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Actuarial Fairness When Longevity Increases

An Evaluation of the Italian Pension System

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Actuarial fairness when longevity increases: an evaluation of the Italian pension system

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Abstract

In this study, we analyse the actuarial features of the Italian pension system after the 1995 reform. We consider both the old defined benefit, the *pro-rata* and the new notional defined contribution pension rules applied to private sector employees born between 1945 and 2000. In the computations, we allow for dynamic mortality. To this aim, we project cohort- and gender-specific mortality rates based on a limit demographic scenario recently depicted by demographic experts. We compare findings for the current legislation with those from a *quasi*-actuarially fair scenario, where cohort- and gender-specific mortality rates are taken into account in the pension computation.

The old DB rules are extremely generous and offer strong incentives to early retirement. Due to dynamic efficiency, the new NDC scheme provides less than actuarially fair benefits. As a consequence of the rules adopted to compute coefficients used to convert the notionally accumulated sum at retirement into the annuity and to update them in response to increasing longevity, the NDC scheme is more than *quasi*-actuarially fair. Periodical *ex-post* adjustments of the coefficients generate big incentives to retire. The main cause for the actuarial unfairness embedded in the new Italian pension system is the use of cross-sectional mortality rates in the computation of conversion coefficients: retired cohorts will likely live longer than what accounted for in the computation of their pension benefits, since cohort effects in mortality are disregarded by the Italian law.

Keywords: social security, notional defined contribution pension systems, actuarial fairness, longevity, cohort-specific mortality forecasts.

JEL codes: H55, J11, J14.

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1 Introduction

In the last two decades, population aging and low economic growth have undermined the financial stability of several pay-as-you-go pension schemes. Some countries (including Italy, Latvia, Poland and Sweden) have reacted to the crises by replacing their defined benefit (DB) pension system with a notional defined contribution (NDC) system, keeping the previous pay-as-you-go financial architecture. An NDC scheme consists of an individual account system to which contributions are earmarked and interests notionally paid; at retirement, the notionally accumulated sum is converted into the pension taking into account life expectancy, i.e. incorporating actuarial fairness.

An ideal actuarially fair pension scheme is characterized by both actuarial fairness and actuarial fairness at margin. Actuarial fairness guarantees that, for each individual, the discounted sum of contributions paid during the working career is equal to the discounted sum of expected benefits. On the other hand, actuarial fairness at margin ensures that, for each individual, the discounted sum of expected benefits (net of expected contributions to pay in case of continued work) does not depend on the worker's retirement age (see e.g Legros 2006, Gruber and Wise 1999).

An NDC scheme cannot guarantee the two above described "pure" actuarial conditions; however, it must satisfy the weaker conditions of *quasi*-actuarial fairness on average, and *quasi*-actuarial fairness at margin on average (Palmer 2006). These conditions first recognize that, in a dynamic efficient economy - i.e. an economy where the risk-adjusted return on assets is greater than the earnings growth rate - only a funded DC pension scheme can guarantee pure actuarial fairness. Since an NDC system is pay-as-you-go financed, its feasible (equilibrium) rate of return is approximately equal to the wage bill growth rate, i.e. the sum of earnings growth per head and the population growth (see Aaron 1966, Samuelson 1958). Moreover, these conditions allow for actuarial fairness (at margin) to only hold "on average", whereas in a pure actuarial system they must hold for each individual.[1]

The implementation of a *quasi*-actuarially fair NDC system needs to handle increasing longevity, and to insure that life expectancy used to compute the annuity at retirement is as close as possible to actual, *ex-post*, residual life (Disney 2004).[2] Palmer (2006) has recently suggested three procedures to handle increasing longevity in NDC schemes. The first procedure consists in forming a committee of demographic experts in charge of the analysis of long-run scenarios and the publication of official cohort projections. Revisions would always apply to non-retired cohorts and would be increasingly small as the cohort approaches retirement age. The second procedure consists in estimating cohort-specific mortality tables based on historical cross-sectional survival data. In this case, periodical adjustments are necessary to avoid producing excessively generous, i.e. system-

[1] NDC systems should account for known differences in life expectancy related to individual characteristics such as gender, race (Sorlie, Rogot, Anderson, Johnson, and Backlund 1992), socioeconomic status (Kitagawa and Hauser 1973) and region (Caselli, Peracchi, Balbi, and Lipsi 2003).

[2] DG-ECFIN (2006) projections state that life expectancy at age 65 for the EU-25 countries will increase by about 4 years by 2050.

atically more-than-actuarially fair, annuities. The third procedure makes use of recent cross-sectional survival data to compute annuities at retirement; it regularly adjusts the pensions of all retirees on the basis of more updated statistics. According to Palmer (2006), the first and the third procedures have the advantage of explicitly fulfilling the criterion of financial equilibrium, whereas the second and the third are, in principle, less discretionary than the first since they are based on historical statistics.

In 1995, the Italian pension system was reformed, and an NDC scheme was introduced to replace the previous unsustainable DB scheme. The reform set up a transitional phase lasting almost thirty years toward the new rules. Therefore, in the coming two decades, pensions will still be computed according to the old rules (the so-called *pro-rata* system); consequently, their actuarial features will still depend on the characteristics of the old DB scheme. New DC pensions, on the other hand, will be computed on the basis of updated cross-sectional mortality tables, while benefits of retired individuals will be kept untouched regardless of longevity changes. From a comparison with the third procedure suggested by Palmer (2006), it is clear that the Italian NDC rules will systematically violate actuarial principles if longevity continues to rise.

Various studies have analysed the actuarial characteristics of the Italian pension system after the 1995 reform. Ferraresi and Fornero (2000) and Fornero and Castellino (2001) analyse a set of workers which is representative of future cohorts of retirees. Relying on a static mortality assumption, these scholars provide empirical evidence suggesting that the DB scheme is extremely generous, whereas the NDC is almost actuarially fair on average and at margin.[3] While Ferraresi and Fornero (2000) and Fornero and Castellino (2001) focus on differences across cohorts, others (e.g. Caselli, Peracchi, Balbi, and Lipsi 2003, Borella and Coda 2006) look more within cohorts. Caselli, Peracchi, Balbi, and Lipsi (2003) find evidence of a sizable redistribution generated by the DC scheme which occurs across genders and Italian regions and which is induced by differential mortality. Borella and Coda (2006) develop a microsimulation model to study the redistributive impact of the Italian pension system both between and within cohorts; simulations are all based on cross-sectional mortality tables (ISTAT 2000).

In this study, we follow the representative agents approach proposed by Ferraresi and Fornero (2000) and Fornero and Castellino (2001). We analyse the actuarial features of the Italian pension system after the 1995 reform. We consider both the DB, the *pro-rata* and the (N)DC steady state rules applied to INPS-FPLD (i.e. private sector) employees. We compute two actuarial indicators, namely the present value ratio (PVR) and the implicit tax rate (TAX). Differently from previous studies, we allow for dynamic mortality in their computation. In particular, we investigate the actuarial properties of the rules designed by the 1995 reform to handle increasing longevity. To this aim, we build projected cohort- and gender-specific mortality tables based on a limit demographic scenario recently depicted by Robine, Crimmins, Horiuchi, and Zeng (2006). We first use the projected life tables in a baseline scenario (scenarios “B95” and “B07”, see section 4) to simulate pension benefits

[3] These results are qualitatively confirmed by other studies (see e.g. Brugiavini and Peracchi 2004, Brugiavini and Peracchi 2003) which quantified the degree of actuarial fairness at margin of the Italian pension system in order to gauge its effects on retirement choices.

according to the current legislation. We then compare these results with alternative findings from a *quasi*-actuarial fair scenario ("AB") where conversion coefficients are cohort- (and gender-)specific, as indicated by the first procedure in Palmer (2006). Although our analysis focuses on actuarial differences across cohorts, in section 7, we also provide some evidence of within cohorts redistribution (as in Caselli, Peracchi, Balbi, and Lipsi 2003) by distinguishing workers by gender and occupation.

The paper proceeds as follows. Section 2 illustrates the institutional framework, section 3 describes the projected cohort- and gender-specific mortality tables. Sections 4 and 5 describe the model and the actuarial indicators. Section 6 shows the main results, section 7 provides a sensitivity analysis with respect to some key model assumptions and section 8 concludes. Three appendixes describe (A) the methodology used to forecast mortality, (B) the formulas used to predict conversion coefficients for future retirees and (C) detailed simulation results.

2 Institutional framework

Until the 1990s, the Italian pension system was financially unsustainable. Pension expenditure grew from 7.4 % of GDP in 1970 to 14.9 % in 1992 (Brugiavini and Galasso 2004). To improve the social security budget, an impressive sequence of reforms was introduced during the 1990s. Most of them (such as the 1992 and 1997 reforms) were designed to be effective in the short run by acting on specific parameters of the existing system, such as the minimum retirement age. Law n.335/1995, which was designed instead to improve the budget in the long run, replaced the existing DB scheme with an (N)DC one. In line with its long run view, the law classified workers into three groups: the oldest, the middle-aged and the youngest. The oldest are those workers who, at the time of the reform, had accrued more than 18 years of seniority. They were left totally untouched by the reform and the old DB system is still applied to them. The middle-aged are those who had accrued less than 18 years of seniority by the end of 1995. Their pension is computed according to a mixed (*pro-rata*, PR henceforth) system where old and new rules are combined in proportion to the number of years worked prior to and after 1995. The youngest, to whom the new system fully applies, are those who started working after the 1995 reform.

In this study, we focus on private sector employees enrolled in the FPLD (*Fondo Pensioni Lavoratori Dipendenti*) fund. This fund enrols almost all employees in the private sector; in 2008, it paid around 10 millions of pensions (INPS 2009). It is managed by INPS (*Istituto Nazionale della Previdenza Sociale*), the most important social security institution in Italy. The main retirement options for FPLD workers are the old-age and the seniority pensions. Their access has been progressively tightened by various reforms during the 1990s and the 2000s. Currently, male (female) FPLD workers can claim an old-age pension at age 65 (60) provided that they have accrued 20 years of seniority. They can claim a seniority pension at age 60, provided that 35 years of seniority have been accrued and only if the sum of seniority plus age is greater than or equal to 96 (called "quota 96"). Alternatively, they can claim a seniority pension if 40 years of seniority have been accumulated. In the future, DC benefits could be claimed when 5 years of seniority plus a pension benefit equal to at least 1.2 times the social assistance benefit will be accumulated.[4]

The DB benefit is computed as the product of three factors: pensionable earnings, seniority and annual return. Pensionable earnings are the average wage of the last years of work. The number of years to include in the computation of pensionable earnings was progressively increased from 5 to 10 by the reforms of the 1990s. Seniority includes the number of years of regular contribution to the scheme, as well as years of notional contribution spent during out-of-work periods (e.g. unemployment spells, maternity leaves and military service); total seniority is topped at 40 years. Annual return is a decreasing function of pensionable earnings, equal to 2 % for a large part of the earnings distribution. Payroll tax rates grew dramatically in the last decades: from 19 % in 1967 (the first relevant year for our simulation, see section 4) to 33 %; they are paid for one third by the employee and for two thirds by the employer. Since 1992, pensions have been price-indexed.[5]

The DC pension for a worker retiring at age x is computed as:

$$P(x) = \left[c_a + \sum_{i=1}^{a-1} c_i \prod_{j=i}^{a-1} (1 + \bar{g}_j) \right] \delta_x \tag{1}$$

where c_i are the contributions paid when seniority is i, a is seniority at retirement and $\bar{g}_j$ is the geometric mean of nominal GDP growth rate in the 5 years preceding the year in which seniority is j. The amount in squared brackets is the nominally accrued fund at retirement. δ_x is the conversion coefficient for retirement at age x, where $x \in [57, 65]$, defined as[6]:

$$\delta_x = \left(\frac{\sum_{s=m,f} dir_{x,s} + ind_{x,s}}{2} - k \right)^{-1} \tag{2a}$$

$$dir_{x,s} = \sum_{t=0}^{\Omega-x} \frac{\ell_{x+t,s}}{\ell_{x,s}} (1 + g_f)^{-t} \tag{2b}$$

$$ind_{x,s} = \theta \sum_{t=0}^{\Omega-x} \frac{\ell_{x+t,s}}{\ell_{x,s}} (1 - \frac{\ell_{x+t+1,s}}{\ell_{x+t,s}})(1 + g_f)^{-(t+1)} a^W_{x+t+1} \tag{2c}$$

where $\frac{\ell_{x+t,s}}{\ell_{x,s}}$ is the gender-s-specific conditional survival probability at age $x + t$; g_f is the long-run expected GDP growth rate; a^W_{x+t+1} is the expected present value of a unitary annuity paid to the widow(er) at time $x + t + 1$; θ is the fraction of the annuity paid to the widow(er) and k is an actuarial adjustment factor that takes into account different frequencies in pension payments (set to 0.4615 by law to account for anticipated monthly payments). Notice that (equation 2a) differences in death probabilities between genders

[4] The requirement on the minimum pension is not needed if retirement occurs at age 65.

[5] A formal description of the DB and PR pension formulas applied to FPLD workers is provided by Fornero and Castellino (2001) and Ferraresi and Fornero (2000). Brugiavini and Galasso (2004) provide a comprehensive description of social security reforms in Italy.

[6] Retirement at ages greater than 65 implies the application of δ_{65} and is thus highly discouraged. Retirement before age 57 is allowed only if 40 years of seniority are accrued; δ_{57} is applied in this case.

are averaged-out. Further computational details on the conversion coefficients are provided in Appendix B.

Conversion coefficients enclosed to the 1995 law incorporated the ISTAT (Italian National Institute of Statistics) 1990 mortality tables and a value for g_f equal to 1.5 %. The 1995 reform established that conversion coefficients had to be revised every ten years according to updated mortality tables and projected GDP growth rates. However, the first update of the coefficients was delayed: the new values - expected in 2005 - were legislated in 2007 (law n.247/2007) and applied in 2010. In addition to updating conversion coefficients, the 2007 law reduced their temporal validity from ten to three years. Current values, based on the ISTAT 2002 mortality tables and $g_f = 0.015$, are thus valid for the period 2010-2012.

3 Projected cohort-specific mortality tables

Starting from the 1970s, a sizable downward trend in old-age mortality has taken place in Italy.[7] Between 1970 and 1990, male (females) life expectancy at age 60 (e_{60}) gained 2.4 (3.2) years (Caselli, Peracchi, Balbi, and Lipsi 2003) while, between 1990 and 2007, it earned an additional 3.4 (3) years (ISTAT 2010). In 2007, e_{60} was 21.89 years for males and 25.98 for females.

Positive past data on mortality has brought about an optimistic view of its future evolution. The greatest improvements are expected for the oldest-old, i.e. individuals aged 80 and over. The twenty-first century is considered by the experts as characterized not only by further progress in the prevention and cure of disease but also by firmly-rooted life styles able to promote more general "successful ageing". In this context, younger cohorts are expected to live longer than older ones, i.e. the "cohort" effect (Caselli 1990) will continue to play its positive role.

In this study, we build projected life tables for the Italian cohorts who will face the transitional phase from DB to NDC pension rules (i.e cohorts 1945-2000). We rely on the theory of mortality expansion (Myers and Manton 1984, Olshanski, Carnes, and Cassel 1993) according to which the average life span will continue to rise in the future. In order to build "limit" life tables set in the distant future, we follow the indications provided by recent interdisciplinary studies which have depicted the most important traits for human survival (see Robine, Crimmins, Horiuchi, and Zeng 2006)[8]. We then connect current tables with limit mortality tables; therefore, in the first years of the projections, our tables reflect the characteristics of current mortality, while for farther projection years, our tables progressively come closer to those of the limit scenario. The projected period is extremely long (the limit scenario is set beyond year 2100) and thus our age-times-time matrix includes all the information related to the future process of mortality of the

[7] In the 1970s, this phenomenon was a novelty for males, since their life expectancy at age 60 had only increased by 0.25 years in the previous forty years.

