy of this new indexation rule, the 10-years after retirement theoretical replacement rate is more suitable. Table 5 depicts this indicator with the

previous legislation (only $\lambda = CPI$ was possible) and after the reforms (if $\lambda = CPI$, and if $\lambda = CPI$-1%).

Table 5. 10-years after retirement theoretical replacement rate

Case	Legislation before reforms	Legislation after reforms if λ = 2%	Legislation after reforms if λ = 1% (*CPI*-1%)
	TRR_{10}^{2066}	TRR_{10}^{2066}	TRR_{10}^{2066}
Base case	74.8%	59.6%	48.2%
Low earnings	74.8%	59.6%	54.0%
High earnings	39.4%	39.4%	24.1%
Early retirement	65.1%	50.6%	45.9%
Deferred retirement	79.7%	65.2%	52.1%
Short career	70.2%	50.1%	45.4%
Woman with 2 children	74.8%	62.5%	49.5%
Woman with 2 children, low earnings and short career	70.2%	52.6%	47.7%

Source: own elaboration.

The results in table 5 show that the 10-years after retirement *TRR* would drop under 50% in the base case if the new pension revaluation index was 1 p.p. lower than *CPI*, with a relevant reduction in relative income of older people. This automatic balancing mechanism depends on the overall situation of the public pension budget, then economic recessions or population ageing could trigger it and cause that pensioners were not protected enough against inflation. In recent years, however, the negative inflation rate has allowed a purchasing power gain for pensioners. But if prices begin to rise in the future, the most deprived groups will need a special protection to mitigate this risk, for example, securing that minimum pensions indexation is not lower than *CPI*.

6. CONCLUSIONS

The public pension system in Spain has suffered crucial reforms since 2011 with the main objective of ensuring the financial sustainability. Our calculations show that the sustainability indicator, the internal rate of return, improves by 0.7 p.p. for the base case of an individual with 40 years of uninterrupted service, with average earnings and who retires at the age of 65. The

value of 2.98% for this indicator is close to the average *GDP* growth in Spain in the past four decades. However, the projected *GDP* growth for Spain according to the 2015 Ageing Report is clearly lower than this value (average of 1.4% in 2013-2060), revealing that fiscal sustainability of public pension system persists as a serious challenge in the future.

On the other hand, the effect of pension reform on adequacy shows a 17.7 p.p. decrease in the prospective gross theoretical replacement rate for the base case. Nevertheless, this adequacy indicator is expected to remain one of the highest of EU countries, providing a sufficient level of protection against poverty and social exclusion risks. However, individuals of certain groups (with low earnings and/or short careers) could fall into poverty as they age, mainly if indexation of pensions was lower than *CPI*.

As a result of our analysis, the recommendations for Spanish pension system to strengthen the positive effects on sustainability and to mitigate the undesirable effects on adequacy are:

- Extending working lives: this requires labor market policies to create opportunities of jobs for older people (with suitable working conditions) and some changes in the accrual rates and in the premiums for deferred retirement to transform that in pension rights. With this policies more people would retire later or would combine work and pension. Both sustainability and adequacy would improve with this advice.
- Minimum pension indexation in line with *CPI*: minimum pension is a crucial mechanism to provide income in old age for the most disadvantaged groups. The damages of this proposal on sustainability are quite limited because the supplements to reach the minimum pension are financed by the public budget and the total amount is moderate (around 0.7% of *GDP*).
- Promote retirement saving: to compensate the decline in *TRR*, Spain should develop some cost-effective vehicle of long term saving, with very low administration costs and fiscal advantages with thresholds. An extension of the occupational pension plans is also

recommended. Information about pension entitlements and how different scenarios about earnings and retirement age could affect the pension amount should help people to adopt correct saving decisions.

Logically, successful economic growth policies are strongly recommended. Higher productivity leads to higher wages and this to higher contributions and pension entitlements, improving both the sustainability and adequacy. Unfortunately, this is also an objective of the economic policy and not an instrument of the pension policy.

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