Pension expectations, information and the downturn of the Italian economy

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Abstract

We use different waves of the Bank of Italy's Survey on Household Income and Wealth (SHIW) to determine how expectations on the future level of pension benefits and retirement age changed from 2000 to 2014. Defining pension error as the difference between the expected and the statutory value of the pension benefit, we estimate its economic, social and macroeconomic determinants. We find that general economic conditions have played an important role in shaping expectations. This appears to be particularly important in a country where the government has not developed informational policies on the future of the profoundly reformed pension system. Finally, using our measure of information on pension benefits, we check whether information and adequacy of savings are related to each other.

JEL: H55, J26, D84

1. Introduction

Impelled by financial pressures determined by the ageing of their populations and by the aim of eliminating or at least reducing their distortionary effects on the labour market, during the past two decades a series of reforms have progressively modified the rules for computing pension benefits and retirement age in a large number of countries. If these changes are not correctly understood by workers, the consequences may be very costly, both for the individual and for the society as a whole. For example, individuals could be forced to work longer than previously planned, decumulate their wealth in a less than optimal way at old age, or increase their demand for social assistance transfers. Information is therefore crucial in determining the effectiveness and success of any pension reform, particularly when changes are radical and profound.

Italy is an interesting case from this point of view. The share of the public pillar in the pension portfolio of Italian workers is large and so it will remain in the future. The ratio of public pension expenditure over GDP, which stood at 15.7% in 2014, is one of the highest among developed countries. From 1992 to 2011, a series of reforms radically reduced the internal rate of return for social security contributions, raised the legal retirement age and increased uncertainty over the future level of pension benefits, in particular for younger workers.

A distinctive feature of the Italian reform process is that the main legislative changes in 1992, 1995 and 2011, were approved during a period of financial crisis, with the aim of reassuring the "financial markets" of the sustainability of the Italian public budget and debt. Accordingly, there was a lack of debate before the approval of the reforms and little effort was expended by public institutions on explaining and describing the likely microeconomic and distributive effects. In spite of this, the idea that the reform of the pension system was still incomplete and that "worse was still to come" was a constant refrain in media reports throughout the period.[1] The National Pension Institute (INPS) was supposed, starting from 1995, to inform each worker yearly of his/her prospective level of pension benefit, but this legislative duty was constantly disregarded. It was only starting from 2015 that INPS promoted an information campaign called "La mia pensione" (my pension) with the purpose to fulfil this duty.

Imperfect knowledge may stem not only from the fact that a structural reform is typically full of technical aspects that are difficult to understand. Pension expectations may also depend on the

[1] Other countries have chosen quite a different path to introduce reforms in the pension system as profound as in the Italian case, the notable example being Sweden, where a public debate anticipated the approval of the reform and where the government yearly updates the likely evolution of future pension benefits (Sunden 2012). The effectiveness of informational policies concerning pensions has been discussed by, for example, Finseraas and Jakobsson (2013). See also Sunden (2012) for a comparison of policies developed in Sweden and in the United States (US).

macroeconomic conditions of a country, not only because future statutory entitlements are linked to GDP growth during working years as in the reformed Italian NDC system, but also because periods of low or even negative real growth in GDP may influence the degree of confidence in future public pension provision (Bissonette and Van Soest 2015). During a severe recession, people may become more pessimistic both about their personal pension entitlements and also about the ability of the government to meet its commitments. The crisis that started in 2008 has been by far the worst for the Italian economy in the last 70 years, with effects not uniformly distributed across the population. The more adversely affected groups may have changed their expectations about all future income streams, including pensions.

Using various waves of the Bank of Italy's Survey of Household Income and Wealth (SHIW), we aim to consider both sources of the above mentioned uncertainty regarding future pensions. Our study relates to the literature that investigates the accuracy of subjective expectations concerning retirement age and pension benefit (Bernheim 1988; Bernheim and Douglas 1990; Disney and Tanner 1999; Gustman and Steinmeier 2005). Unlike these studies, however, we analyse a relatively long time period, from 1989 to 2014, and consider at the same time two dimensions of individuals' expectation errors, the first related to the replacement rate and the second to the retirement age.

The next section describes Italian pension reforms and discusses the main legislative changes that have taken place, covering the period from 1992 to 2011. Section 3 presents the data and the procedure used for measuring expectations, statutory pension benefits and pension error. Sections 4 and 5 present the descriptive and the econometric analysis and section 6 deals with the role of information on the adequacy of workers households' savings.

2. A short history of Italian pension reforms

The Italian pension system has been radically modified since 1992. Three major reforms took place in 1992, 1995 and 2011 and also a number of minor interventions were undertaken. Before 1992, the computation of old age pension benefit (P) was based on a generous defined benefit (DB) formula, as summarized in equation (1):

$$P_{DB} = \gamma\, N\, W \qquad (1)$$

where:

γ is an accrual factor equal to 0.02 up to a ceiling and decreasing thereafter;

N is seniority at retirement;

W denotes pensionable earnings[2];

Prior to the reforms, at least 15 years of contributions were required to claim an old age pension. The legal retirement age for dependent workers was 60 for men and 55 for women. Early retirement was allowed without any kind of actuarial adjustment and with a minimum seniority requirement of 35 years (20 years for public dependent employees). Such a system shifted the demographic and macroeconomic risks towards workers through increases in the rate of contributions and/or to future taxpayers via increases in the level of public debt. The parameters of the system were quite generous: for example, a public sector worker with 40 years of seniority at retirement was sure to receive a pension equal to 80% of his/her final earnings, irrespective of his/her retirement age.

The 1992 reform increased the number of years over which W were to be computed. The legal retirement age was also progressively increased to 65 for men and 60 for women. The indexation mechanism of pension benefits was shifted from wages to prices. The reform also split the working population into three groups according to their seniority in 1992 and applied the changes described above differently to each. The changes were more severe for individuals belonging to the group which started work after the reform. For those with fewer than 15 years of seniority in 1992, a pro-rata mechanism was implemented and those with more than 15 years of seniority in 1992 were substantially exempted.

The 1995 reform confirmed this generational split and introduced a notional defined contribution (NDC) formula that was to be applied in its entirety only to those individuals who entered the labour market after 1995. Workers with seniority of fewer or equal to 18 years in 1995 entered the pro rata regime. Older workers remained in a modified defined benefit (MDB) regime.

The old-age pension in the NDC system is computed as:

$$P_{NDC} = k_R \sum_{i=L}^{R} C_i (1+g)^{R-L} \qquad (2)$$

where:

k_R is a conversion factor;

L is the age at which the worker starts to contribute to the pension scheme;

R is the age at which the worker retires;

[2] W was computed as the average of the last 5 years of earnings for the scheme of private dependent workers, 1 year for public employees, 10 years for the self-employed, and revalued to take account for inflation.