[8] Robine, Crimmins, Horiuchi, and Zeng (2006) collects studies from biology, medicine, epidemiology, demography, sociology, and mathematics. We also refer to the proceedings of the conference "Health, ageing and work. Strategies for the new welfare society in the larger Europe", The Geneva Association, Trieste, 2004.

Table 1. predicted period life expectancies at birth: our tables *versus* official tables

	Males		**Females**	
Forecast/Year:	**2030**	**2050**	**2030**	**2050**
Our tables	81.8	83.2	86.1	88.7
ISTAT[a] - central	82.2	84.5	87.5	89.5
ISTAT[b] - low	80.2	81.9	85.7	87.2

[a] Source: ISTAT (2008)
[b] Source: ISTAT (2008)

cohorts 1945-2000. Of course, for the oldest cohorts, the forecasts refer only to mortality at older ages, while for the youngest they cover their entire life. Consequently, projection uncertainty is higher for younger cohorts than for those approaching retirement in the coming years. Unfortunately, the method followed in the projections is deterministic and thus it does not allow for a quantification of projection uncertainty.[9] Appendix A provides more methodological details.

Table 1 compares the estimated life expectancy at birth with the corresponding statistics provided by the most recent ISTAT projections (ISTAT 2008).[10] The table indicates that our forecasts lie between ISTAT-low and ISTAT-central mortality scenarios. For instance, according to our tables, in 2030 male e_0 is expected to equal 81.8 years, while official statistics predict either 80.2 (low scenario) or 82.2 (central scenario). Figures 1 and 2 show the forecasted survival curves by cohort for females and males respectively. They highlight two typical characteristics of the mortality process of younger cohorts: the "rectangularization" of life tables (i.e. deaths are concentrated around a narrower interval of age) and the increase in life span. As a consequence of these improvements, younger cohorts are expected to experience sizable improvements in life expectancy: males e_{60} will increase from 23.1 years (cohort 1945) to 27.1 years (cohort 1970), up to a striking 31.4 years (cohort 2000). Corresponding values for females are 28.3, 31.6 and 38.1 years.

No official cohort life tables for the overall population exist in Italy. There exist two cohort life tables (called "RG48" and "IP55", pertaining to the 1948 and 1955 cohorts) used by Italian insurance companies to compute premiums. They refer to the annuitant population and correct for self-selection. Due to self-selection of healthier individuals, the annuitants' expected life expectancy is longer than the whole population's.

[9] Maccheroni and Barugola (2010) project mortality for the Italian birth cohorts 1950-2005 using a Lee Carter (i.e. stochastic) model. They show that uncertainty is pretty small if one concentrates on mortality at older ages, especially for cohorts born prior to 1975.

[10] At an intermediate step, our approach produces a forecast for fictitious cohorts, i.e. calculated year by year, as in the case of most forecasts. The results obtained in this phase can thus be compared with those obtained by other recent official forecasts. It should be pointed out, however, that the methodological approaches used in a very long-term forecast (like those adopted for the cohort tables we provide) and in standard demographic forecasts (which usually cover a period of 30-50 years) are extremely different. Therefore, a formal comparison between the two tables cannot be conducted.

Figure 1. Projected survival curves by cohort: females

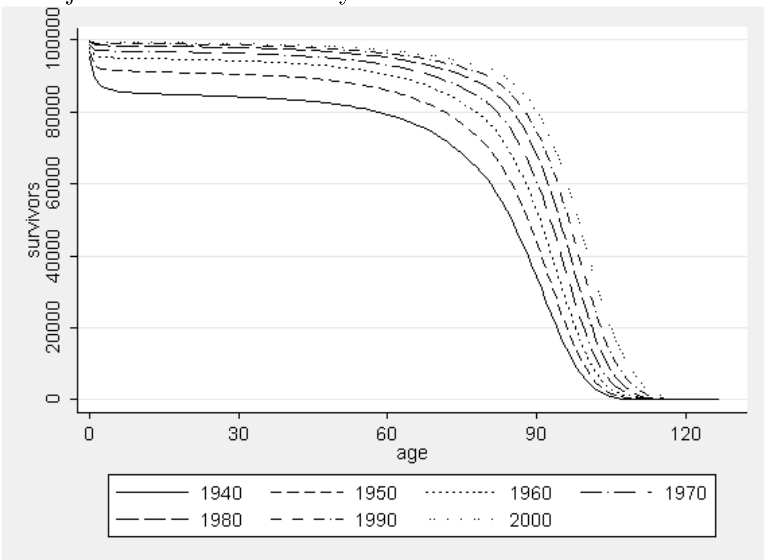
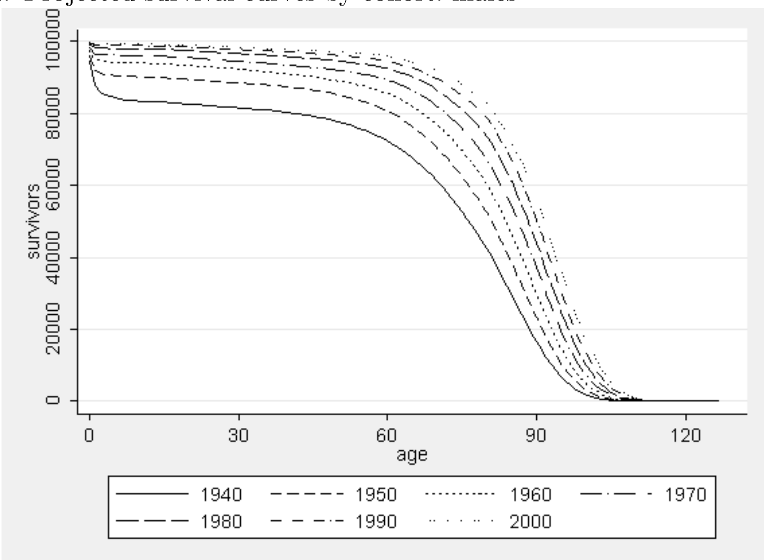


Figure 2. Projected survival curves by cohort: males



4 Representative agents

In this exercise, we evaluate the actuarial features of the Italian pension system for a set of representative individuals subject to DB, PR or (N)DC pension rules. Each analysed individual represents a typical INPS-FPLD (i.e. private sector) employee born in a given year, of a given gender and occupation (blue and white-collar). Agents are characterized by a stylized working career, described by an age of enrolling, a lifetime wage profile and a set of alternative retirement ages. The main features of the working career (e.g. age of entry into the labour market) are kept constant across cohorts to better highlight the actuarial impact of both normative and mortality changes.

Based on the data provided in the Bank of Italy's "Survey of Household's Income and Wealth" (SHIW), our study assumes that white-collar workers enrol to the pension scheme at age 24, while blue-collar workers enrol at age 22 if female or at age 21 if males. We further assume that, once enrolled, agents keep contributing to the same scheme until retirement.[11] Retirement occurs between age 60 and 65. Given our assumptions, all agents become eligible to claim pension benefits at age 60 (see section 2).

Lifetime wage profiles are obtained as predictions from a random effects model for individual wages estimated on the Italian administrative data "Estratti Conto INPS", a panel data set that covers the period 1985-1997 and includes 1/365 of the Italian private sector workforce. In the wage model, the log of wages is regressed against an age spline, a variable capturing the cohort effect, a set of year, sector and area of work dummies.[12] The model is estimated separately by gender and occupation (blue and white collars). Due to self-selection problems, the estimation samples only include individuals younger than age 60. Between ages 60 and 65, we assume that wages are constant. Figure 3 displays the estimated lifetime wage profiles: among the four groups, male white-collar workers have the steepest and highest profile while female blue-collar workers are the poorest and have the less dynamic careers.

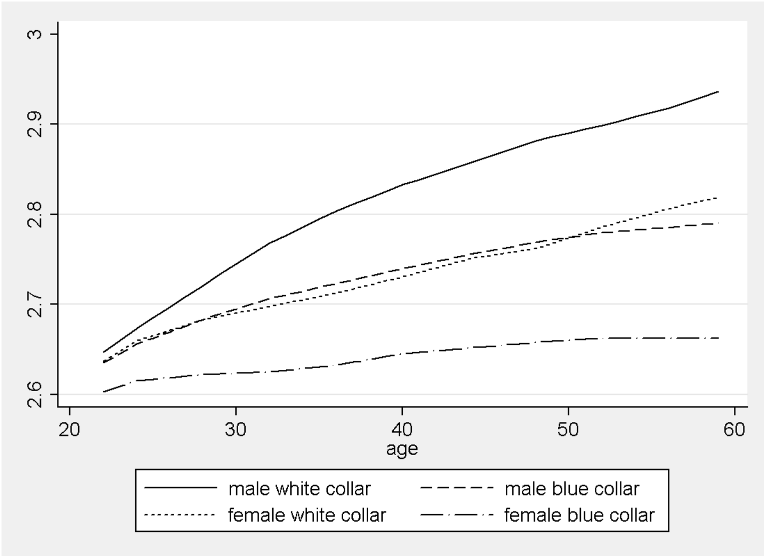
Given these stylized careers, each representative agent is assigned to a specific pension regime (DB, PR or NDC). Table 2, for example, reports assigned pension regime and retirement years by cohort for white-collar employees. It shows that agents born between 1945 and 1953 are subject to the DB rules, since in 1995 they had accumulated 18 years of contributions or more. Depending on retirement age and cohort, they claim pension benefits between year 2005 and 2018. Employees born between 1954 and 1970 are subject to the PR rules and retire between 2014 (cohort 1954, retiring at age 60) and 2035 (cohort 1970, retiring at age 65). Finally, employees born in 1971 or later are subject to the DC rules and retire in 2031 or later. A similar categorization of workers (not shown in the table) is obtained for male blue-collar and female blue-collar workers.

For each agent and retirement age between 60 and 65, we compute the accrued pension benefit and corresponding actuarial indicators (see section 5). In these computations, we consider both historical and projected values of key macroeconomic indicators such as GDP growth rates, inflation rates and long-run (10 years' maturity) government bonds interest rate. Historical values are taken from various official sources: the OECD, the Bank

[11] Using the SHIW data (various cross-sections) we compute gender- and occupation-specific average ages of entry into the labour market. To avoid overestimation of accrued seniority at retirement, we account for an average period of 3 years spent out of the labour market and not compensated by notional contributions (see section 2).

[12] Given the long-run horizon of our analysis, we also need to predict wages for out-of-sample cohorts. Traditional econometric models, which use dummies to capture cohort effects, require additional assumptions for out-of-sample predictions. Following Heckman and Robb (1985) and Kapteyn, Alessie, and Lusardi (2005) we assume that wages differ across cohorts due to the macroeconomic conditions when individuals enter into the labour market. These conditions are summarized by productivity growth and are approximated by GDP per capita. Econometric details are provided upon request.

Figure 3. Estimated age-wage profiles by gender and occupation



Note: log-wages in €10,000 (2009 euros).

of Italy and ISTAT. In our main macroeconomic scenario, we assume a projected long-run real GDP growth rate (g_f, see section 2) equal to 1.5 % and a long-run riskless interest rate (r, see section 5) equal to 2 %. A very similar value for the GDP growth rate has been adopted in recent long-run EPC-WGA pension projections (EPC-WGA 2008) and in most of the Italian pension expenditure projections (MEF 2009, MEF 2011).[13] The implied spread ($r - g_f = 0.5$ percentage points) is coherent with a dynamic efficient economy although it does not overestimate the dominance of the financial market with respect to the pay-as-you-go system. In a sensitivity analysis we consider alternative macroeconomic scenarios where the spread between the two key macroeconomic variables is wider.[14]

Actuarial fairness is evaluated in three different normative scenarios: “baseline 1995 (B95)”, “baseline 2007 (B07)” and “*quasi*-actuarial benchmark (AB)”. The first two incorporate actual pension rules. Scenario B95 considers the 1995 pension rules, whereas scenario B07 takes into account the reduced validity (from 10 to 3 years, as modified by the 2007 law) of the conversion coefficients. The AB scenario considers a hypothetical *quasi*-actuarial fair pension system, where conversion coefficients are cohort- and gender-specific and computed according to equation (B 2) in appendix B.[15]

[13] See also MLSP (2002a) and MLSP (2002b). As already mentioned in section 2, a value of 1.5 % for the GDP growth rate has been used to compute conversion coefficients in 1995 and 2007.

[14] Recent long-run EPC-WGA pension projections (EPC-WGA 2008) consider an interest rate equal to 3 %, which implies a wider spread $r - g_f$.

[15] Consistently with current rules, in the B95 and B07 scenarios, conversion coefficients for the DC and PR benefits incorporate cross-sectional mortality rates, which we obtain by looking at the appropriate column of the gender-specific age-times-year projected life table (see equation (B 1)

Table 2. pension regime and retirement years by cohort: white-collar workers

cohort	**start**[a]	**sen.1995**[b]	**regime**[c]	**retirement years:** age 60	... age 65
1945	1969	26	DB	2005	2010
...	...	...	...	...	...
1953	1977	18	DB	2013	2018
1954	1978	17	PR	2014	2019
...	...	...	...	...	...
1970	1994	1	PR	2030	2035
1971	1995	0	DC	2031	2036
...	...	...	...	...	...
2000	2024	0	DC	2060	2065

[a] enrollment year.
[b] seniority accrued at the end of 1995.
[c] DB=defined benefit, PR=pro-rata, DC=notional defined contribution.

5 Actuarial indicators

We evaluate the actuarial characteristics of the Italian pension system by means of two social security money's worth measures (Geanakoplos, Mitchell, and Zeldes 2000): the present value ratio (PVR) and the implicit tax/subsidy rate (TAX). The former is used to evaluate actuarial fairness while the latter measures actuarial fairness at margin. Both of them require the computation of social security wealth (SSW). The SSW for retirement at a, computed at $t_1 \in [1, a+1]$ and evaluated at t_2, where a, t_1, t_2 define years of seniority, is given by:

$$SSW^a_{t_1,t_2} = -\sum_{j=t_1}^{a} c^*_j (1+r)^{t_2-j} + \left[P(e+a)\frac{1}{\overline{\delta}^{co}_{e+a,s}} \right] (1+r)^{t_2-(a+1)} \qquad (3)$$

where c^*_j are the contributions at constant prices paid by the worker to the fund when accrued seniority is j and r is the time-constant riskless interest rate.[16] $P(e+a)$ is the pension benefit associated with retirement at age $e+a$, where e is the age at which the employee starts contributing to the scheme and a is the number of years of seniority accrued at retirement. $\overline{\delta}^{co}_{e+a,s}$ is equal to $\delta^{co}_{e+a,s}$ as described in equation (B 2) but with g_f replaced by r. The sum in square brackets is therefore the present value of expected

and section 3). In the AB scenario, mortality rates are selected from the appropriate diagonal of the gender-specific age-times-year projected life table.

[16] In the empirical analysis, we approximate r with the long-run (10 years' maturity) government bonds interest rate. See Queisser and Whitehouse (2006) for a discussion of the appropriate discount rate. Notice that (see e.g. Coile and Gruber 2000) we assume that the individual is alive at retirement.

pension benefits. It is computed assuming cohort- and gender- specific mortality rates, a discount rate equal to r, price-indexation of pensions and survivors' benefits. Financial flows are annual and anticipated.

The PVR is given by the ratio between the present value of expected pension benefits and the present value of the contributions paid during the working career. This indicator shows how much the system returns to the worker for each euro paid. The PVR computed when seniority at retirement is equal to a is given by:

$$PVR^a = \frac{P(e+a)\frac{1}{\bar{\delta}^{co}_{e+a,s}}}{\sum_{j=1}^{a} c^*_j (1+r)^{a+1-j}} \tag{4}$$

A pension system is defined as actuarially fair if $PVR^a = 1$ (i.e. $SSW^a_{1,1} = 0$ in equation 3). A pension system is defined as *quasi*-actuarially fair if $PVR^a = 1$ when $r = g_f$.

The TAX computed at $t_1 \in [1, a+1]$, once a' years of seniority have been accrued and evaluated at t_2, is given by:

$$TAX^{a'}_{t_1,t_2} = \frac{-acc^{a'}_{t_2}}{E_{t_1}\left[w_{a'+1}\right](1+r)^{t_2-(a'+1)}} \tag{5}$$

where the numerator is called *accrual* and is defined as:

$$\begin{aligned} acc^{a'}_{t_2} &= SSW^{a'+1}_{t_1,t_2} - SSW^{a'}_{t_1,t_2} \\ &= -c^*_{a'+1}(1+r)^{t_2-(a'+1)} + \\ &\quad \left[P(e+a'+1)\frac{1}{\bar{\delta}^{co}_{e+a'+1,s}} - P(e+a')\frac{1}{\bar{\delta}^{co}_{e+a',s}}(1+r)\right] \\ &\quad (1+r)^{t_2-(a'+2)} \end{aligned} \tag{6}$$

Equation (6) highlights that, if retirement is postponed by one year, the SSW varies due to two reasons. First, it decreases because of additional contributions to pay. Second, it varies due to the difference in square brackets between the present values of pension benefits associated with the alternative retirement options a' and $a'+1$. The sign of this difference is undefined because a shorter retirement period is generally associated with a higher pension benefit. In equation (5), the accrual is normalized with respect to the expected wage for the additional year of work.

A pension system is defined as actuarially fair at margin if $TAX^{a'}_{t_1,t_2} = 0$. A pension system is defined as *quasi*-actuarially fair at margin if $TAX^{a'}_{t_1,t_2} = 0$ when $r = g_f$ in (5). If $TAX^{a'}_{t_1,t_2} > 0$ (i.e. $Accr^{a'}_{t_2} < 0$) the pension system imposes an implicit taxation on the continuation of the working activity, thus providing financial incentives to early retirement; if $TAX^{a'}_{t_1,t_2} < 0$ the pension system penalizes early retirement.

6 Results

6.1 Forecasted conversion coefficients

Table 3 shows legislated and forecasted conversion coefficients by retirement age (57-65) and selected retirement years. In the first two columns, it reports values fixed by the 1995

Table 3. Legislated and forecasted conversion coefficients by age and retirement year: current legislation

	Selected retirement years *(life tables)*					
	1995-09	**2010-12**	**2019-21**	**2028-30**	**2040-42**	**2049-51**
Age	*(ISTAT90)*	*(ISTAT02)*	*(2018)*	*(2027)*	*(2039)*	*(2048)*
57	4.720	4.419	4.169	4.029	3.866	3.793
58	4.860	4.538	4.276	4.128	3.956	3.879
59	5.006	4.664	4.390	4.234	4.052	3.971
60	5.163	4.798	4.511	4.345	4.153	4.067
61	5.334	4.940	4.640	4.464	4.261	4.170
62	5.514	5.093	4.777	4.590	4.375	4.279
63	5.706	5.257	4.922	4.724	4.496	4.394
64	5.911	5.432	5.077	4.867	4.625	4.517
65	6.136	5.620	5.244	5.020	4.762	4.648
	percentage deviation with respect to 1995-09					
57	-	-6.38	-11.67	-14.64	-18.10	-20.38
58	-	-6.63	-12.01	-15.06	-18.60	-20.93
59	-	-6.83	-12.30	-15.43	-19.06	-21.45
60	-	-7.07	-12.62	-15.83	-19.56	-22.01
61	-	-7.39	-13.01	-16.31	-20.12	-22.63
62	-	-7.64	-13.37	-16.75	-20.66	-23.23
63	-	-7.87	-13.74	-17.20	-21.21	-23.84
64	-	-8.10	-14.10	-17.66	-21.76	-24.45
65	-	-8.41	-14.54	-18.19	-22.39	-25.14

Note: percentage points; the first two columns report coefficients determined by laws n.335/95 and n.247/07; the following columns report forecasted coefficients (scenario B07) for selected triennial retirement periods. Coefficients are computed using forecasted cross-sectional life tables for the year indicated in italics at the top of each column.

and 2007 laws and valid respectively for the period 1995-2009 and 2010-12. In the following columns, the table shows forecasted coefficients (scenario B07) for selected retirement periods (2019-21, 2028-30, 2040-42, 2049-51). Conversion coefficients are expected to decrease considerably, as a consequence of the increased longevity. For example, the coefficients which will be applied in 2019-21 are expected to be 12-15 % lower than those legislated in 1995 (see lower part of the table). These findings are in line with those found by Caselli, Peracchi, Balbi, and Lipsi (2003) in their low-mortality scenario.[17] The bottom part of table 3 shows that the relative reduction in the coefficients is higher for older retirement ages and concentrated in the first years of the simulation.

Table 4 reports the forecasted conversion coefficients according to the AB scenario for

[17] Caselli, Peracchi, Balbi, and Lipsi (2003) predict conversion coefficients for 2020 using projected ISTAT life tables (base 2002, central and low-mortality scenarios, unpublished forecasts).

Table 4. Forecasted conversion coefficients by age, cohort and gender: AB scenario

	Selected cohorts					
Age	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**
			Males			
57	4.044	3.896	3.769	3.656	3.557	3.466
58	4.140	3.985	3.851	3.734	3.629	3.534
59	4.240	4.079	3.939	3.816	3.706	3.606
60	4.347	4.178	4.031	3.902	3.787	3.682
61	4.459	4.282	4.128	3.993	3.872	3.762
62	4.578	4.392	4.231	4.089	3.961	3.846
63	4.704	4.509	4.339	4.190	4.056	3.934
64	4.837	4.632	4.454	4.297	4.156	4.028
65	4.978	4.763	4.575	4.410	4.262	4.127
			Females			
57	3.925	3.767	3.627	3.498	3.375	3.255
58	4.014	3.848	3.701	3.566	3.437	3.312
59	4.108	3.933	3.779	3.637	3.503	3.371
60	4.208	4.024	3.862	3.713	3.571	3.433
61	4.313	4.119	3.949	3.792	3.643	3.499
62	4.425	4.220	4.041	3.875	3.719	3.568
63	4.543	4.327	4.137	3.964	3.800	3.640
64	4.668	4.440	4.240	4.057	3.884	3.716
65	4.802	4.560	4.348	4.155	3.973	3.797

selected cohorts. It highlights how heterogeneous the conversion coefficients would be, were they computed consistently with the cohort and gender differentials in life expectancy. For example, the coefficient applied to a male born in 1960 and retiring at age 60 ($\delta^{1960}_{60,m} = 4.178$) would be 3.9 % lower than that applied to a male retiring at the same age but born 10 years earlier ($\delta^{1950}_{60,m} = 4.347$). The coefficient applied to a male born in 2000 would be 15.3 % lower than that applied to an employee born in 1950 (cf. $\delta^{2000}_{60,m}$ with $\delta^{1950}_{60,m}$). Lower conversion coefficients would be applied to females, since they live longer than males; the provision of a joint annuity (see equation B 2, the indirect component) would only partially compensate the difference in life expectancy between genders in the main (direct) pension beneficiary.

Finally, table 5 shows - for each gender, retirement age and selected retirement year - the percentage deviation between coefficients computed according to the current legislation (scenario B07, table 3) and those computed according to the actuarial benchmark (AB scenario, table 4). For instance, the coefficient applied by law to a male employee retiring in 2010 at age 60 (4.798, see table 3) is 10.4 % higher than the coefficient computed according to the cohort- and gender-specific mortality rates ($\delta^{1950}_{60,m} = 4.347$, see table 4). The figures in the table are positive, meaning that the rules adopted by the 1995 reform

Table 5. Forecasted conversion coefficients: percentage deviation between current legislation (Table 3) and AB scenario (Table 4)

	Selected retirement years				
Age	**2010**	**2020**	**2030**	**2040**	**2050**
			Males		
57	10.5	8.1	7.9	6.6	6.5
58	10.5	8.1	7.9	6.6	6.5
59	10.4	8.0	7.8	6.5	6.7
60	10.4	8.0	7.8	6.4	6.3
61	10.3	7.9	7.8	6.4	6.3
62	10.3	7.9	7.7	6.3	6.2
63	10.2	7.8	7.7	6.2	6.1
64	10.2	7.8	7.6	6.1	6.1
65	10.2	7.7	7.6	6.1	6.0
			Females		
57	14.1	12.0	12.3	11.7	12.5
58	14.1	12.0	12.4	11.8	12.6
59	14.1	12.1	12.5	11.8	12.7
60	14.0	12.1	12.5	11.9	12.8
61	14.1	12.1	12.6	11.9	12.8
62	14.1	12.2	12.6	12.0	12.9
63	14.1	12.2	12.7	12.0	12.9
64	14.1	12.2	12.7	12.0	13.0
65	14.1	12.2	12.8	12.0	13.0

to compute conversion coefficients - which rely on cross-sectional life tables and disregard cohort improvements in longevity - provide pension benefits which are more generous than what the benchmark suggests. This "premium" is lower for males than for females, since it is partly compensated (see equation 2a) by the application of unisex conversion coefficients averaging-out differences in mortality rates between genders.

6.2 Actuarial fairness

The PVR by cohort for a typical male white-collar worker retiring at age 60 is reported in figure 4. As specified in section 4, we consider three alternative scenarios (B07, B95 and AB), we assume a long-run GDP growth rate equal to 1.5 % and an risk-less interest rate equal to 2 %. Results for other agents, retirement ages and macroeconomic assumptions are reported in section 7.

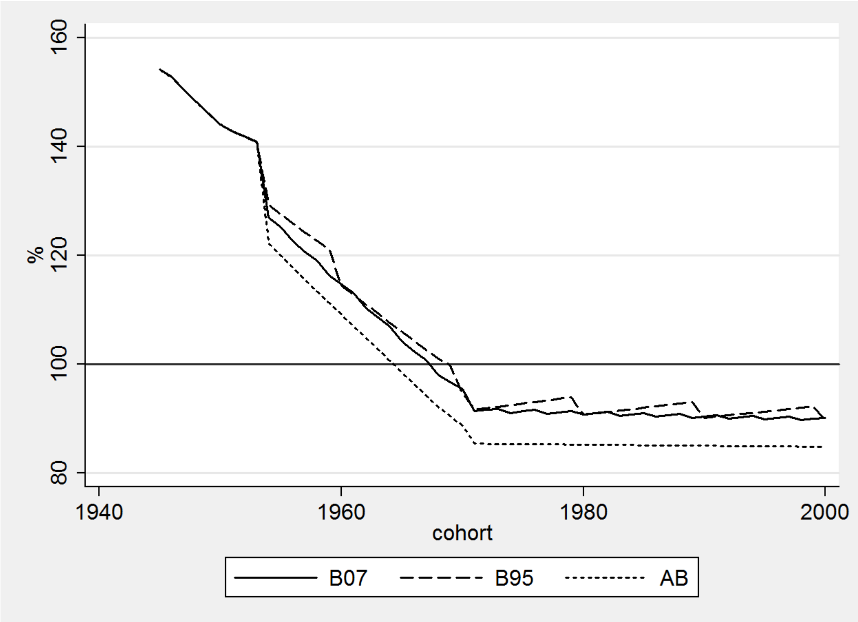
Figure 4 highlights that the pre-reform system is extremely generous, providing much more than actuarially fair benefits. Cohorts belonging to the DB scheme (1945-1953), in fact, receive in terms of social security benefits up to 150 % of what they paid during their working career. The PVR sharply falls (-14 percentage points, from 141 to 127 %) between the 1953 and 1954 cohorts, as a consequence of the classification of workers according to either the DB (cohort 1953) or the PR (cohort 1954) rules (see Ferraresi and Fornero 2000, Fornero and Castellino 2001). Throughout the transitional phase toward the DC rules (cohorts 1954-1970) the PVR exhibits a decreasing trend due to the increasing weight of the DC quota in the computation of pension benefits of younger cohorts. For cohorts younger than 1967, the system is less than actuarially fair. For cohorts born in 1971 and later, the indicator ranges between 89.7 and 91 %, indicating that the steady state DC regime is less than actuarially fair.

Results for the steady state can be attributed to dynamic efficiency (see Fornero and Castellino 2001): in an economy where the risk-less rate of return from financial markets dominates its rate of growth, only funded DC schemes can guarantee "pure" actuarial fairness. Regardless of macroeconomic conditions, a comparison across scenarios shows that the Italian pension system does not meet the weaker requirement of *quasi*-actuarial fairness on average (Palmer 2006). The PVR in the B07 and B95 scenarios is higher (by 5-6.5 percentage points) than in the AB scenario, meaning that the steady state DC rules are more than *quasi*-actuarially fair. This result depends on the rules adopted for the computation of conversion coefficients: since cohort effects in mortality are disregarded, retired cohorts will likely live longer than what accounted for in the computation of their pension benefit.

Finally, figure 4 shows that the PVR is characterized by an irregular course in the B07 and B95 scenarios. Periodical adjustments of the conversion coefficients, implemented to *ex-post* counteract increased longevity, generate discontinuities in the pension treatment of adjacent cohorts. The 2007 reform, by reducing from 10 to 3 years the temporal validity of the conversion coefficients, was quite effective in reducing redistribution across adjacent cohorts (cf. discontinuities in the B07 and B95 scenarios).[18] The PVR has a smooth course in the AB scenario, where cohort- and gender-specific longevity increases are fully offset by corresponding reductions in conversion coefficients. For this reason, this simulation is similar to a kind of "static mortality case". Accordingly, our results for the AB scenario are very similar to those reported in previous studies (Ferraresi and Fornero 2000) which assume static mortality.

[18] Consider, for example, cohorts 1971 to 1974. A male white-collar worker born in 1971 is aged 60 in 2031. Under the current rules (B07), his PVR is equal to 91.4 %. A worker born in 1972 (1973) is expected to live slightly longer than one born in 1971, while his pension benefits will be computed using the same conversion coefficient of the previous cohort. As a consequence, he will enjoy a slightly higher PVR=91.6 (91.9). A worker born in 1974 and retiring at age 60 will be hit by the revision of the coefficients fixed by law in 2034 (NPVR=91.1). However, the reduction in the PVR suffered by the 1974 cohort with respect to the 1973 cohort is small, i.e -0.8 percentage points. According to the 1995 legislation (coefficients revised in 2040), the effect of longevity improvements for 9 years combined with less frequent revisions of the coefficients would generate a much more pronounced cycle in the indicator: the PVR would increase by 2.1 percentage points (from 91.8 to 93.9 %) between the 1971 and 1979 cohorts and decrease by 3.2 points between the 1979 and 1980 cohorts due to the coefficients revision.