C_i is the amount of pension contributions paid at age i;

g is the moving average of the last 5 years of nominal GDP growth.

The amount of the conversion factor k_R varies with the retirement age, which was flexible from age 57 to age 65, to guarantee a quasi-actuarial equity. To compute the pension benefit, the conversion factor is multiplied by the total contributions accrued during the whole working life in proportion to gross earnings (33% for employees and 20% for self-employed), capitalized at the rate of growth of nominal GDP. At least five years of contributions were required to claim an old age pension if the corresponding pension instalment had exceeded the amount of the social allowance increased by 20%. The computation rule for the pension benefit of workers under the MDB system is summarized by the formula:

$$P_{MDB} = \gamma\,(N_1 W_1 + N_2 W_2) \qquad (3)$$

where:

N_1 and N_2 represent the years of contributions before and after 1992 respectively;

W_1 and W_2 represent the pensionable earnings used for computing pension instalments for contributions paid before and after 1992 respectively[3]

For workers under the pro rata regime, the old age pension benefit is determined as the weighted sum of the MDB and NDC benefits computed using equations (2) and (3), with the weights given by years of seniority accrued before and after 1995:

$$P_{pro\,rata} = \alpha\, P_{NDC} + (1-\alpha) P_{MDB} \qquad (4)$$

where α is the ratio of the number of years of seniority matured under the NDC scheme to seniority at retirement.

A series of additional measures were approved by parliament from 1995 to 2011, some of them with the aim of speeding up the transition to the NDC regime and others with the opposite aim of smoothing the transition. In 2004, flexibility in the choice of retirement age was abolished and a legal retirement age of 60 for women and 65 for men was reintroduced. In 2007, a new "quota" mechanism was introduced to make early retirement less favourable. Under this mechanism, the

[3] The terms W_1 and W_2 in the MDB formula vary according to the pension scheme. In particular, W_1 is equal to the last year of earnings for employees in the public sector and the average of the last 5 or 10 pensionable yearly earnings for those employed in the private sector and self-employed workers respectively. W_2 is the mean computed over the last 10 years of positive earnings for public and private sector employees and over the last 15 years for self-employed workers.

eligibility conditions depend not only on seniority at retirement (35 years), but on the sum of seniority at retirement and age (58 years for dependent workers and 59 for self-employed); this was expected to increase over time. No actuarial adjustment was still in force for the computation of these pension benefits. In 2010, a deferral mechanism for the time of retirement was approved: the right to receive pension benefits did not correspond to the maturation of the eligibility condition. In the same year, an automatic link to changes in life expectancy was envisaged for both early retirement and the legal retirement age.

The 2011 reform encompassed all requirements for accessing retirement. Some flexibility in the choice of retirement was reintroduced as the age for accessing retirement was fixed at between 63 and 70 years. At the same time age the eligibility conditions were tightened. Anticipated pensions are possible only upon attaining work seniority of 42 years and 3 months (one year less for females) or one can claim an NDC pension worth at least 2.8 times the social assistance pension upon reaching 63 years of age and 20 years of work seniority. As for old age pensions, the reform progressively raised the normal retirement age to 66 years. In order to be eligible workers will need 20 years of seniority and must be able to claim an NDC pension worth at least 1.5 times the social assistance pension; otherwise they will need to wait until 70 years of age. All the aforementioned retirement ages and seniority requirements are increased every two years in line with changes in life expectancy. Finally, the NDC formula also applies to people who had made more than 18 years of contributions by 1995, although only for their years of work since 2012, while the NDC annuity transformation coefficients, will automatically be revised every second year.

3. Data and the construction of expected pensions

In this study we use microdata from the Bank of Italy's SHIW for the periods 1989–1991 and 2000–2014. The survey data are disposable from 1977. Since the 1989 wave individuals participating in the survey have been asked to answer two questions regarding their expected future pension situation, namely: i) "At what age do you expect to retire?"; ii) "What will be the percentage of your first year of pension benefits with respect to earnings gained the year before retirement?". Unfortunately, the second question was not asked to individuals interviewed in the period 1993–1998. Nevertheless, we consider the 1989 and 1991 data interesting because they describe expectations about the pension system before the reform process started in 1992 and so we decided to retain them, when possible.

The SHIW has a yearly dimension of around 20,000 observations and 8,000 households. Among these observations, we first select those respondents who classify themselves as dependent workers or as self-employed, aged between 20 and 65 years (53,209 observations). Of these observations, we drop all individuals not physically present at the interview (17,969 observations), those who did not respond to at least one of the two questions of interest (968 observations), those with a yearly income below 5,000 euros at 2014 prices (1,249 observations), those who declared they had not previously paid social security contributions (1,177 observations) and those with an expected retirement age of less than 50 years (33 observations). We end up with a sample of 31,813 individuals. Table A1 reports some of the demographic and economic characteristics of the selected population.

Implementing a procedure proposed by Jappelli (1995) the subjective point estimation of future public pension benefits in the first year after retirement for worker *i* in the sample is defined as:

$$P_i^{exp} = RR_i^{exp} * Y_i^{last} \qquad (5)$$

where:

RR_i^{exp} is the expected replacement rate for worker *i*;

Y_i^{last} is the value of workers' earnings the year before retirement;

The computation of Y_i^{last} is obtained as:

$$Y_i^{last} = Y_{i,t} * (1 + m_k)^{(ret_i - age_i)} \quad (6)$$

where:

$Y_{i,t}$ denotes the earnings of worker *i* at time *t*;

m_k is a group[4] specific real rate of growth of earnings, k=1, 2,….,6;

ret_i is the expected age at retirement for worker *i*;

age_i is the age of worker *i* in year *t*, i.e. the year of participation in the survey.

The error in the pension computation is obtained as:

$$P_i^{error} = P_i^{stat} - P_i^{exp} \qquad (7)$$

[4] We computed different rates of growth in lifetime earnings for the pseudo panel of the SHIW (2000–2014). To obtain these rates of growth, we split the sample of workers in the SHIW survey into six groups, resulting from the interaction between gender and three educational levels (less than high school, high school, degree). Then, for each group, we regressed yearly earnings on age and its square, obtaining a life cycle profile for earnings. For each individual in the sample, this fitted profile passes through the actual earnings of the survey at the corresponding age. Then we obtained the average growth rate of gross earnings for each group and computed the earnings of the last year of work depending on age.