Figure 4. PVR by cohort at age 60: male white-collar workers, alternative scenarios



Note: percentage points; B07: current legislation; B95: conversion coefficients revised every ten years; AB: *quasi*-actuarial benchmark; 36 years of seniority; $g_f = 0.015, r = 0.02$

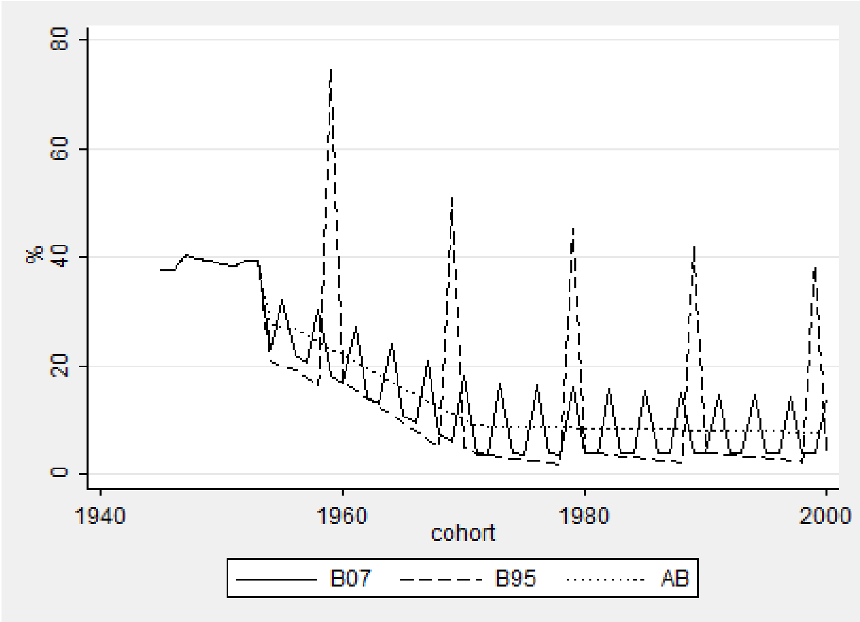
6.3 Actuarial fairness at margin

Figure 5 shows the TAX by cohort for male white-collar workers retiring at age 60. In the DB scheme the indicator reaches a value of 40 %, which represents a strong financial incentive to claim pension benefits at minimum requirements (see e.g. Belloni and Alessie 2009). The application of PR rules and the full application of the DC formula drastically reduce the implicit taxation of continuing working. However, the taxation is not eliminated in the steady state, which is less than actuarially fair at margin for most of the cohorts: excluding retirement years in which conversion coefficients are updated (see next paragraph), the indicator ranges between 3.8 and 4.1 %. Due to dynamic efficiency, even in the DC scheme, it is optimal to retire at minimum requirements and invest the accumulated wealth at the market return $r > g_f$.

Figure 5 (B07) points out the existence of big spikes of TAX (equal to about 11-12 percentage points) for the years in which conversion coefficients are updated. An individual considering staying at work in the year before the revision of the conversion coefficients would face a very strong constraint: his social security wealth would be considerably reduced if he kept working.[19] The 2007 reform, by restricting the time validity of the

[19] Compare, for example, workers born in 1972 and 1973. The former are aged 60 in 2032. They face a TAX equal to 3.8 % ($\delta_{60} = 4.295$ in 2032, they expect $\delta_{61} = 4.41$ in 2033). Workers born in 1973 face the revision of the coefficients when they reach age 60 and are taxed at a rate equal to 16.8 % if they postpone retirement by one year (they expect δ_{61} to fall from 4.41 to 4.36 due to the revision in 2034).

Figure 5. TAX by cohort at age 60: males white-collar workers, alternative scenarios



Note: percentage points; B07: current legislation; B95: conversion coefficients revised every ten years; AB: *quasi*-actuarial benchmark; 36 years of seniority; $g_f = 0.015, r = 0.02$

conversion coefficients to three years, reduced the implicit taxation in a sizable way (the B95 scenario shows spikes equal to 38-45 percentage points, cf. spikes in the B07 scenario).

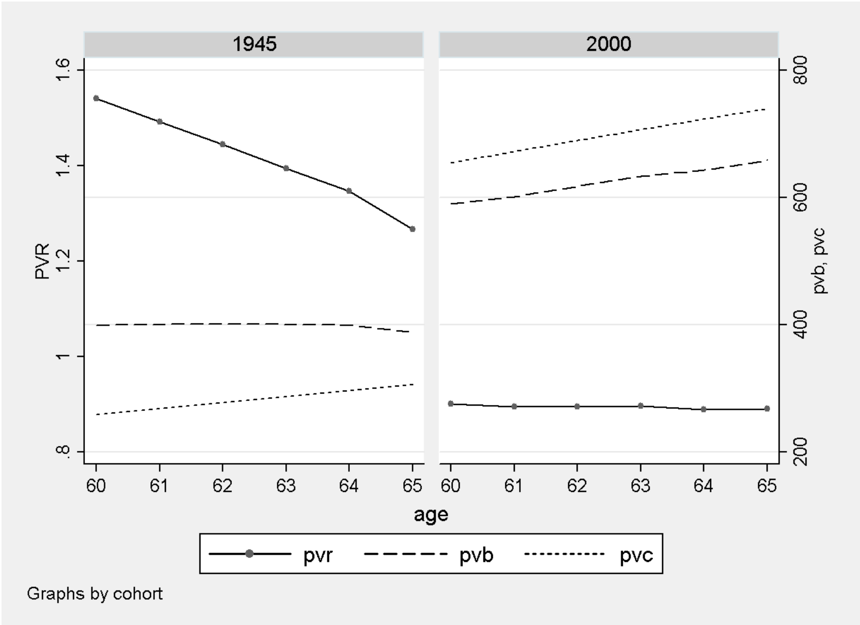
A comparison across scenarios shows that the Italian NDC system is more than *quasi*-actuarially fair at margin, meaning that it generates an implicit tax which is lower than that determined by the spread $r - g_f$. Indeed, in the B07 scenario, the TAX is 4-5 percentage points lower than in the AB scenario (excluding the spikes). This "extra-return" embedded in the current rules is due to the upward-biased difference between the conversion coefficients applied to adjacent retirement ages, which reflects the application of cross-sectional mortality rates in their construction. In the AB scenario, the TAX has a smooth trend since, in this simulation, longevity differences by cohort are compensated by appropriate differences in conversion coefficients applied to different cohorts.

7 Sensitivity

In this section, we provide a sensitivity analysis of the main results illustrated in the previous section comparing findings for alternative retirement ages (60-65), different agents (male blue-collar workers and females) and different macroeconomic settings. The full set of results for the base macroeconomic case is reported in Appendix C.

In the DB scheme, results show a negative relationship between the PVR and the retirement age whereas in the DC scheme the indicator is almost invariant with respect to retirement age. To better understand these findings, in Figure 6 we report the PVR as well as its components - present value of benefits (PVB) and present value of contributions

Figure 6. PVR, PVB and PVC for alternative retirement ages, cohorts 1945 (DB) and 2000 (DC)



Note: PVR left axis; pvb and pvc=1,000 euros, prices 2009, right axis; male white-collar workers; current legislation (B07); $g_f = 0.015, r = 0.02$

(PVC), see equation 4 - for two selected cohorts (1945, DB and 2000, DC) retiring at ages 60-65. For the DB cohort, the negative impact on the PVB of the shorter retirement period associated with later retirement dominates over the positive effect related to the modest increase in the pension benefit (2 % for each additional working year up to 40 years of seniority, plus the increase in pensionable earnings). Therefore, both the PVB and the PVR are lower for later retirement ages. For the DC cohort, the (actuarially-related) increase in the pension benefit associated with later retirement is more pronounced than in the DB case, and the consequent increase in the PVB almost perfectly compensates the increase in the PVC.[20] The TAX rate (see tables in Appendix C), on the contrary, tends to increase with the age of retirement in the DB scheme, thus providing increasingly stronger incentives to retire. The indicator becomes especially high when the individual accrues 40 years of seniority. In this case, in fact, there is a no annual return for the additional years of work. The TAX is instead almost constant with respect to the retirement age in the DC scheme.

[20] A lower PVR associated with older retirement ages does not allow us to infer that there is an incentive to retire (and viceversa). For this kind of considerations, we have to refer to the TAX. As already explained in section 5 (see equation 5) both the SSW associated with immediate retirement and the expected SSW associated with retirement in one year are evaluated at the same point in time in the TAX. When we compare PVR associated with different retirement ages, we instead refer to computations made at different points in time and based on currently accrued pension benefits.

As regards the comparison across genders and occupations, it turns out that the 1995 reform changed the implicit redistribution of the Italian pension system from "wage-based" to "mortality-based". In the DB scheme, the actuarial indicators are particularly affected by the shape of the lifetime wage profile. Figure 7 reports the PVR by cohort for retirement at age 60, for four types of agents: male blue-collar, male white-collar, female blue-collar and female white-collar workers. In the DB scheme, the flattest age-wage profiles are typically associated with lower PVR. If, for instance, we consider the 1945 cohort, the indicator is equal to 154 % for male white-collar workers (steepest profile) and to 126.5 % for female blue-collar workers (flattest profile). The flattest lifetime wage profiles also typically correspond to a higher implicit taxation: the corresponding TAX for the above reported examples are equal to 37.7 (male white-collar) and 64.3 % (female blue-collar). These results are explained by the DB pension formula, which accounts for the wages in the last part of the working career only. By postponing retirement, the implicit taxation is then particularly high for a flat age-wage profile, since in this case pensionable earnings do not increase. In the (N)DC scheme, the indicators are affected by group-specific (in our exercise, gender-specific) mortality rates. Figure 7 illustrates that the PVR is approximately 90 % for males and around 95 % for females. Females are favoured, since their longer life expectancy is not accounted for in the computation of conversion coefficients.[21]

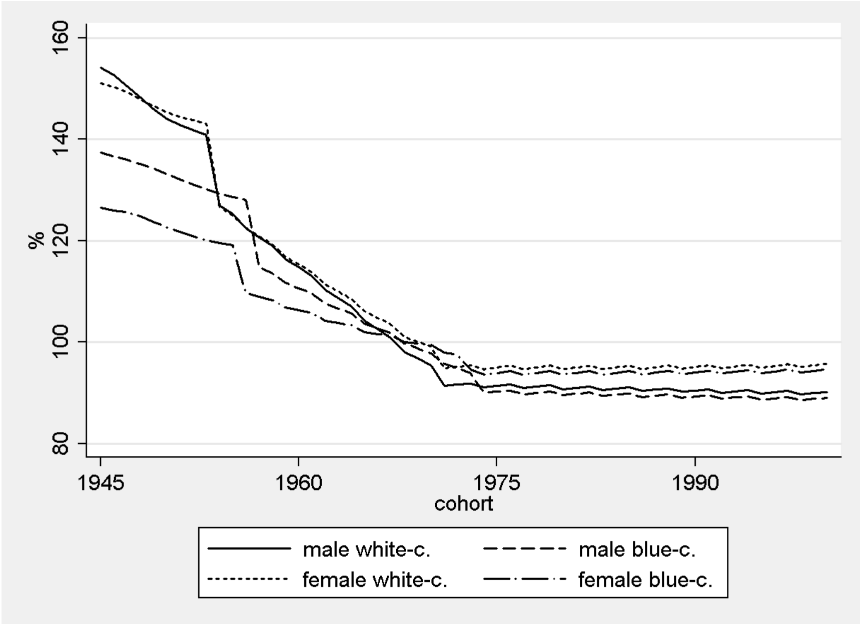
Finally, we report the results of a sensitivity analysis with respect to the macroeconomic scenario. Note that the sign of $\Delta\text{PVR}/\Delta i$ and $\Delta\text{TAX}/\Delta i$, $i = \{r, g_f\}$, in both the DB and the DC scheme is known *a priori* (see section 5) and is reported in the upper part of table 6 ("Qualitative impact"). While r affects the results in both the DB and the DC scheme, g_f affects them only in the DC scheme. To provide a quantification of these effects, we simulate the PVR and the TAX under a number of different values for g_f and r. We restrict our analysis to the sets $r \in [0.01, 0.03]$ and $g_f \in [0.005, 0.025]$, s.t. $r > g_f$. We consider two "extreme" cohorts: 1945 (DB) and 2000 (DC).

Simulated results for male white-collar workers retiring at age 60 are illustrated in detail in figure 8 and summarized in the bottom part of table 6. Each panel in figure 8 shows the value assumed by a given indicator and for a given cohort, as a function of the two macro variables. Each (iso-)line displays the set $\{g_f, r\}$ such that the indicator has the same value; each line refers to a decile of the simulated PVR or TAX distribution: lighter lines are associated with a higher value of the indicator. In the bottom part of table 6 ("Simulation results"), we report the corresponding 25th, 50th and 75th percentiles of the simulated PVR and TAX distributions.

Results in figure 8 are fully consistent with the expected effects described above. We refer to the upper part of table 6 for their interpretation. The simulated PVR (TAX) tends

[21] In the DC scheme, the TAX is slightly negative for females (see appendix C), while it is slightly positive for males. As for males, two effects counteract: dynamic efficiency, which tends to increase the tax, and the upward-biased difference in the conversion coefficients applied to adjacent retirement ages, which leads to a reduction in the TAX (the "extra return" described in 6.3). As compared to males, females benefit from favourable gender-neutral conversion coefficients. Therefore, the latter effect is stronger for females, which explains the difference in the sign of the TAX between the two genders.

Figure 7. PVR by cohort at age 60: current legislation, different agents



Note: scenario B07; $g_f = 0.015, r = 0.02$

to be lower (higher) than in the base case, since in most cases, the spread $r - g_f$ is greater than 0.5 percentage points.[22] Empirical evidence shows that the interquartile range turns out to be quite restricted, especially for the TAX (e.g. 43.9-35.5=8.4 percentage points for the 1945 cohort). The reference thresholds for the two indicators, i.e. 1 for the PVR and 0 for the TAX, are almost never "crossed" in either the DB or the DC scheme. Overall, the main conclusions derived for the base case do not seem to change dramatically for a wide range of macroeconomic conditions.

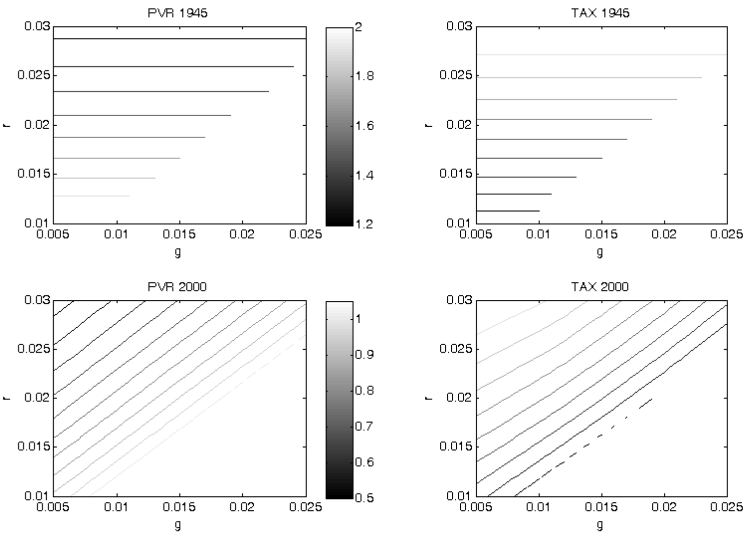
[22] In the base case ($g_f = 0.015$ and $r = 0.02$), PVR is equal to 154.1 for the 1945 cohort and to 90.2 for the 2000 cohort, while TAX is equal to 37.5 and 14.1 respectively (see Appendix C).

Table 6. Sensitivity analysis with respect to g_f and r: qualitative impact and simulation results

	Cohort (scheme)			
	1945 (DB)		**2000 (DC)**	
	Qualitative impact:			
	Δ PVR	Δ TAX	Δ PVR	Δ TAX
Δr	-	+	-	+
Δg_f	0	0	+	-
	Simulation results:			
percentiles:	PVR	TAX	PVR	TAX
25	126.2	35.5	69.7	13.3
50	141.4	40.3	80.4	17.3
75	163.2	43.9	92.3	20.9

Note: percentage points; male white-collar workers retiring at age 60 in the B07 scenario; $r \in [0.01, 0.03], g_f \in [0.005, 0.025]$, $r > g_f$, 21×21 simulations

Figure 8. Sensitivity analysis with respect to g_f and r: isolines of PVR and TAX for the 1945 and 2000 cohorts



Note: male white-collar workers retiring at age 60 in the B07 scenario; $r \in [0.01, 0.03], g_f \in [0.005, 0.025]$, $r > g_f$, 21×21 values; each (iso-)line display the set $\{g_f, r\}$ such that the indicator gets the same value; each line refers to a decile of the simulated PVR or TAX distribution; lighter lines are associated with an higher value of the indicator.

8 Conclusions

In this study, we analysed the actuarial features of the Italian pension system after the 1995 reform. We considered both the pre-reform DB, the *pro-rata* and the new (N)DC rules applied to INPS-FPLD (i.e. private sector) employees. Although our analysis focuses on actuarial differences across cohorts, we also provide some evidence of within cohorts redistribution by distinguishing workers by gender and occupation. We computed two actuarial indicators, namely the present value ratio (PVR) and the implicit tax rate (TAX). Improving on the existing literature (Ferraresi and Fornero 2000, Fornero and Castellino 2001), we allowed for dynamic mortality in their computation. We particularly investigated the actuarial properties of the rules designed by the 1995 reform (as modified by the 2007 law) to handle increasing longevity. To this aim, we built projected cohort- and gender-specific mortality tables based on a limit demographic scenario recently depicted by demographic experts. Results for the current legislation were compared with those stemming from a scenario where conversion coefficients, used to transform the accumulated sum at retirement into the annuity, are based on cohort- and gender-specific mortality rates.

The old DB pension rules provide extremely generous, much more than actuarially fair, pension benefits. The steepest age-wage profiles are typically associated with higher PVR. If, for instance, we consider the 1945 cohort, the indicator is equal to 154 % for male white-collar workers (steepest profile) and to 126.5 % for female blue-collar workers (flattest profile). The DB scheme also provides strong incentives to early retirement (TAX up to 70 % for female blue-collar workers). Throughout the transitional phase toward the DC rules, the generosity and the implicit taxation of the system progressively decrease.

Due to dynamic efficiency, the steady-state (N)DC regime is less than actuarially fair (the PVR is about 90 % for males and 95 % for females). For the same reason, the new regime is less than actuarially fair at margin for most of the retiring cohorts and agents (excluding the years in which conversion coefficients are updated, the TAX is about 4 %). The implicit redistribution of the Italian pension system changed from “wage-based” (DB) to “mortality-based” (NDC).

As a consequence of the rules adopted to compute conversion coefficients and to update them in response to increasing longevity, the future DC steady state is more than *quasi*-actuarially fair on average (at margin). Periodical *ex-post* adjustments in the conversion coefficients generate discontinuities in the pension treatment of adjacent cohorts as well as strong incentives to retire prior to each adjustment. The 2007 reform, reducing from 10 to 3 years the temporal validity of the conversion coefficients, was quite effective in improving actuarial fairness. Nevertheless, actuarial unfairness is still embedded in the Italian DC system, a problem that mostly depends on the use of historical cross-sectional mortality rates in the computation of conversion coefficients. Retired cohorts will likely live longer than what accounted for in the computation of their pension benefits. This discrepancy occurs because cohort effects in mortality are disregarded by the Italian law.

Finally, our simulations highlight that adopting cohort-specific conversion coefficients based on projected mortality tables would drastically improve actuarial fairness across cohorts and retirement ages. Since in that case pension computations would be based on mortality projections, the implementation of such a policy would mean dealing with both possible discretionary policy interventions and uncertainty. For this reason, operations and proceedings by the demographic experts in charge of producing mortality tables would need to be as transparent as possible. Revisions would need to be performed by a strictly technical team. Uncertainty related to the projections can be indeed high for young cohorts, but is more limited for those approaching retirement (unfortunately, we cannot quantify projection uncertainty in our exercise). As Palmer (2006) pointed out, *quasi*-actuarially fair NDC pension systems can opt for either uncertainty *at* retirement - i.e. relying on projected cohort mortality when annuitizing, but keeping constant benefits for retirees - or uncertainty *after* retirement - i.e. regularly adjusting the pensions of retirees on the basis of updated historical statistics. Current Italian social security rules are not a feasible *quasi*-actuarially fair alternative.

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Appendices

A Mortality forecasts: methodology

The construction of our life tables by cohort involves several steps. The first step consists in converting the indication of the experts on the human being limit characteristics (Robine, Crimmins, Horiuchi, and Zeng 2006) into an appropriate survival function. Following previous studies (see e.g. Duchêne and Wunsch 1993, Maccheroni 1998), we model the trend in endogenous mortality $q_{end}(x)$ by means of a Weibull model. It generates a process of mortality of an initial closed contingent of individuals of the same age according to the following survival function:

$$\ell(x) = exp\left[-\left(\frac{x-a}{m}\right)^b\right] \qquad x \geq a; a \geq 0; b, m > 0 \tag{A 1}$$

The derivative of (A 1) provides the corresponding function of deaths which corresponds to the Weibull statistical distribution:

$$f(x) = \begin{cases} \frac{b}{m}\left(\frac{x-a}{m}\right)^{b-1} exp\left[-\left(\frac{x-a}{m}\right)^b\right] & x \geq a; a \geq 0; b, m > 0 \\ 0 & \text{otherwise} \end{cases}$$

where we interpret $f(x)dx$ as the fraction of components of an initial contingent that are eliminated at age $[x, x+dx)$. The Weibull model, in particular the three-parameters type, permits fairly effective control of important features of the survival reference scenario, such as life expectancy at birth, the Lexis point and also the threshold below which mortality is considered avoidable. They are all functions of the parameters in equation (A 1) (Maccheroni 1998).

We then build the limit probabilities of dying due to exogenous or accidental causes $q_{eso}(x)$, i.e. accidents, traumas, etc. $q_{eso}(x)$ is valorised analyzing the trend of this set of causes of death for a group of developed countries,[23] thus constructing an initial table of minimum mortality by age. A fifth degree polynomial, which provides the analytical form of $q_{eso}(x)$, is then adapted to the empirical function obtained in this way.

The limit probabilities of dying $q_{lim}(x)(x = 0, 1, ...)$ is obtained as the suitably perequated sum of (the discrete version of) the original components $q_{end}(x)$ and $q_{eso}(x)$. The abridged limit survival function is shown in table A 1. The synthetic characteristics of this mortality model are $e_0 = 109.4$ years and an extreme age of life $\omega = 125$.

Forecasts are then obtained as follows:

1. by establishing a time frame for the scenario provided by $q_{lim}(x)$ in relation to the recorded Italian mortality trends. A procedure based on the logit model (see Brass 1971, Zaba 1979) is used: the limit survival function $\ell_{lim}(x)$ obtained from $q_{lim}(x)$ is taken as standard and, using the observed survival functions (Maccheroni and Locatelli 1999) $\ell_{x,t}(t = 1945, 1946, , 1998)$, the historical series of parameters a_t and b_t of the following relationship are studied:

$$Y_{x,t} = a_t + b_t Y_x^{lim} \tag{A 2}$$

where Y_x^{lim} is the logit of the limit life table and $Y_{x,t}$ is the logit obtained from the observed $\ell_{x,t}$. Extrapolations are performed on the historical series of a_t and b_t in order to obtain new time sequences for parameters a_t^* and b_t^* (to establish if and when $a_t^* \to 0$ and $b_t^* \to 1$ when t diverges). In our case, these results are obtained when $t = 2143$ for females and when $t = 2170$ for males. On the basis of (A 2), it is then possible to obtain the sequence of projected life tables that reflect the characteristics of the limit situation in the period of time that stretches from 1999 to the two previously defined extremities of time;

[23] In details: Norway, Holland, Belgium, Spain, France, Finland, Italy, Great Britain, Sweden, Austria, Canada, USA, Australia, Japan, New Zealand.

2. by linking the mortality models obtained as explained above with the on-going process of evolution of mortality. The gap between current and limit mortality is bridged by assuming a type of evolution that reflects the theory of expansion of mortality (Myers and Manton 1984). This step is carried out in two phases. In the first one, we define the evolution of mortality resulting from the most recent trends. In the age groups where the mortality trend is decreasing, the evolution of mortality is obtained by extrapolating the recent observed historical series of $q_{x,t}$ with a conventional exponential model. In the groups where mortality is growing, the evolution is first obtained by envisaging a stationary situation and subsequently by considering a tendentially decreasing evolution. In the second phase, we synthesize the projections for each year by averaging the results of the two mortality models (the logit A 2 and the exponential model). The average assigns gradually increasing linear weights to the life tables projected obtained from the logit (A 2) and decreasing linear weights to those obtained with the exponential model. The resulting projected life tables, therefore, initially take into account recent mortality trends and gradually assume the characteristics of the limit life table.

Table A 1. Limit life table: survivors from 100,000 live births

$\mathbf{Age_x}$	$\ell_\mathbf{x}$	$\mathbf{Age_x}$	$\ell_\mathbf{x}$	$\mathbf{Age_x}$	$\ell_\mathbf{x}$
0	100,000	40	99,831	85	98,985
1	99,997	45	99,799	90	98,242
5	99,992	50	99,768	95	95,017
10	99,983	55	99,735	100	85,236
15	99,968	60	99,695	105	67,726
20	99,948	65	99,642	110	42,180
25	99,923	70	99,566	115	15,306
30	99,894	75	99,454	120	1,980
35	99,863	80	99,280	125	40

B conversion coefficients: formulas

Conversion coefficients in the B07 and B95 scenarios are given by equation (B 1) while in the AB scenario they are given by equation (B 2). Symbols are described in table B 1.

Table B 1. symbols

Symbol	**Description**	**Value**
x	retirement age	[57,65]
$s(-s)$	gender (gender of the widow(er))	m=male, f=female
co	cohort	[1945,2000]
g_f	Expected long-run real GDP growth rate	0.015
$\ell_{x,s}/\ell^{co}_{x,s}$	Survivors of age x and gender s, according to cross-sectional/longitudinal mortality tables	our computations[a]
Ω/Ω^{co}	life span according to cross-sectional/cohort- and gender-specific mortality tables	our computations
$\ell^{ved}_{x,s}$	Probability for the age-x gender-s widow(er) to re-marry	INPS 1989
$\Theta_{s+t,s}$	Probability for the age-$x+t$ gender-s widow(er) to leave the family	INPS 1989
ϵ_s	Age difference between the (gender-s) pensioner and the widow(er)	+3(-3) if s=m(f)
Ψ	Quota of the pension revertible to the widow(er)	0.6
Φ_s	Reduction in the survivor's benefit due to earning test	0.9(0.7) if s=m(f)
k	Actuarial adjustment factor	0.4615[b]

[a] δ_x for $co + x < 2010$ are computed according to ISTAT 1990 mortality tables; δ_x for $2010 \leq co + x \leq 2013$ are computed according to ISTAT 2002 mortality tables.
[b] law 247/2007

$$
\begin{aligned}
\delta_x &= \left(\frac{\sum_{s=m,f} dir_{x,s} + ind_{x,s}}{2} - k \right)^{-1} \\
dir_{x,s} &= \sum_{t=0}^{\Omega-x} \frac{\ell_{x+t,s}}{\ell_{x,s}} (1+g_f)^{-t} \\
ind_{x,s} &= \Psi\Phi_s \sum_{t=0}^{\Omega-x} \frac{\ell_{x+t,s}}{\ell_{x,s}} \left(1 - \frac{\ell_{x+t+1,s}}{\ell_{x+t,s}}\right)(1+g_f)^{-t}\Theta_{x+t,s} \\
& \quad \sum_{\tau=1}^{\Omega-x-t+\varepsilon_s} \frac{\ell_{x+t+\tau-\varepsilon_s,-s}}{\ell_{x+t+1-\varepsilon_s,-s}} (1 - \ell^{ved}_{x+t+\tau-\varepsilon_s,-s})(1+g_f)^{-\tau}
\end{aligned} \tag{B 1}
$$

$$
\begin{aligned}
\delta^{co}_{x,s} &= (dir^{co}_{x,s} + ind^{co}_{x,s})^{-1} \\
dir^{co}_{x,s} &= \sum_{t=0}^{\Omega^{co}-x} \frac{\ell^{co}_{x+t,s}}{\ell^{co}_{x,s}} (1+g_f)^{-t} \\
ind^{co}_{x,s} &= \Psi\Phi_s \sum_{t=0}^{\Omega^{co}-x} \frac{\ell^{co}_{x+t,s}}{\ell^{co}_{x,s}} \left(1 - \frac{\ell^{co}_{x+t+1,s}}{\ell^{co}_{x+t,s}}\right)(1+g_f)^{-t}\Theta_{x+t,s} \\
& \quad \sum_{\tau=1}^{\Omega^{co}-x-t+\varepsilon_s} \frac{\ell^{co+\varepsilon_s}_{x+t+\tau-\varepsilon_s,-s}}{\ell^{co+\varepsilon_s}_{x+t+1-\varepsilon_s,-s}} (1 - \ell^{ved}_{x+t+\tau-\varepsilon_s,-s})(1+g_f)^{-\tau}
\end{aligned} \tag{B 2}
$$

C Detailed results

In this appendix we report detailed simulation results for the base macroeconomic case ($r = 0.02$, $g_f = 0.015$). Scenario B95 = law n. 335/1995; Scenario B07 = current legislation; Scenario AB = conversion coefficients are cohort- and gender-specific. DB = defined benefit; PR = *pro-rata*; DC = notional defined contribution. Indicators are in percentage points.