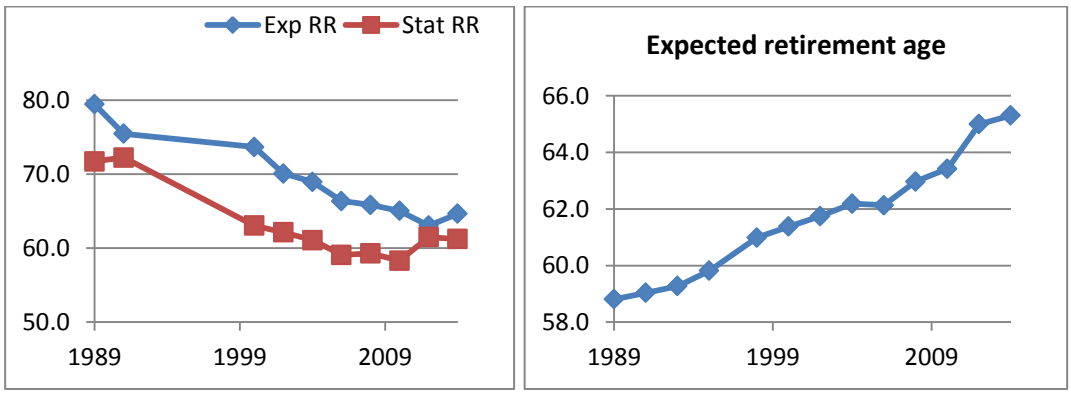
where P_i^{stat} is the statutory pension benefit of individual i computed according to the rules described in this sub-section and summarized in equations (1) to (4).

4. Descriptive analysis

Figure 1 reports the yearly average values for the expected (Exp) and the statutory (Stat) replacement rates (Panel a) and for the expected retirement age (Panel b) over the period 1989–2014. Workers in the sample revised their expectations significantly during the observed period: the expected replacement rate decreased by around 15% from nearly 80% in 1989 to approximately 65% in 2014, while the planned retirement age increased by around 6.5 years, from 58.8 in 1989 to 65.3 years in 2014. Over the same time lapse, the statutory replacement rate also decreased, but less than the expected replacement rate, by approximately 10%, from around 72% in 1989 to around 62% in 2014. Similar statistical evidence for Italy, even if for shorter periods and only for the replacement rate, is reported in Jappelli (1995), Bottazzi et al. (2006) and Jappelli et al. (2014). Comparing the difference between the average expected replacement rate and the average statutory replacement rate, a convergence process brings the two variables to relatively similar levels from the year 2012.

Figure 1

Statutory replacement rate, expected replacement rate and planned retirement age (1989–2012)



Note: Data on replacement rates are missing in the SHIW for the period 1993–1998.

However, matters are more complex than these statistics show. First, it is important to remember that two different sources of error can plague the ability of workers to predict their future pension benefits with accuracy. Papers studying the link between pensions and information in Italy have

focused on the workers' ability to compute correctly the amount of pension benefits, without taking into account their ability to compute correctly the retirement age (Jappelli 1995; Bottazzi et al. (2006). Information on the retirement age was easier to acquire before 1992: workers could retire either when they reached the "legal" retirement age or they could anticipate retirement at any age in the case that they had accrued a "sufficient" number of years of contributions.[5] Continuous changes to the eligibility conditions for retirement occurred from 1992 to 2011 and the introduction in 2010 of the automatic link between retirement age and life expectancy introduced a second non-negligible source of uncertainty. Table 2 presents evidence on the level of knowledge about the replacement rate and the retirement age. The first column reports the proportion of workers who have a planned retirement age which is consistent with the eligibility conditions. The following three columns refer, respectively, to (i) the proportion of workers who underestimate future pension benefits by at least (+/-) 25% of the statutory correspondent variable, (ii) are within 25% of their computed benefits and (iii) overestimate their benefits by at least 25%. Finally, the fifth column contains the proportion of workers who correctly reported both the retirement age and the replacement rate.

In 1989 almost 90% of workers interviewed were able to correctly report their retirement age. The percentage was remarkably lower in 2000, at 77%, after the first wave of reforms. In the next decade, the proportion of correct answers increased constantly and it is only from 2010 after the introduction of the link between retirement age and life expectancy that it again decreased abruptly.

The ability to correctly predict a future value for the pension benefit was high before the reform process began. Starting from a percentage of around 70% of the sample before 1992, it dropped to 52% in the year 2000 and then increased more or less constantly. Similar to the case of retirement age expectations, it seems that workers need time to assimilate changes to the pension benefit formula. External macroeconomic conditions also play an important role in shaping expectations: this is clear looking at the proportion of workers who underestimate and overestimate the pension benefit by year; they reach respectively a maximum and a minimum value in 2012 when the public financial crisis in Italy reached its peak. Men are better at predicting their future level of pension benefit than women. They are also much less optimistic.

[5] The seniority requirement was equal to 20 years for public dependent workers and 35 years for private dependent workers and the self-employed.

Table 2
Understanding of expected pension benefits and retirement age

Year	% anticipating the correct retirement age	% with expected pension <75% of the correct pension	% with expected pension within 75–125% of the correct pension	% with expected pension >125% of the correct pension	% with correct retirement age + correct replacement rate
1989	88.6	4.0	71.6	24.4	63.4
1991	88.4	9.0	73.5	17.5	65.0
2000	77.7	9.0	52.1	38.9	41.9
2002	82.5	7.9	58.5	33.6	49.9
2004	84.8	8.7	56.7	34.5	49.8
2006	81.5	10.4	54.3	35.3	46.6
2008	87.5	8.8	58.4	32.9	52.9
2010	59.8	8.4	57.7	33.9	40.7
2012	60.6	14.3	61.6	24.1	37.7
2014	63.0	11.5	62.1	26.4	40.0
Gender					
Men	75.4	11.0	60.4	28.8	47.7
Women	76.8	7.8	52.2	40.0	41.6
Cohort					
Min/1950	71.9	10.5	61.9	27.6	45.1
1951/1960	75.3	7.5	62.9	29.6	49.4
1961/1970	78.7	9.5	52.6	37.9	44.0
1971/max	75.1	13.8	52.5	33.7	41.3
Geographical area					
North	76.4	11.0	61.9	27.0	49.2
Centre	74.8	9.4	54.9	35.7	42.6
South	76.0	7.6	50.9	41.5	40.9
Education					
Primary	75.74	10.1	60.14	29.7	47.7
Secondary	76.15	9.1	57.1	33.9	45.5
Degree	76.12	10.0	50.4	39.6	39.3
Pension regime					
Pre-reform					
MDB	74.0	10.5	78.3	11.2	58.8
Pro rata	77.9	8.6	54.2	37.1	44.8
NDC	73.9	11.2	42.4	46.4	33.2
Single					
No	76.0	9.6	58.9	31.5	46.3
Yes	75.8	10.0	54.3	35.7	43.7
Occupational status					
Private dependent	75.6	10.0	63.1	26.9	49.7
Public dependent	73.7	4.8	57.8	37.4	45.0
Self-employed	80.8	17.1	38.0	44.9	32.2