PVR - MALE WHITE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	154.1	149.2	144.4	139.5	134.6	126.7	154.1	149.2	144.4	139.5	134.6	126.7	154.1	149.2	144.4	139.5	134.6	126.7
1946	DB	152.7	147.9	142.9	138.1	133.3	125.6	152.7	147.9	142.9	138.1	133.3	125.6	152.7	147.9	142.9	138.1	133.3	125.6
1947	DB	150.4	145.5	140.7	136.0	131.5	123.9	150.4	145.5	140.7	136.0	131.5	123.9	150.4	145.5	140.7	136.0	131.5	123.9
1948	DB	148.2	143.5	138.8	134.3	129.9	122.4	148.2	143.5	138.8	134.3	129.9	122.4	148.2	143.5	138.8	134.3	129.9	122.4
1949	DB	146.0	141.4	136.9	132.6	128.2	120.7	146.0	141.4	136.9	132.6	128.2	120.7	146.0	141.4	136.9	132.6	128.2	120.7
1950	DB	144.0	139.6	135.3	130.9	126.4	118.9	144.0	139.6	135.3	130.9	126.4	118.9	144.0	139.6	135.3	130.9	126.4	118.9
1951	DB	142.8	138.5	134.1	129.8	125.3	117.9	142.8	138.5	134.1	129.8	125.3	117.9	142.8	138.5	134.1	129.8	125.3	117.9
1952	DB	141.8	137.5	133.2	128.7	124.3	117.0	141.8	137.5	133.2	128.7	124.3	117.0	141.8	137.5	133.2	128.7	124.3	117.0
1953	DB	140.9	136.6	132.3	127.8	123.5	116.3	140.9	136.6	132.3	127.8	123.5	116.3	140.9	136.6	132.3	127.8	123.5	116.3
1954	PR	129.2	126.9	124.7	122.7	120.8	119.1	127.0	124.6	121.3	119.1	117.0	114.1	122.2	119.4	116.8	114.2	111.9	109.6
1955	PR	127.6	125.5	123.4	121.5	119.9	112.8	125.2	122.1	119.9	117.8	114.9	113.1	120.0	117.4	114.9	112.5	110.3	108.2
1956	PR	125.9	123.8	122.0	120.3	113.4	111.7	122.5	120.3	118.3	115.5	113.7	112.1	117.7	115.2	112.9	110.7	108.7	106.7
1957	PR	124.2	122.4	120.7	113.8	112.2	110.8	120.7	118.7	115.9	114.2	112.6	110.1	115.5	113.2	111.1	109.0	107.1	105.3
1958	PR	122.6	121.0	114.2	112.6	111.2	109.9	119.0	116.2	114.5	113.0	110.5	109.1	113.3	111.2	109.3	107.4	105.6	104.0
1959	PR	121.1	114.4	112.9	111.4	110.2	109.0	116.3	114.7	113.2	110.8	109.4	108.2	111.2	109.3	107.5	105.8	104.2	102.6
1960	PR	114.4	112.9	111.6	110.3	109.2	108.2	114.7	113.3	110.9	109.6	108.4	106.3	109.2	107.4	105.8	104.2	102.7	101.3
1961	PR	112.7	111.4	110.2	109.1	108.1	107.3	113.0	110.7	109.5	108.4	106.3	105.3	107.1	105.5	104.0	102.5	101.2	99.9
1962	PR	111.1	109.9	108.9	108.0	107.1	106.4	110.4	109.2	108.2	106.1	105.2	104.4	105.0	103.5	102.2	100.9	99.7	98.6
1963	PR	109.4	108.4	107.6	106.8	106.1	105.5	108.7	107.7	105.7	104.9	104.1	102.3	102.8	101.6	100.4	99.3	98.2	97.2
1964	PR	107.7	106.9	106.2	105.6	105.0	104.6	107.0	105.1	104.3	103.6	101.9	101.3	100.7	99.6	98.5	97.6	96.6	95.8
1965	PR	106.0	105.4	104.8	104.4	104.0	99.5	104.2	103.5	102.9	101.3	100.8	100.3	98.5	97.6	96.7	95.9	95.1	94.3
1966	PR	104.3	103.9	103.5	103.2	98.8	98.5	102.5	102.0	100.4	100.0	99.6	98.1	96.4	95.6	94.9	94.2	93.5	92.9
1967	PR	102.6	102.4	102.1	98.0	97.7	97.5	100.8	99.3	99.0	98.7	97.3	97.1	94.3	93.6	93.0	92.5	91.9	91.4
1968	PR	101.0	100.9	96.9	96.7	96.6	96.5	98.0	97.8	97.6	96.3	96.2	96.1	92.2	91.7	91.2	90.8	90.4	89.9
1969	PR	99.8	95.9	95.9	95.8	95.8	95.8	96.8	96.7	95.5	95.4	95.4	94.2	90.5	90.1	89.8	89.5	89.1	88.8
1970	PR	94.7	94.7	94.8	94.9	95.0	95.1	95.4	94.4	94.4	94.5	93.4	93.5	88.7	88.5	88.3	88.1	87.9	87.7
1971	DC	91.8	92.0	92.2	92.5	92.7	93.0	91.4	91.6	91.8	90.9	91.1	91.4	85.5	85.5	85.4	85.4	85.3	85.3
1972	DC	92.0	92.2	92.4	92.7	93.0	93.3	91.6	91.8	90.9	91.2	91.4	90.4	85.4	85.4	85.3	85.3	85.2	85.2
1973	DC	92.2	92.4	92.7	93.0	93.3	93.6	91.9	91.0	91.2	91.4	90.5	90.7	85.4	85.3	85.3	85.2	85.2	85.1
1974	DC	92.5	92.7	93.0	93.3	93.6	93.9	91.1	91.3	91.5	90.6	90.8	91.0	85.3	85.3	85.2	85.2	85.1	85.1
1975	DC	92.8	93.0	93.3	93.6	93.9	90.2	91.4	91.6	90.7	90.9	91.1	90.2	85.3	85.3	85.2	85.2	85.1	85.1
1976	DC	93.1	93.3	93.6	93.9	90.3	90.6	91.7	90.8	91.0	91.2	90.3	90.6	85.3	85.3	85.2	85.2	85.1	85.1
1977	DC	93.4	93.6	93.9	90.5	90.7	90.9	90.9	91.1	91.3	90.5	90.7	90.9	85.3	85.3	85.2	85.2	85.1	85.1
1978	DC	93.7	93.9	90.6	90.8	91.0	91.2	91.2	91.4	90.6	90.8	91.0	90.1	85.3	85.2	85.2	85.1	85.1	85.1
1979	DC	93.9	90.6	90.8	91.0	91.2	91.5	91.5	90.6	90.8	91.0	90.2	90.4	85.3	85.2	85.2	85.1	85.1	85.0
1980	DC	90.7	90.9	91.1	91.3	91.5	91.8	90.7	90.9	91.1	90.3	90.4	90.7	85.2	85.2	85.1	85.1	85.0	85.0
1981	DC	91.0	91.2	91.4	91.6	91.8	92.1	91.0	91.2	90.4	90.5	90.7	89.9	85.2	85.2	85.1	85.1	85.0	85.0
1982	DC	91.3	91.4	91.7	91.9	92.1	92.4	91.3	90.5	90.6	90.8	90.0	90.2	85.2	85.1	85.1	85.1	85.0	85.0
1983	DC	91.5	91.7	91.9	92.2	92.4	92.7	90.5	90.7	90.9	90.1	90.3	90.5	85.2	85.1	85.1	85.0	85.0	84.9
1984	DC	91.8	92.0	92.2	92.4	92.7	93.0	90.8	91.0	90.2	90.4	90.5	89.7	85.2	85.1	85.1	85.0	85.0	84.9
1985	DC	92.0	92.2	92.5	92.7	93.0	89.6	91.1	90.3	90.4	90.6	89.8	90.0	85.1	85.1	85.0	85.0	84.9	84.9
1986	DC	92.3	92.5	92.7	93.0	89.7	89.9	90.4	90.5	90.7	89.9	90.1	90.3	85.1	85.1	85.0	85.0	84.9	84.9
1987	DC	92.5	92.8	93.0	89.8	90.0	90.2	90.6	90.8	90.0	90.2	90.4	89.5	85.1	85.1	85.0	85.0	84.9	84.9
1988	DC	92.8	93.0	89.9	90.1	90.3	90.5	90.9	90.1	90.3	90.4	89.6	89.8	85.1	85.0	85.0	84.9	84.9	84.8
1989	DC	93.0	90.0	90.2	90.4	90.6	90.8	90.2	90.4	90.5	89.7	89.9	90.1	85.1	85.0	85.0	84.9	84.9	84.8
1990	DC	90.1	90.3	90.5	90.6	90.8	91.1	90.4	90.6	89.8	90.0	90.2	89.4	85.1	85.0	85.0	84.9	84.9	84.8
1991	DC	90.4	90.5	90.7	90.9	91.1	91.3	90.7	89.9	90.1	90.3	89.5	89.6	85.0	85.0	84.9	84.9	84.8	84.8
1992	DC	90.6	90.8	91.0	91.2	91.4	91.6	90.0	90.2	90.3	89.6	89.7	89.9	85.0	85.0	84.9	84.9	84.8	84.8
1993	DC	90.9	91.0	91.2	91.4	91.6	91.9	90.3	90.4	89.7	89.8	90.0	89.2	85.0	84.9	84.9	84.8	84.8	84.7
1994	DC	91.1	91.3	91.5	91.7	91.9	92.1	90.5	89.8	89.9	90.1	89.3	89.4	85.0	84.9	84.9	84.8	84.8	84.7
1995	DC	91.3	91.5	91.7	91.9	92.2	89.1	89.9	90.0	90.2	89.4	89.5	89.7	85.0	84.9	84.9	84.8	84.7	84.7
1996	DC	91.6	91.8	92.0	92.2	89.2	89.3	90.1	90.3	89.5	89.7	89.8	89.0	84.9	84.9	84.8	84.8	84.7	84.6
1997	DC	91.8	92.0	92.2	89.3	89.4	89.6	90.4	89.6	89.8	89.9	89.1	89.3	84.9	84.9	84.8	84.7	84.7	84.6
1998	DC	92.1	92.3	89.4	89.5	89.7	89.8	89.7	89.9	90.0	89.2	89.4	89.5	84.9	84.8	84.8	84.7	84.6	84.6
1999	DC	92.3	89.5	89.7	89.8	89.9	90.1	90.0	90.1	89.4	89.5	89.6	88.8	84.9	84.8	84.7	84.7	84.6	84.5
2000	DC	89.6	89.7	89.8	90.0	90.1	90.3	90.2	89.4	89.6	89.7	88.9	89.0	84.8	84.8	84.7	84.6	84.6	84.5

PVR - MALE BLUE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	137.4	132.6	124.7	117.0	109.8	103.0	137.4	132.6	124.7	117.0	109.8	103.0	137.4	132.6	124.7	117.0	109.8	103.0
1946	DB	136.7	131.9	123.8	116.2	109.0	102.3	136.7	131.9	123.8	116.2	109.0	102.3	136.7	131.9	123.8	116.2	109.0	102.3
1947	DB	136.0	130.9	122.9	115.4	108.3	101.7	136.0	130.9	122.9	115.4	108.3	101.7	136.0	130.9	122.9	115.4	108.3	101.7
1948	DB	135.1	130.1	122.2	114.8	107.8	101.2	135.1	130.1	122.2	114.8	107.8	101.2	135.1	130.1	122.2	114.8	107.8	101.2
1949	DB	134.2	129.3	121.5	114.2	107.2	100.6	134.2	129.3	121.5	114.2	107.2	100.6	134.2	129.3	121.5	114.2	107.2	100.6
1950	DB	133.1	128.4	120.6	113.3	106.4	99.9	133.1	128.4	120.6	113.3	106.4	99.9	133.1	128.4	120.6	113.3	106.4	99.9
1951	DB	132.1	127.4	119.7	112.4	105.6	99.2	132.1	127.4	119.7	112.4	105.6	99.2	132.1	127.4	119.7	112.4	105.6	99.2
1952	DB	131.1	126.4	118.8	111.6	104.9	98.6	131.1	126.4	118.8	111.6	104.9	98.6	131.1	126.4	118.8	111.6	104.9	98.6
1953	DB	130.1	125.5	117.9	110.9	104.2	98.0	130.1	125.5	117.9	110.9	104.2	98.0	130.1	125.5	117.9	110.9	104.2	98.0
1954	DB	129.2	124.7	117.2	110.2	103.7	97.5	129.2	124.7	117.2	110.2	103.7	97.5	129.2	124.7	117.2	110.2	103.7	97.5
1955	DB	128.6	124.1	116.8	109.8	103.3	97.2	128.6	124.1	116.8	109.8	103.3	97.2	128.6	124.1	116.8	109.8	103.3	97.2
1956	DB	128.1	123.6	116.3	109.4	103.0	96.9	128.1	123.6	116.3	109.4	103.0	96.9	128.1	123.6	116.3	109.4	103.0	96.9
1957	PR	117.8	115.7	113.8	107.4	105.6	103.9	114.7	112.5	109.6	107.7	105.9	103.3	110.1	107.7	105.3	103.1	101.1	99.1
1958	PR	116.8	114.9	108.5	106.7	105.0	103.5	113.6	110.7	108.8	107.0	104.4	102.8	108.6	106.3	104.1	102.1	100.1	98.3
1959	PR	115.8	109.5	107.7	106.1	104.6	103.1	111.7	109.8	108.0	105.5	103.9	102.5	107.2	105.0	103.0	101.1	99.2	97.5
1960	PR	110.3	108.6	107.0	105.5	104.1	102.8	110.6	108.9	106.4	104.8	103.4	101.1	105.7	103.7	101.8	100.0	98.3	96.7
1961	PR	109.3	107.7	106.2	104.9	103.6	102.5	109.6	107.1	105.6	104.2	102.0	100.7	104.3	102.4	100.7	99.0	97.4	95.9
1962	PR	108.3	106.8	105.5	104.3	103.2	102.2	107.7	106.2	104.9	102.7	101.5	100.4	102.8	101.1	99.5	98.0	96.5	95.2
1963	PR	107.3	106.0	104.8	103.7	102.8	101.9	106.6	105.3	103.2	102.0	101.0	99.0	101.4	99.8	98.4	97.0	95.6	94.4
1964	PR	106.2	105.1	104.1	103.2	102.3	101.6	105.6	103.5	102.4	101.4	99.5	98.6	99.9	98.5	97.2	95.9	94.7	93.6
1965	PR	105.3	104.3	103.5	102.7	101.9	97.5	103.7	102.7	101.7	99.8	99.0	98.2	98.5	97.3	96.1	94.9	93.8	92.8
1966	PR	104.3	103.5	102.8	102.1	97.8	97.2	102.7	101.8	100.0	99.2	98.5	96.8	97.1	96.0	94.9	93.9	92.9	92.0
1967	PR	103.4	102.7	102.2	98.0	97.4	96.8	101.7	100.0	99.3	98.6	97.0	96.4	95.7	94.7	93.8	92.9	92.0	91.2
1968	PR	102.5	102.0	97.9	97.4	96.9	96.5	99.8	99.1	98.6	97.0	96.5	96.1	94.4	93.5	92.7	91.9	91.1	90.4
1969	PR	101.6	97.6	97.2	96.8	96.4	96.1	98.8	98.3	96.8	96.4	96.0	94.6	93.0	92.2	91.5	90.9	90.2	89.6
1970	PR	97.1	96.7	96.4	96.2	95.9	95.7	97.8	96.4	96.1	95.8	94.4	94.2	91.5	91.0	90.4	89.8	89.3	88.8
1971	PR	96.1	95.9	95.7	95.6	95.4	95.4	95.7	95.5	95.3	94.1	93.9	93.8	90.1	89.7	89.2	88.8	88.4	88.0
1972	PR	95.2	95.1	95.0	95.0	95.0	95.0	94.8	94.7	93.6	93.5	93.5	92.3	88.8	88.5	88.1	87.8	87.5	87.2
1973	PR	94.2	94.3	94.3	94.4	94.5	94.7	93.9	92.8	92.8	92.9	91.8	91.8	87.4	87.2	87.0	86.7	86.5	86.3
1974	DC	91.4	91.6	91.8	92.1	92.3	92.6	90.0	90.2	90.4	89.4	89.6	89.8	84.3	84.3	84.2	84.1	84.0	83.9
1975	DC	91.6	91.8	92.0	92.3	92.6	88.9	90.2	90.4	89.5	89.7	89.8	88.9	84.2	84.2	84.1	84.0	83.9	83.8
1976	DC	91.8	92.1	92.3	92.5	89.0	89.2	90.4	89.6	89.7	89.9	89.0	89.2	84.2	84.1	84.0	83.9	83.8	83.8
1977	DC	92.1	92.3	92.6	89.1	89.3	89.5	89.7	89.8	90.0	89.1	89.3	89.5	84.1	84.1	84.0	83.9	83.8	83.7
1978	DC	92.4	92.6	89.3	89.4	89.6	89.8	90.0	90.1	89.3	89.4	89.6	88.7	84.1	84.1	84.0	83.9	83.8	83.7
1979	DC	92.7	89.4	89.6	89.7	89.9	90.1	90.3	89.4	89.6	89.7	88.8	89.0	84.1	84.1	84.0	83.9	83.8	83.7
1980	DC	89.6	89.7	89.9	90.0	90.2	90.4	89.6	89.7	89.9	89.0	89.1	89.3	84.1	84.1	84.0	83.9	83.8	83.7
1981	DC	89.8	90.0	90.1	90.3	90.5	90.7	89.8	90.0	89.1	89.3	89.4	88.5	84.1	84.0	84.0	83.9	83.8	83.7
1982	DC	90.1	90.2	90.4	90.6	90.8	91.0	90.1	89.2	89.4	89.5	88.7	88.8	84.1	84.0	83.9	83.8	83.8	83.7
1983	DC	90.3	90.5	90.6	90.8	91.1	91.3	89.4	89.5	89.6	88.8	88.9	89.1	84.1	84.0	83.9	83.8	83.7	83.7
1984	DC	90.6	90.7	90.9	91.1	91.3	91.6	89.6	89.7	88.9	89.1	89.2	88.3	84.0	84.0	83.9	83.8	83.7	83.6
1985	DC	90.8	91.0	91.2	91.4	91.6	88.3	89.9	89.1	89.2	89.3	88.5	88.6	84.0	83.9	83.9	83.8	83.7	83.6
1986	DC	91.1	91.2	91.5	91.7	88.4	88.6	89.2	89.3	89.4	88.6	88.8	88.9	84.0	83.9	83.8	83.8	83.7	83.6
1987	DC	91.3	91.5	91.7	88.6	88.7	88.8	89.4	89.6	88.8	88.9	89.0	88.2	84.0	83.9	83.8	83.7	83.7	83.6
1988	DC	91.6	91.8	88.7	88.8	89.0	89.1	89.7	88.9	89.0	89.1	88.3	88.4	84.0	83.9	83.8	83.7	83.6	83.6
1989	DC	91.8	88.8	89.0	89.1	89.2	89.4	89.0	89.1	89.3	88.5	88.6	88.7	84.0	83.9	83.8	83.7	83.6	83.5
1990	DC	89.0	89.1	89.2	89.3	89.5	89.7	89.3	89.4	88.6	88.7	88.8	88.0	83.9	83.9	83.8	83.7	83.6	83.5
1991	DC	89.2	89.3	89.5	89.6	89.8	90.0	89.5	88.7	88.8	89.0	88.2	88.3	83.9	83.8	83.8	83.7	83.6	83.5
1992	DC	89.4	89.6	89.7	89.9	90.0	90.2	88.8	89.0	89.1	88.3	88.4	88.5	83.9	83.8	83.7	83.7	83.6	83.5
1993	DC	89.7	89.8	90.0	90.1	90.3	90.5	89.1	89.2	88.4	88.5	88.7	87.8	83.9	83.8	83.7	83.6	83.6	83.5
1994	DC	89.9	90.0	90.2	90.4	90.6	90.8	89.3	88.6	88.7	88.8	88.0	88.1	83.9	83.8	83.7	83.6	83.5	83.5
1995	DC	90.1	90.3	90.5	90.6	90.8	87.8	88.7	88.8	88.9	88.1	88.3	88.4	83.8	83.8	83.7	83.6	83.5	83.4
1996	DC	90.4	90.5	90.7	90.9	87.9	88.0	88.9	89.0	88.3	88.4	88.5	87.7	83.8	83.7	83.7	83.6	83.5	83.4
1997	DC	90.6	90.8	91.0	88.1	88.2	88.3	89.2	88.4	88.5	88.7	87.9	88.0	83.8	83.7	83.6	83.6	83.5	83.4
1998	DC	90.9	91.0	88.2	88.3	88.4	88.6	88.6	88.7	88.8	88.0	88.1	88.2	83.8	83.7	83.6	83.5	83.5	83.4
1999	DC	91.1	88.3	88.5	88.6	88.7	88.8	88.8	88.9	88.2	88.3	88.4	87.6	83.8	83.7	83.6	83.5	83.4	83.4
2000	DC	88.4	88.5	88.7	88.8	88.9	89.1	89.0	88.3	88.4	88.5	87.7	87.8	83.8	83.7	83.6	83.5	83.4	83.3