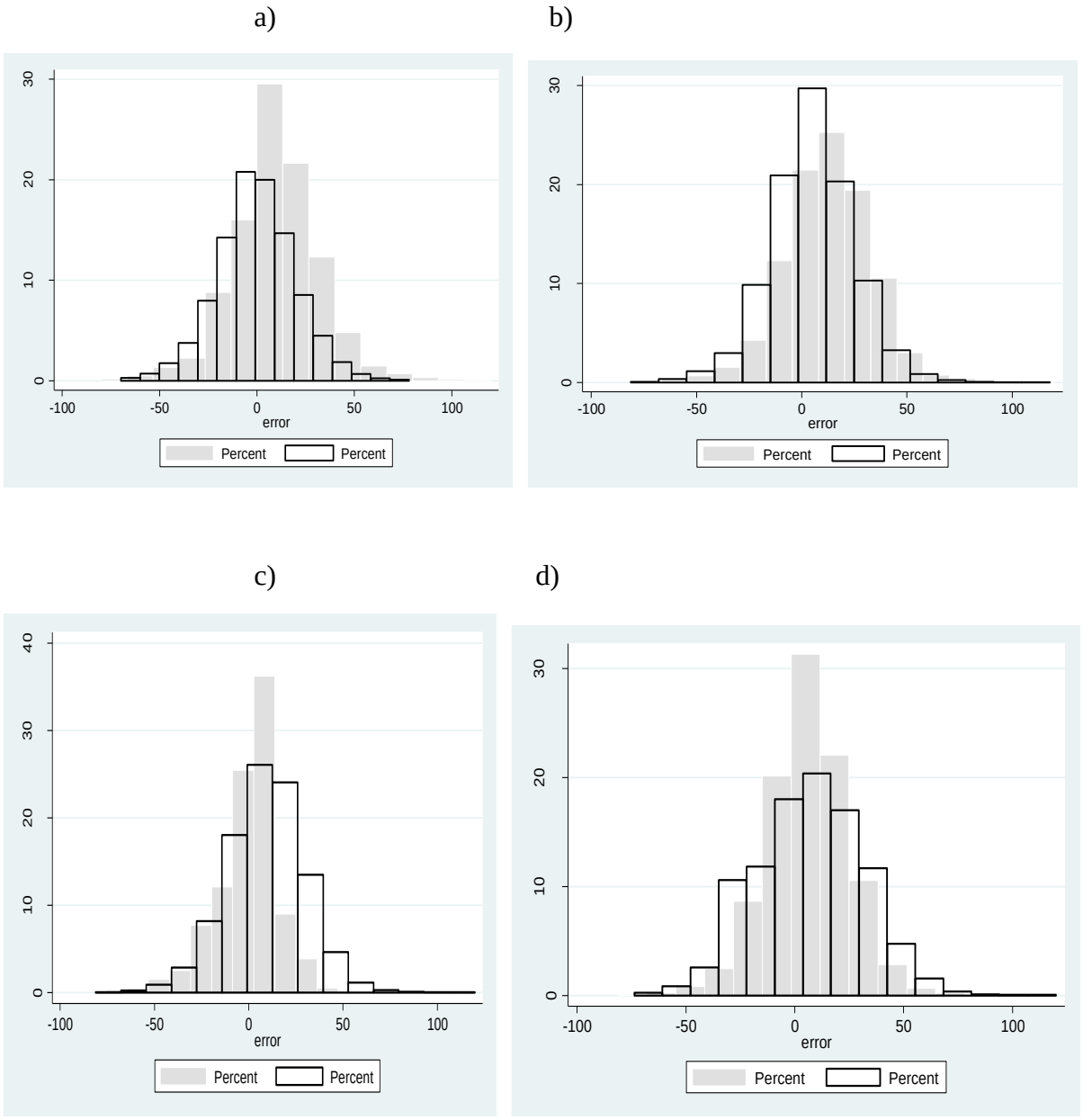
Controlling by cohort and by pension regime returns similar qualitative information: younger workers are much worse at computing future pension benefits and are essentially either more optimistic or more pessimistic, denoting a higher dispersion of expectations. Looking at the educational level, a contradictory picture emerges, at least considering the results from other countries (Barret et al. 2013; Finseraas and Jakobson 2014): better educated workers in Italy do not display a greater ability to predict either the future level of pension benefits or retirement age, a result consistent with the findings of Bottazzi et al. (2006) for Italy and Gustman and Steinmeier (2005) for the US. This evidence can be explained by the fact that among the employed population, educated workers are much more concentrated in younger cohorts and among individuals under the less generous and more uncertain NDC system.

In terms of occupational status, the self-employed perform worse than dependent workers. Again the transition from the DB to the NDC system might explain the difference between these two groups as the change in the computation rule hurts the first group to a greater extent than the second.

Looking at the last column it emerges that the proportion of workers who appear to have sound information on both retirement age and the replacement rate is appreciably lower following the reform period, always being below the 50% with the exception of the year 2008.

Figure 2 offers a more complete description of the error distribution in replacement rates. We compare the error distributions at the beginning and at the end of period (*a),* first for different levels of education (*b);* for different pension regimes (*c)* and for different occupational status (*d)*. Part (a) of the figure depicts the general worsening in mood regarding the pension system in the period 2000–2014. Contrasting highly educated workers with those less well educated, it becomes apparent that the first group is generally more optimistic concerning future pension benefits. Interestingly, workers under the NDC regime are much more optimistic than future MDB pensioners. Finally, the error distribution for dependent workers is more condensed than that of the self-employed.

Figure 2
Error distribution in the replacement rate.



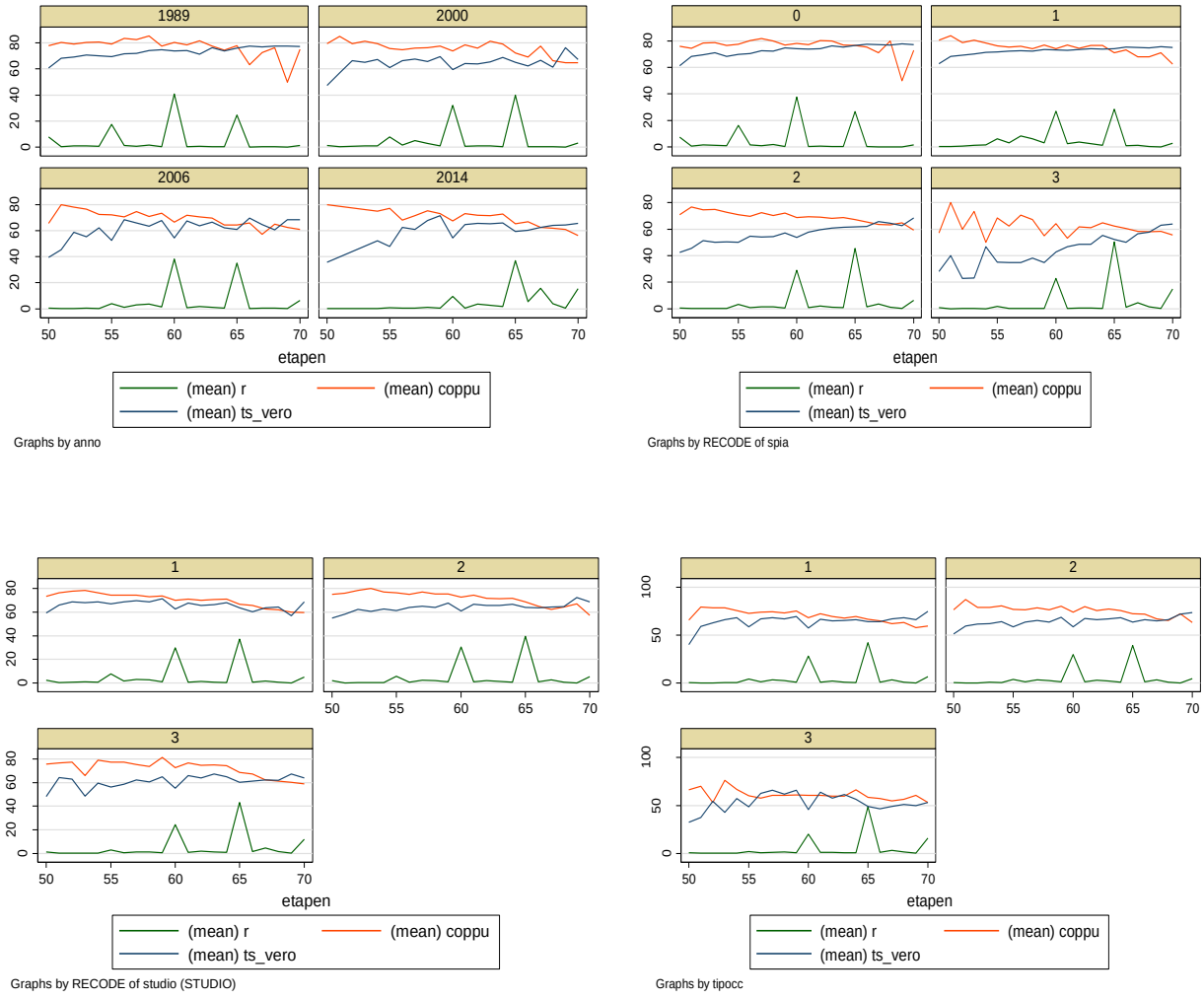
Notes: (a) beginning (2000 = grey) and end (2014 = no colour) of reform; (b) high educational level (grey) and mid-low level (no colour); (c) DB pensioners (grey) and mixed-NDC pensioners (no colour); (d) dependent workers (grey) and self-employed (no colour).

Figure 3 plots the mean expected and statutory replacement rates against the planned retirement age for different categories. Consistently with previous empirical results (Disney and Tanner 1999; Coppola and Wilke 2013; Van Dujin et al. 2013) the distribution of the expected retirement age is condensed around some specific ages, typically the two legal retirement ages. Controlling for year and pension regime (MDB, pro rata and NDC) it is noticeable that, as time passes, workers continue

the downward revision in their expectations of future pension benefits while starting to revise the expectation of retirement age upwards. There is no clear direction in the relationship between expected retirement age and expected replacement rates. Similar to Van Dujin et al.'s (2014) findings for the Netherlands, the positive relationship supposed for individuals between the two variables is obscured by the fact that average figures are shown.

Figure 3

Expected and statutory (average) replacement rates over planned retirement age and frequency distribution of the expected retirement age in different years and for the different pension regimes



5. The determinants of information: an econometric analysis

Individual expectations on future pension benefits depend on observable demographic characteristics and socio-economic factors. First, those who live and work in periods of frequent

and significant reforms of pension rules may have difficulty in understanding the effects of these changes on their own future pension benefits (Bottazzi et al. 2006; Okumura and Usui 2014). Moreover, macroeconomic conditions could also exert an influence on perceptions of future pensions: during a crisis, a worker may become more pessimistic about his/her own job prospects and therefore also concerning pension entitlements (Bissonette and Van Soest, 2015). Finally, austerity policies may convince some that further restrictive reforms will be enacted to avoid the risk of default. The crisis that started in 2008 has been the worst Italy has experienced in the last few decades, so it is very likely that a wave of pessimism may have hit workers' expectations. Since the crisis in the financial markets in 2011, which affected Italian public bonds, Italy has been one of the countries that have implemented severe austerity policies with the aim of restoring a climate of confidence concerning the sustainability of its very high public debt. We therefore expect a reduction in optimism after the onset of the crisis, particularly among younger workers, who still face many years ahead of them in a labour market that could worsen for a significant number of years in the future.[6]

To distinguish between personal and macroeconomic factors that contribute to determinee the degree of knowledge of the pension system, we first run a probit regression on the ability to accurately estimate the retirement age, . The set of explanatory variables includes yearly quintiles of individual earnings, gender and the age of the worker, occupational status (divided into private, public employee and self-employed), geographical area of residence (north, centre, south), educational level (elementary or primary, secondary, degree). We restrict our sample to the period 2000–2014.[7]

Table 3 presents the marginal effects from the probit estimation of the probability of correctly predicting retirement age, both for the whole period and then separately for two sub-periods: from 2000 to 2008, i.e. before the crisis, and from 2010 to 2014, i.e. the recent crisis.[8] The two separate estimations for the different periods are aimed at checking whether the crisis produced some structural changes in the process of expectation formation. Starting from the regression covering the whole period, the elderly seem marginally less able to predict future retirement age correctly, as is the case for males and those with lower education. Until 2008, workers' predictions improve in terms of their ability to estimate the retirement age with respect to the reference year, while in the

[6] Indeed, the unemployment rate for younger cohorts increased to a much greater extent than for the rest of the population: for the age range 25–34, for example, it increased by 9.7 percentage points in the period 2008–2014 (from 8.9% to 18.6%), while for the whole population the increase was still strong, but significantly lower (from 6.7% to 12.7%, i.e. 6 percentage points).