PVR - FEMALE WHITE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	151.0	146.9	142.7	138.2	133.7	126.1	151.0	146.9	142.7	138.2	133.7	126.1	151.0	146.9	142.7	138.2	133.7	126.1
1946	DB	150.3	146.2	141.7	137.3	132.9	125.5	150.3	146.2	141.7	137.3	132.9	125.5	150.3	146.2	141.7	137.3	132.9	125.5
1947	DB	149.3	144.9	140.5	136.3	132.0	124.7	149.3	144.9	140.5	136.3	132.0	124.7	149.3	144.9	140.5	136.3	132.0	124.7
1948	DB	147.9	143.6	139.4	135.3	131.1	123.8	147.9	143.6	139.4	135.3	131.1	123.8	147.9	143.6	139.4	135.3	131.1	123.8
1949	DB	146.6	142.4	138.3	134.3	130.1	122.9	146.6	142.4	138.3	134.3	130.1	122.9	146.6	142.4	138.3	134.3	130.1	122.9
1950	DB	145.3	141.3	137.3	133.2	129.1	122.0	145.3	141.3	137.3	133.2	129.1	122.0	145.3	141.3	137.3	133.2	129.1	122.0
1951	DB	144.4	140.5	136.5	132.5	128.5	121.4	144.4	140.5	136.5	132.5	128.5	121.4	144.4	140.5	136.5	132.5	128.5	121.4
1952	DB	143.8	139.8	135.9	131.9	128.0	121.0	143.8	139.8	135.9	131.9	128.0	121.0	143.8	139.8	135.9	131.9	128.0	121.0
1953	DB	143.0	139.2	135.3	131.4	127.5	120.6	143.0	139.2	135.3	131.4	127.5	120.6	143.0	139.2	135.3	131.4	127.5	120.6
1954	PR	128.8	126.7	124.8	123.0	121.4	120.0	126.6	124.4	121.4	119.5	117.7	115.0	120.0	117.4	114.9	112.6	110.4	108.2
1955	PR	127.3	125.4	123.6	122.0	120.6	113.8	125.0	122.0	120.1	118.3	115.7	114.1	117.8	115.4	113.1	110.9	108.8	106.8
1956	PR	125.8	124.0	122.5	121.0	114.4	113.0	122.5	120.6	118.9	116.3	114.7	113.3	115.7	113.4	111.3	109.2	107.3	105.4
1957	PR	124.3	122.8	121.4	114.8	113.4	112.1	120.9	119.2	116.6	115.1	113.8	111.4	113.6	111.5	109.5	107.6	105.8	104.1
1958	PR	122.9	121.5	115.1	113.7	112.5	111.3	119.3	116.8	115.4	114.1	111.8	110.6	111.5	109.5	107.7	105.9	104.3	102.7
1959	PR	121.5	115.1	113.8	112.6	111.6	110.6	116.8	115.5	114.2	112.0	110.8	109.8	109.4	107.6	105.9	104.3	102.8	101.3
1960	PR	115.0	113.7	112.6	111.6	110.6	109.8	115.3	114.1	111.9	110.9	109.9	107.9	107.3	105.7	104.1	102.7	101.3	99.9
1961	PR	113.4	112.4	111.4	110.5	109.7	109.0	113.8	111.7	110.7	109.8	107.9	107.1	105.2	103.7	102.3	101.0	99.7	98.5
1962	PR	112.0	111.1	110.3	109.6	108.9	108.4	111.3	110.4	109.6	107.7	107.0	106.4	103.2	101.9	100.6	99.4	98.3	97.2
1963	PR	110.6	109.9	109.2	108.6	108.1	107.7	109.9	109.1	107.4	106.7	106.1	104.5	101.2	100.0	98.9	97.9	96.8	95.9
1964	PR	109.2	108.7	108.1	107.7	107.4	107.1	108.5	106.8	106.3	105.8	104.2	103.7	99.3	98.2	97.2	96.3	95.4	94.6
1965	PR	107.9	107.5	107.1	106.8	106.6	102.3	106.1	105.6	105.2	103.7	103.3	103.1	97.3	96.4	95.6	94.8	94.0	93.3
1966	PR	106.6	106.3	106.1	106.0	101.7	101.6	104.8	104.4	103.0	102.7	102.5	101.2	95.4	94.6	93.9	93.2	92.6	91.9
1967	PR	105.3	105.2	105.1	101.0	100.9	100.9	103.4	102.1	101.9	101.8	100.5	100.5	93.5	92.8	92.2	91.7	91.1	90.6
1968	PR	104.1	104.1	100.1	100.1	100.1	100.2	101.0	100.9	100.9	99.7	99.7	99.8	91.5	91.1	90.6	90.1	89.7	89.3
1969	PR	103.2	99.4	99.5	99.6	99.7	99.9	100.1	100.1	99.1	99.2	99.3	98.2	90.0	89.7	89.3	89.0	88.7	88.4
1970	PR	98.4	98.6	98.8	99.0	99.3	99.6	99.1	98.2	98.4	98.6	97.6	97.8	88.5	88.2	88.0	87.8	87.6	87.4
1971	DC	95.2	95.6	96.0	96.4	96.8	97.3	94.9	95.2	95.6	94.8	95.2	95.6	85.0	84.9	84.8	84.8	84.7	84.7
1972	DC	95.5	95.8	96.3	96.7	97.1	97.6	95.1	95.5	94.7	95.1	95.5	94.6	84.8	84.8	84.7	84.7	84.6	84.5
1973	DC	95.8	96.2	96.6	97.0	97.5	98.0	95.4	94.6	95.0	95.4	94.6	95.0	84.8	84.7	84.6	84.6	84.5	84.5
1974	DC	96.1	96.5	96.9	97.4	97.9	98.4	94.6	95.0	95.4	94.6	95.0	95.4	84.7	84.7	84.6	84.5	84.5	84.4
1975	DC	96.5	96.9	97.3	97.8	98.3	94.6	95.0	95.4	94.6	95.0	95.4	94.6	84.7	84.7	84.6	84.5	84.5	84.4
1976	DC	96.8	97.3	97.7	98.2	94.6	95.0	95.4	94.7	95.0	95.4	94.6	95.0	84.7	84.7	84.6	84.5	84.5	84.4
1977	DC	97.2	97.7	98.1	94.7	95.0	95.4	94.7	95.0	95.4	94.7	95.0	95.4	84.7	84.6	84.6	84.5	84.5	84.4
1978	DC	97.6	98.0	94.7	95.1	95.4	95.9	95.0	95.4	94.7	95.1	95.4	94.7	84.7	84.6	84.6	84.5	84.5	84.4
1979	DC	97.9	94.7	95.0	95.4	95.8	96.2	95.3	94.7	95.0	95.4	94.7	95.1	84.6	84.6	84.5	84.5	84.4	84.4
1980	DC	94.7	95.0	95.4	95.8	96.2	96.6	94.7	95.0	95.4	94.7	95.1	95.5	84.6	84.5	84.5	84.4	84.4	84.3
1981	DC	95.0	95.4	95.7	96.1	96.6	97.0	95.0	95.4	94.7	95.0	95.4	94.7	84.6	84.5	84.5	84.4	84.4	84.3
1982	DC	95.3	95.7	96.1	96.5	97.0	97.4	95.3	94.7	95.0	95.4	94.7	95.1	84.6	84.5	84.4	84.4	84.3	84.3
1983	DC	95.7	96.1	96.5	96.9	97.4	97.8	94.7	95.0	95.4	94.7	95.1	95.5	84.5	84.5	84.4	84.4	84.3	84.2
1984	DC	96.0	96.4	96.8	97.3	97.8	98.3	95.0	95.4	94.7	95.1	95.5	94.8	84.5	84.4	84.4	84.3	84.3	84.2
1985	DC	96.4	96.8	97.2	97.7	98.1	94.8	95.3	94.7	95.1	95.5	94.8	95.2	84.5	84.4	84.4	84.3	84.2	84.2
1986	DC	96.7	97.1	97.6	98.0	94.8	95.2	94.7	95.1	95.4	94.8	95.2	95.6	84.4	84.4	84.3	84.3	84.2	84.2
1987	DC	97.0	97.5	97.9	94.8	95.2	95.6	95.0	95.4	94.8	95.1	95.5	94.9	84.4	84.4	84.3	84.2	84.2	84.1
1988	DC	97.4	97.8	94.8	95.2	95.6	96.0	95.4	94.8	95.1	95.5	94.9	95.3	84.4	84.3	84.3	84.2	84.2	84.1
1989	DC	97.7	94.8	95.2	95.5	96.0	96.4	94.8	95.1	95.5	94.9	95.3	95.7	84.4	84.3	84.3	84.2	84.1	84.1
1990	DC	94.8	95.1	95.5	95.9	96.3	96.8	95.1	95.5	94.9	95.2	95.6	95.0	84.3	84.3	84.2	84.2	84.1	84.1
1991	DC	95.1	95.5	95.9	96.3	96.7	97.2	95.4	94.9	95.2	95.6	95.0	95.4	84.3	84.3	84.2	84.1	84.1	84.0
1992	DC	95.5	95.8	96.2	96.7	97.1	97.6	94.8	95.2	95.6	95.0	95.4	95.8	84.3	84.2	84.2	84.1	84.1	84.0
1993	DC	95.8	96.2	96.6	97.1	97.5	98.0	95.2	95.6	95.0	95.4	95.8	95.1	84.3	84.2	84.1	84.1	84.0	84.0
1994	DC	96.1	96.6	97.0	97.4	97.9	98.4	95.5	95.0	95.3	95.7	95.1	95.5	84.2	84.2	84.1	84.1	84.0	83.9
1995	DC	96.5	96.9	97.4	97.8	98.3	95.2	94.9	95.3	95.7	95.1	95.5	95.9	84.2	84.1	84.1	84.0	84.0	83.9
1996	DC	96.8	97.3	97.7	98.2	95.2	95.6	95.3	95.7	95.1	95.5	95.9	95.3	84.2	84.1	84.1	84.0	83.9	83.9
1997	DC	97.2	97.6	98.1	95.2	95.6	96.0	95.6	95.1	95.5	95.9	95.3	95.7	84.1	84.1	84.0	84.0	83.9	83.9
1998	DC	97.5	98.0	95.2	95.6	96.0	96.5	95.1	95.4	95.8	95.3	95.7	96.1	84.1	84.0	84.0	83.9	83.9	83.8
1999	DC	97.9	95.2	95.6	96.0	96.4	96.9	95.4	95.8	95.3	95.7	96.1	95.5	84.1	84.0	84.0	83.9	83.8	83.8
2000	DC	95.2	95.6	95.9	96.4	96.8	97.3	95.8	95.3	95.6	96.0	95.5	95.9	84.0	84.0	83.9	83.9	83.8	83.8