[7] We do not introduce the pension regime (MDB, pro rata, NDC) to which each worker belongs as additional regressor because it is strictly correlated to the age of the worker.

[8] The 2008 dataset is included in the "before the crisis" sub-period because in 2008 the crisis in Italy was just at its beginning and presumably still had not changed expectations about the long run.

following years the trend is completely reversed. This is due to the introduction in 2010 of the automatic link between the maturation of eligibility conditions and the evolution of life expectancy.

Table 3
Marginal effects from probit estimation of the probability of correctly predicting the retirement age

VARIABLES	(1) Whole period: 2000-2014	(2) Before the crisis: 2000-08	(3) During the crisis: 2010-14
Age	-0.0028***	-0.0047***	0.0019***
	(0.0003)	(0.0003)	(0.0006)
Second quintile	0.0098	0.0087	0.0230
	(0.0076)	(0.0085)	(0.0155)
Third quintile	0.0212***	0.0171**	0.0330**
	(0.0078)	(0.0086)	(0.0161)
Fourth quintile	-0.0050	-0.0127	0.0149
	(0.0081)	(0.0089)	(0.0166)
Fifth quintile	-0.0047	-0.0043	-0.0083
	(0.0088)	(0.0096)	(0.0179)
Male	-0.0285***	-0.0731***	0.0646***
	(0.0056)	(0.0064)	(0.0109)
Public employee	-0.0259***	-0.0220***	-0.0394***
	(0.0065)	(0.0070)	(0.0128)
Self-employed	0.0599***	0.0465***	0.0906***
	(0.0075)	(0.0080)	(0.0149)
Centre	-0.0088	-0.0024	-0.0147
	(0.0068)	(0.0073)	(0.0134)
South	0.0126**	0.0291***	-0.0214*
	(0.0063)	(0.0070)	(0.0123)
High school	0.0137**	0.0057	0.0271**
	(0.0060)	(0.0065)	(0.0119)
Degree	0.0345***	0.0558***	0.0138
	(0.0085)	(0.0099)	(0.0159)
Married	-0.0215***	-0.0268***	-0.0128
	(0.0059)	(0.0069)	(0.0112)
2002	0.0502***	0.0431***	.
	(0.0088)	(0.0075)	
2004	0.0778***	0.0671***	.
	(0.0091)	(0.0078)	
2006	0.0354***	0.0268***	.
	(0.0091)	(0.0078)	
2008	0.1183***	0.1010***	.
	(0.0098)	(0.0084)	
2010	-0.1531***	.	-0.0281**
	(0.0090)		(0.0124)
2012	-0.1453***	.	-0.0227**
	(0.0092)		(0.0113)
2014	-0.1237***	.	.
	(0.0095)		
Pseudo R^2	0.0637	0.0434	0.0115
χ^2	2095.79	703.99	148.20
Observations	31,813	21,800	10,013

Note: Clustered standard errors at the household level. Reference group: first quintile, female, private employee, resident in the north, for regression (1): year 2000. Marginal effects are computed as the averages of the individual estimated marginal effects for each observation of the sample.

This provision was reinforced thereafter and it appears not to have been incorporated in the mental framework of many workers. The subgroup regressions show that during the crisis the switch in personal expectations primarily involved younger workers, who became less able than older workers to formulate a correct expectation of retirement age. The increase in life expectancy does indeed have stronger effects on the retirement age of younger cohorts. Consistently, the coefficient of a higher level of education loses its significance.

Concerning the probability of correctly predicting the future level of pension benefits, we run an ordered probit regression, where the dependent variable assumes three values: 1 if the expected future pension is less than 75% of the "true" value computed applying the correct rules; 2 if the expected pension is between 75% and 125% of the statutory future pension and 3 if it is more than 125% of the true amount.

Table 4 reports the marginal effects of the explanatory variables for each of the three possible outcomes over the whole period 2000–2014. As before, the marginal effects are computed as the averages of the estimated marginal effects for each worker in the sample. Age appears to have a negative effect on the probability of overestimating pension entitlements, i.e. young workers are on average more optimistic. The position in terms of income distribution does not seem to affect expectations. As for occupational status, private dependent workers perform better in estimating their future pensions, while the ability of the self-employed to predict their future pensions worsens considerably with the switch from am MDB to an NDC system because of their lower contribution rate with respect to dependent workers. As the educational level increases, workers become more optimistic, but are no better at estimating their pension benefit, a result that is consistent with previous empirical papers on Italian workers' pension estimation (Bottazzi et al. 2006; Padula et al. 2011). Being married has a positive effect on the probability of a correct estimation, perhaps due to the possibility of discussing these issues with the partner. While being a woman increases the probability of correctly predicting retirement age, it decreases the ability to compute the future pension benefit.

Finally, time seems to play an important role. In particular, as time passes, more individuals become better able to correctly predict their future pension benefits, but there is also an increasing tendency to become significantly more pessimistic after the start of the crisis, in particular in the two more recent surveys, which in parallel show a reduction in the propensity to be optimistic. It therefore seems that the recession has had profound effects on expectations of future pensions.

Table 4
Marginal effects from ordered probit estimation
on the expected amount of future pension (2000–2014)

	(1) Pessimist: expected pension < 75% of true pension	(2) Correct: expected pension between 75% and 125% of true pension	(3) Optimist: expected pension >125% of true pension
Age	0.0012***	0.0013***	-0.0025***
	(0.0001)	(0.0002)	(0.0003)
Second quintile	-0.0017	-0.0018	0.0035
	(0.0038)	(0.0042)	(0.0080)
Third quintile	-0.0007	-0.0008	0.0015
	(0.0039)	(0.0042)	(0.0081)
Fourth quintile	-0.0005	-0.0006	0.0011
	(0.0040)	(0.0044)	(0.0084)
Fifth quintile	0.0072	0.0078	-0.0150
	(0.0044)	(0.0049)	(0.0093)
Male	0.0473***	0.0516***	-0.0990***
	(0.0028)	(0.0031)	(0.0056)
Public employee	-0.0357***	-0.0389***	0.0746***
	(0.0031)	(0.0034)	(0.0063)
Self-employed	-0.0394***	-0.0430***	0.0825***
	(0.0041)	(0.0047)	(0.0087)
Centre	-0.0329***	-0.0358***	0.0687***
	(0.0035)	(0.0039)	(0.0073)
South	-0.0621***	-0.0677***	0.1299***
	(0.0033)	(0.0037)	(0.0067)
High school	-0.0080***	-0.0087***	0.0168***
	(0.0029)	(0.0032)	(0.0061)
Degree	-0.0158***	-0.0173***	0.0331***
	(0.0044)	(0.0048)	(0.0092)
Married	0.0051*	0.0055*	-0.0106*
	(0.0030)	(0.0033)	(0.0063)
2002	0.0139***	0.0152***	-0.0291***
	(0.0042)	(0.0046)	(0.0088)
2004	0.0122***	0.0133***	-0.0255***
	(0.0044)	(0.0048)	(0.0091)
2006	0.0157***	0.0171***	-0.0327***
	(0.0045)	(0.0049)	(0.0094)
2008	0.0182***	0.0199***	-0.0381***
	(0.0045)	(0.0049)	(0.0094)
2010	0.0163***	0.0178***	-0.0340***
	(0.0047)	(0.0051)	(0.0098)
2012	0.0655***	0.0715***	-0.1370***
	(0.0048)	(0.0052)	(0.0098)
2014	0.0468***	0.0510***	-0.0978***
	(0.0049)	(0.0053)	(0.0101)
Observations	31,813	31,813	31,813

Notes: Clustered standard errors at the household level. Reference group: first quintile, female, private employee, resident in the north, year 2000. Pseudo R^2 =0.0313; χ^2 =1421.17.

To examine the personal characteristics that are more associated with a change in mood after the start of the recession, we run separate regressions for the two periods before (2000–2008) and during (2010–2014) the crisis.

Table 5
Marginal effects from the ordered probit estimation
on pension expectations before and during the crisis

	Before the crisis: 2000-2008			During the crisis: 2010-2014		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Pessimist	Correct	Optimist	Pessimist	Correct	Optimist
Age	0.0020***	0.0025***	-0.0045***	-0.0008***	-0.0006***	0.0014***
	(0.0002)	(0.0002)	(0.0004)	(0.0003)	(0.0002)	(0.0005)
Second quintile	-0.0031	-0.0039	0.0070	0.0000	0.0000	-0.0000
	(0.0043)	(0.0054)	(0.0097)	(0.0075)	(0.0056)	(0.0132)
Third quintile	-0.0011	-0.0014	0.0025	-0.0009	-0.0007	0.0016
	(0.0043)	(0.0054)	(0.0098)	(0.0076)	(0.0057)	(0.0132)
Fourth quintile	-0.0005	-0.0006	0.0011	-0.0033	-0.0025	0.0058
	(0.0045)	(0.0056)	(0.0101)	(0.0079)	(0.0059)	(0.0137)
Fifth quintile	0.0042	0.0053	-0.0095	0.0128	0.0095	-0.0223
	(0.0049)	(0.0062)	(0.0110)	(0.0087)	(0.0065)	(0.0152)
Male	0.0503***	0.0635***	-0.1138***	0.0418***	0.0312***	-0.0731***
	(0.0031)	(0.0039)	(0.0067)	(0.0053)	(0.0040)	(0.0090)
Public employee	-0.0358***	-0.0452***	0.0810***	-0.0339***	-0.0253***	0.0591***
	(0.0034)	(0.0042)	(0.0074)	(0.0060)	(0.0046)	(0.0105)
Self-employed	-0.0249***	-0.0314***	0.0563***	-0.0808***	-0.0603***	0.1411***
	(0.0044)	(0.0058)	(0.0101)	(0.0080)	(0.0067)	(0.0141)
Centre	-0.0383***	-0.0484***	0.0868***	-0.0213***	-0.0159***	0.0372***
	(0.0038)	(0.0049)	(0.0086)	(0.0066)	(0.0050)	(0.0115)
South	-0.0619***	-0.0782***	0.1401***	-0.0631***	-0.0471***	0.1103***
	(0.0037)	(0.0046)	(0.0079)	(0.0061)	(0.0047)	(0.0103)
High school	-0.0127***	-0.0161***	0.0288***	0.0087	0.0065	-0.0152
	(0.0032)	(0.0040)	(0.0072)	(0.0056)	(0.0042)	(0.0097)
Degree	-0.0309***	-0.0391***	0.0700***	0.0154*	0.0115*	-0.0268*
	(0.0049)	(0.0062)	(0.0110)	(0.0080)	(0.0059)	(0.0139)
Married	0.0031	0.0039	-0.0069	0.0068	0.0050	-0.0118
	(0.0034)	(0.0043)	(0.0077)	(0.0054)	(0.0040)	(0.0094)
2002	0.0125***	0.0158***	-0.0282***	.	.	.
	(0.0040)	(0.0050)	(0.0089)			
2004	0.0109***	0.0137***	-0.0246***	.	.	.
	(0.0041)	(0.0052)	(0.0093)			
2006	0.0154***	0.0194***	-0.0348***	.	.	.
	(0.0042)	(0.0053)	(0.0095)			
2008	0.0169***	0.0214***	-0.0383***	.	.	.
	(0.0042)	(0.0054)	(0.0096)			
2010				-0.0389***	-0.0291***	0.0680***
				(0.0054)	(0.0041)	(0.0093)
2012				0.0187***	0.0140***	-0.0326***
				(0.0051)	(0.0038)	(0.0089)
Pseudo R^2		0.0353			0.0306	
χ^2		1155.62			464.46	
Observations		21,800			10,013	

Note: Clustered standard errors at the household level. Reference group: first quintile, female, private employee, resident in the north, year 2000 for the first period regressions, year 2014 for the second.

The first important difference between the two sub-periods concerns the effect of age: before the crisis the young were more optimistic and were also more able to express a correct evaluation, while during the crisis there is a complete reversal in the signs of the coefficients and the young become significantly less optimistic than older workers. The crisis has had a marked impact across age groups, with a much greater increase in the unemployment rate for the younger generations and a substantial slowdown in labour productivity and therefore in the rate of growth of wages. Younger generations have therefore adapted to the new environment their expectations about future pensions. The same reversal of signs happens, not unexpectedly, for those with a degree; for this variable, the size of the sign is very relevant. The coefficients of the other variables maintain their signs in the two periods. Workers who live in the northern part of Italy are more able to express a correct prediction, perhaps because of their greater consciousness of the mechanics of the system, living in the most industrialized part of the country.

A general point can be made: both the regression on expected retirement age and that on expected pension seem to display a gradual adjustment of expectations to the changes introduced to the pension formula that is used to compute pension benefits and to the age and seniority conditions necessary to retire. However, while the shock on computation rules occurred in the 1990s and workers seem able to have improved their ability to predict the future value of their pension continuously, in the second case the shock is more recent and time still seems to be needed by workers to improve their ability to predict their correct retirement age with accuracy. The severe crisis started in the second half of last decade has made more difficult and confusing this gradual adjustment path.

6. Are Italian workers saving enough to finance their consumption during old age? The role of information

The analysis of the previous sub-sections has shown that the adjustment process in the expectations among Italian workers is still incomplete and unevenly distributed. An important reason for implementing effective informational policies is the fact that future pension benefits are a primary component of the lifetime resources that workers and their household members will use to finance consumption during old age.

Exploiting information on income, consumption and wealth from the SHIW database and a social security wealth measure, we estimate for each household, *i*, present in the sample at time *t*, a variable called "residual", defined as:

$$Residual_{i,t} = NW_{i,t} + SSWH_{i,t} + PVI_{i,t} - PVC_{i,t} \quad (9)$$

where:

$NW_{i,t}$ is the net value of the financial wealth of household *I*;

$SSWH_{i,t}$ is the social security wealth of household *i;*

$PVI_{i,t}$ is the present value of future income streams belonging to household *i*;

$PVC_{i,t}$ is the present value of future consumption streams belonging to household *i*.

Data for the households' net wealth and for its components (real and financial activities and financial debt) are taken from the SHIW archive. The income and consumption values used to compute $PVI_{i,t}$ and $PVC_{i,t}$ respectively are obtained from the fitted values of a reduced form equation for the log of earnings and family consumption, which include a second-order polynomial in age three dummies for the educational level and gender.

We estimate individual statutory social security wealth taking into account the expected retirement age (correcting the retirement age for those who did not respond correctly) according to the following formula:

$$SSW_{i,t} = (1+r)^{(t-p)} \sum_{k=p}^{p+d} (1+r)^{(P-k)} P_i^{STAT} \quad (10)$$

Household social security wealth is the sum of the individual social security wealth of the head of household and (if present) of his/her spouse computed according to equation (10).

Equation (9) can be considered a specification of the households' intertemporal budget constraint, where the LHS term measures the residual amount of resources after lifetime consumption has been subtracted from the total wealth of the household. The sign of the residual can be positive or negative. Only in the first case will the household have sufficient resources to finance consumption and/or to leave a bequest. If the residual is negative, an adjustment in consumption, given the future path of income, is necessary.

In our baseline simulation, we exclude real wealth from the computation of net worth in equation (9), as in Skinner (2007). This hypothesis is consistent with the assumption that most households will remain in their house during old age and that more than 80% of Italian households own the house in which they live. The real discount rate is fixed at 1.5%, while a real growth of 1% for both

consumption and income is used. Table 6 reports the results of this baseline specification. We report in the table the share of households with a negative value for the residual term in equation (9), controlling for years and for different levels of error in the expectations of the future value of pension benefits.

Table 6
Share of households with a negative residual in equation (9) for different expectations of pension benefits

Year	Future pension underestimated (<75%)	Future pension "correctly" predicted (75%-125%)	Future pension overestimated (>125%)	All
2000	38.9%	43.4%	46.5%	44.2%
2002	37.5%	40.2%	46.8%	42.1%
2004	42.1%	43.0%	51.2%	45.7%
2006	31.8%	40.3%	53.2%	43.8%
2008	35.9%	41.7%	56.2%	45.8%
2010	40.8%	45.7%	57.8%	49.4%
2012	40.1%	46.4%	64.5%	49.9%
2014	28.5%	31.7%	48.3%	35.8%

Notes: Baseline: r=1%, g=0%, no real wealth

Looking first at the whole population, 36% to 49% of households have a negative residual, meaning that more than between a third and a half of current workers do not accumulate sufficient resources to finance future consumption. The proportion increases slightly from 2000 to 2012 and decreases abruptly in 2014. Interesting results emerge if we concentrate on the second, third and fourth columns. Within the group of households that overestimate their future pension benefits, the proportion of those who have a negative value for the residual is constantly higher than in the other two subgroups: misinformation and particularly overestimation of old age pension benefits can lead to a higher risk of the under-accumulation of resources.

The sensitivity analysis reported in Table 7, only for those overestimating future pension benefits, confirms the results of the baseline case.

Table 7
Proportion of households that overestimate future pension benefits and with a negative value of the residual in equation (9): sensitivity analysis

year	baseline	r=2.5%	g=2%	ar>0
2000	46.5%	36.5%	58.5%	30.7%
2002	46.8%	37.1%	58.5%	32.2%
2004	51.2%	39.9%	62.7%	33.9%
2006	53.2%	41.3%	65.5%	32.4%
2008	56.2%	44.0%	66.3%	33.6%
2010	57.8%	47.0%	68.2%	35.0%
2012	64.5%	52.6%	74.0%	36.9%
2014	48.3%	39.0%	59.6%	26.0%

We find that this result has important policy consequences. Government and/or public institutions should act as soon as possible to make their citizens aware of the risk of not having sufficient resources to finance their planned level of consumption in later years.

7. Conclusions

The Italian pension system has experienced a long series of reforms in the last 20 years. Most of these were aimed at reducing the generosity of the system and at guaranteeing its financial sustainability, but some actually went in the opposite direction, i.e. reducing the severity of previous reforms for at least part of the population of workers. The frequency and sometimes also the sign of these reforms has made the whole process somewhat confusing for many workers, but the general message that transmitted was one of a reduction in the level of future pension benefits. Workers consequently adapted their expectations, but with a delay and in an incomplete and confused fashion: there has been a shift from a general overestimation of the generosity of the future pension towards a greater tendency to underestimate it, particularly because many do not realize that the retirement age will continuously be postponed following the increase in life expectancy. At the end of a turbulent period of reforms, many workers are still not able to predict the level of the pension benefit or their correct retirement age accurately; this is particularly true of the last few years, also due to the effect of the economic crisis.

Our results show that errors in expectations concerning future pension benefits and retirement age are not evenly distributed among the population. In particular, we highlight the role of macroeconomic shocks and the fact that younger workers perform worse than adults (even after controlling for educational level), women are less conscious about their future level of pension benefits and the self-employed perform worse than dependent workers.

We finally check whether households have sufficient resources to finance a future stream of consumption that is consistent with reported current values, taking into account net wealth and statutory social security wealth. The results show that households in which the head is overly optimistic concerning social security wealth tend to be more exposed to the risk of not accumulating sufficient resources to finance their current stream of consumption into the future.

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