PVR - FEMALE BLUE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	126.5	121.9	117.4	109.8	102.8	96.1	126.5	121.9	117.4	109.8	102.8	96.1	126.5	121.9	117.4	109.8	102.8	96.1
1946	DB	126.0	121.4	116.6	109.2	102.2	95.6	126.0	121.4	116.6	109.2	102.2	95.6	126.0	121.4	116.6	109.2	102.2	95.6
1947	DB	125.6	120.7	116.0	108.6	101.7	95.3	125.6	120.7	116.0	108.6	101.7	95.3	125.6	120.7	116.0	108.6	101.7	95.3
1948	DB	124.8	120.0	115.4	108.1	101.3	94.8	124.8	120.0	115.4	108.1	101.3	94.8	124.8	120.0	115.4	108.1	101.3	94.8
1949	DB	123.7	119.1	114.5	107.4	100.5	94.1	123.7	119.1	114.5	107.4	100.5	94.1	123.7	119.1	114.5	107.4	100.5	94.1
1950	DB	122.6	118.1	113.6	106.4	99.7	93.3	122.6	118.1	113.6	106.4	99.7	93.3	122.6	118.1	113.6	106.4	99.7	93.3
1951	DB	121.7	117.3	112.8	105.7	99.0	92.8	121.7	117.3	112.8	105.7	99.0	92.8	121.7	117.3	112.8	105.7	99.0	92.8
1952	DB	120.9	116.4	112.0	105.0	98.4	92.2	120.9	116.4	112.0	105.0	98.4	92.2	120.9	116.4	112.0	105.0	98.4	92.2
1953	DB	120.1	115.6	111.3	104.4	97.9	91.8	120.1	115.6	111.3	104.4	97.9	91.8	120.1	115.6	111.3	104.4	97.9	91.8
1954	DB	119.6	115.2	110.9	104.0	97.6	91.5	119.6	115.2	110.9	104.0	97.6	91.5	119.6	115.2	110.9	104.0	97.6	91.5
1955	DB	119.1	114.8	110.5	103.7	97.3	91.3	119.1	114.8	110.5	103.7	97.3	91.3	119.1	114.8	110.5	103.7	97.3	91.3
1956	PR	112.5	110.6	108.8	107.2	101.0	99.4	109.6	107.5	105.6	103.0	101.3	99.8	103.6	101.2	98.9	96.7	94.7	92.8
1957	PR	111.9	110.2	108.6	102.4	100.9	99.5	108.9	107.0	104.4	102.7	101.2	98.8	102.4	100.1	98.0	96.0	94.1	92.3
1958	PR	111.4	109.8	103.7	102.2	100.8	99.5	108.3	105.7	104.0	102.5	100.2	98.9	101.3	99.1	97.1	95.3	93.5	91.8
1959	PR	111.0	104.9	103.4	102.0	100.8	99.6	106.8	105.2	103.7	101.4	100.1	99.0	100.1	98.1	96.3	94.5	92.9	91.3
1960	PR	105.9	104.5	103.1	101.9	100.8	99.8	106.2	104.8	102.5	101.3	100.1	98.0	99.0	97.2	95.5	93.8	92.3	90.9
1961	PR	105.4	104.1	102.9	101.8	100.8	99.9	105.7	103.5	102.3	101.1	99.1	98.2	97.9	96.3	94.7	93.2	91.8	90.4
1962	PR	104.8	103.7	102.7	101.7	100.9	100.1	104.2	103.1	102.0	100.0	99.1	98.3	96.9	95.3	93.9	92.5	91.2	90.0
1963	PR	104.3	103.4	102.5	101.7	100.9	100.3	103.7	102.7	100.8	99.9	99.1	97.4	95.8	94.4	93.1	91.8	90.6	89.5
1964	PR	104.0	103.1	102.4	101.7	101.1	100.6	103.3	101.5	100.7	99.9	98.2	97.6	94.8	93.6	92.4	91.2	90.2	89.1
1965	PR	103.6	102.9	102.3	101.8	101.3	97.1	102.0	101.2	100.5	98.9	98.3	97.8	93.9	92.7	91.7	90.7	89.7	88.8
1966	PR	103.3	102.8	102.3	101.9	97.7	97.3	101.6	101.0	99.4	98.9	98.4	96.9	92.9	91.9	91.0	90.1	89.2	88.4
1967	PR	103.0	102.6	102.3	98.2	97.9	97.6	101.3	99.8	99.3	99.0	97.5	97.2	92.0	91.2	90.3	89.6	88.8	88.1
1968	PR	102.8	102.6	98.6	98.3	98.1	97.9	100.0	99.6	99.3	97.9	97.7	97.5	91.1	90.4	89.7	89.0	88.4	87.7
1969	PR	102.6	98.7	98.6	98.4	98.3	98.2	99.7	99.5	98.2	98.0	97.9	96.7	90.3	89.6	89.1	88.5	87.9	87.4
1970	PR	98.7	98.6	98.6	98.6	98.6	98.6	99.4	98.3	98.2	98.2	97.0	97.0	89.4	88.9	88.5	88.0	87.6	87.1
1971	PR	98.3	98.3	98.4	98.5	98.6	98.8	97.9	98.0	98.0	96.9	97.0	97.1	88.4	88.0	87.6	87.3	86.9	86.6
1972	PR	97.8	98.0	98.2	98.4	98.7	99.0	97.5	97.6	96.7	96.8	97.0	96.0	87.3	87.0	86.8	86.5	86.3	86.0
1973	DC	94.9	95.2	95.6	96.0	96.4	96.8	94.5	93.7	94.1	94.4	93.6	93.9	84.0	83.9	83.8	83.7	83.6	83.5
1974	DC	95.1	95.5	95.8	96.2	96.7	97.1	93.7	94.0	94.3	93.5	93.8	94.2	83.8	83.7	83.7	83.6	83.5	83.4
1975	DC	95.4	95.8	96.1	96.6	97.0	93.3	93.9	94.3	93.5	93.8	94.1	93.3	83.8	83.7	83.6	83.5	83.4	83.3
1976	DC	95.7	96.1	96.5	96.9	93.4	93.7	94.3	93.5	93.8	94.2	93.4	93.7	83.7	83.6	83.5	83.4	83.3	83.2
1977	DC	96.1	96.5	96.9	93.4	93.8	94.1	93.6	93.9	94.2	93.4	93.8	94.1	83.7	83.6	83.5	83.4	83.3	83.2
1978	DC	96.5	96.9	93.5	93.8	94.2	94.5	93.9	94.3	93.5	93.8	94.2	93.4	83.7	83.6	83.5	83.4	83.3	83.2
1979	DC	96.8	93.6	93.9	94.2	94.6	95.0	94.3	93.6	93.9	94.2	93.5	93.8	83.7	83.6	83.5	83.4	83.3	83.2
1980	DC	93.6	93.9	94.3	94.6	95.0	95.4	93.6	93.9	94.3	93.5	93.8	94.2	83.7	83.6	83.5	83.4	83.3	83.2
1981	DC	93.9	94.3	94.6	95.0	95.3	95.7	93.9	94.3	93.5	93.9	94.2	93.4	83.6	83.6	83.5	83.4	83.3	83.2
1982	DC	94.3	94.6	94.9	95.3	95.7	96.1	94.3	93.6	93.9	94.2	93.5	93.8	83.6	83.5	83.4	83.3	83.2	83.1
1983	DC	94.6	94.9	95.3	95.7	96.1	96.5	93.6	93.9	94.2	93.5	93.9	94.2	83.6	83.5	83.4	83.3	83.2	83.1
1984	DC	94.9	95.3	95.7	96.1	96.5	96.9	93.9	94.3	93.6	93.9	94.2	93.5	83.6	83.5	83.4	83.3	83.2	83.1
1985	DC	95.3	95.6	96.0	96.4	96.9	93.5	94.3	93.6	93.9	94.3	93.5	93.9	83.5	83.4	83.3	83.2	83.1	83.1
1986	DC	95.6	96.0	96.4	96.8	93.6	93.9	93.6	94.0	94.3	93.6	93.9	94.3	83.5	83.4	83.3	83.2	83.1	83.0
1987	DC	96.0	96.4	96.8	93.6	94.0	94.3	94.0	94.3	93.6	94.0	94.3	93.6	83.5	83.4	83.3	83.2	83.1	83.0
1988	DC	96.3	96.7	93.7	94.0	94.3	94.7	94.3	93.7	94.0	94.3	93.6	94.0	83.4	83.4	83.3	83.2	83.1	83.0
1989	DC	96.6	93.7	94.0	94.4	94.7	95.1	93.7	94.0	94.3	93.7	94.0	94.4	83.4	83.3	83.2	83.1	83.0	82.9
1990	DC	93.7	94.0	94.4	94.7	95.1	95.5	94.0	94.4	93.7	94.0	94.4	93.7	83.4	83.3	83.2	83.1	83.0	82.9
1991	DC	94.1	94.4	94.7	95.1	95.5	95.9	94.4	93.8	94.1	94.4	93.8	94.1	83.4	83.3	83.2	83.1	83.0	82.9
1992	DC	94.4	94.7	95.1	95.5	95.9	96.3	93.8	94.1	94.4	93.8	94.1	94.5	83.3	83.2	83.2	83.1	83.0	82.9
1993	DC	94.7	95.1	95.5	95.8	96.3	96.7	94.1	94.4	93.8	94.2	94.5	93.9	83.3	83.2	83.1	83.0	82.9	82.8
1994	DC	95.1	95.4	95.8	96.2	96.6	97.1	94.5	93.9	94.2	94.5	93.9	94.2	83.3	83.2	83.1	83.0	82.9	82.8
1995	DC	95.4	95.8	96.2	96.6	97.0	94.0	93.9	94.2	94.5	93.9	94.3	94.6	83.3	83.2	83.1	83.0	82.9	82.8
1996	DC	95.8	96.1	96.5	97.0	94.0	94.4	94.2	94.6	94.0	94.3	94.7	94.0	83.2	83.1	83.0	82.9	82.8	82.7
1997	DC	96.1	96.5	96.9	94.0	94.4	94.8	94.6	94.0	94.3	94.7	94.1	94.4	83.2	83.1	83.0	82.9	82.8	82.7
1998	DC	96.4	96.9	94.1	94.4	94.8	95.2	94.0	94.3	94.7	94.1	94.4	94.8	83.2	83.1	83.0	82.9	82.8	82.7
1999	DC	96.8	94.1	94.4	94.8	95.2	95.6	94.4	94.7	94.1	94.5	94.8	94.2	83.1	83.0	82.9	82.9	82.8	82.7
2000	DC	94.1	94.4	94.8	95.2	95.5	96.0	94.7	94.1	94.5	94.8	94.2	94.6	83.1	83.0	82.9	82.8	82.7	82.6

TAX - MALE WHITE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	37.5	40.5	46.3	48.8	86.6	86.8	37.5	40.5	46.3	48.8	86.6	86.8	37.5	40.5	46.3	48.8	86.6	86.8
1946	DB	37.7	43.3	45.8	48.3	86.1	86.4	37.7	43.3	45.8	48.3	86.1	86.4	37.7	43.3	45.8	48.3	86.1	86.4
1947	DB	40.4	42.7	45.1	47.6	85.5	86.9	40.4	42.7	45.1	47.6	85.5	86.9	40.4	42.7	45.1	47.6	85.5	86.9
1948	DB	39.8	42.1	44.5	46.9	86.2	87.1	39.8	42.1	44.5	46.9	86.2	87.1	39.8	42.1	44.5	46.9	86.2	87.1
1949	DB	39.2	41.4	43.8	47.8	87.7	89.8	39.2	41.4	43.8	47.8	87.7	89.8	39.2	41.4	43.8	47.8	87.7	89.8
1950	DB	38.6	40.9	45.0	50.6	89.1	89.0	38.6	40.9	45.0	50.6	89.1	89.0	38.6	40.9	45.0	50.6	89.1	89.0
1951	DB	38.2	42.0	45.6	51.1	88.8	88.6	38.2	42.0	45.6	51.1	88.8	88.6	38.2	42.0	45.6	51.1	88.8	88.6
1952	DB	39.5	42.0	47.6	50.7	88.4	88.2	39.5	42.0	47.6	50.7	88.4	88.2	39.5	42.0	47.6	50.7	88.4	88.2
1953	DB	39.2	42.6	48.0	50.3	88.1	87.9	39.2	42.6	48.0	50.3	88.1	87.9	39.2	42.6	48.0	50.3	88.1	87.9
1954	PR	21.1	22.3	22.5	22.3	22.2	93.3	22.9	35.0	25.6	25.7	38.5	26.9	27.9	29.7	30.5	31.0	31.5	32.1
1955	PR	19.8	21.0	20.8	20.6	89.1	25.6	32.0	23.9	24.0	36.3	25.1	25.3	27.0	28.8	29.2	29.7	30.2	30.8
1956	PR	19.4	19.3	19.1	85.0	23.7	23.9	22.1	22.3	34.2	23.3	23.5	37.6	26.9	27.4	27.8	28.3	28.9	29.5
1957	PR	17.8	17.6	81.3	22.0	22.1	22.3	20.6	32.1	21.5	21.7	35.4	22.9	25.7	26.1	26.5	27.1	27.6	28.2
1958	PR	16.2	77.8	20.3	20.4	20.6	20.7	30.2	19.9	20.0	33.2	21.1	21.3	24.4	24.8	25.3	25.8	26.4	26.9
1959	PR	74.6	18.6	18.7	18.8	19.0	19.1	18.3	18.3	31.1	19.4	19.6	34.5	23.2	23.6	24.0	24.6	25.1	25.7
1960	PR	17.1	17.1	17.2	17.3	17.5	17.6	16.8	29.2	17.8	17.9	32.4	19.1	22.0	22.4	22.8	23.4	23.9	24.5
1961	PR	15.5	15.6	15.7	15.8	15.9	16.0	27.2	16.1	16.2	30.2	17.4	17.6	20.7	21.2	21.6	22.1	22.7	23.3
1962	PR	14.0	14.1	14.1	14.2	14.3	14.4	14.6	14.6	28.2	15.7	15.9	31.6	19.5	19.9	20.4	20.9	21.5	22.0
1963	PR	12.5	12.5	12.6	12.7	12.7	12.8	13.0	26.1	14.0	14.2	29.3	15.4	18.3	18.7	19.2	19.7	20.2	20.8
1964	PR	11.0	11.0	11.1	11.1	11.2	67.3	24.1	12.4	12.5	27.2	13.7	13.9	17.1	17.5	17.9	18.5	19.0	19.6
1965	PR	9.5	9.5	9.5	9.6	63.8	12.9	10.8	10.9	25.1	12.0	12.1	28.5	15.8	16.3	16.7	17.2	17.8	18.4
1966	PR	8.0	8.0	8.0	60.4	11.2	11.7	9.4	23.0	10.3	10.5	26.3	12.0	14.7	15.1	15.5	16.0	16.6	17.5
1967	PR	6.5	6.5	57.1	9.6	10.0	10.2	21.1	8.8	8.9	24.2	10.3	10.5	13.5	13.9	14.4	14.9	15.7	16.3
1968	PR	5.1	53.9	8.0	8.4	8.5	8.6	7.3	7.4	22.1	8.6	8.8	25.6	12.4	12.8	13.2	13.9	14.4	15.0
1969	PR	50.9	6.6	6.7	6.9	7.1	7.2	6.0	20.1	7.0	7.2	23.4	8.4	11.3	11.7	12.2	12.8	13.3	13.9
1970	PR	5.2	5.2	5.3	5.5	5.6	5.7	18.2	5.5	5.6	21.3	6.8	6.9	10.2	10.6	11.1	11.6	12.2	12.7
1971	DC	3.8	3.8	3.9	4.0	4.1	4.2	4.0	4.1	19.0	5.2	5.3	22.2	9.0	9.4	9.9	10.4	10.9	11.4
1972	DC	3.5	3.6	3.6	3.7	3.8	3.8	3.8	17.8	4.7	4.9	20.9	6.0	9.0	9.4	9.8	10.3	10.8	11.3
1973	DC	3.3	3.3	3.3	3.4	3.4	3.5	16.8	4.4	4.5	19.7	5.5	5.6	8.9	9.3	9.7	10.2	10.7	11.2
1974	DC	3.0	3.0	3.0	3.1	3.1	60.1	4.0	4.1	18.5	5.1	5.2	21.6	8.9	9.3	9.7	10.1	10.6	11.2
1975	DC	2.7	2.7	2.8	2.8	56.9	5.9	3.8	17.4	4.7	4.8	20.4	5.9	8.8	9.2	9.6	10.1	10.6	11.1
1976	DC	2.5	2.5	2.5	53.8	5.4	5.5	16.4	4.3	4.4	19.2	5.4	5.5	8.8	9.2	9.6	10.0	10.5	11.0
1977	DC	2.2	2.2	50.8	5.0	5.1	5.2	4.0	4.1	18.1	5.0	5.1	21.1	8.7	9.1	9.5	9.9	10.4	10.9
1978	DC	2.0	48.0	4.7	4.7	4.8	4.9	3.8	17.0	4.7	4.7	19.9	5.8	8.7	9.0	9.4	9.9	10.3	10.8
1979	DC	45.4	4.3	4.4	4.5	4.5	4.6	16.1	4.3	4.4	18.7	5.4	5.4	8.6	9.0	9.4	9.8	10.3	10.7
1980	DC	4.0	4.1	4.1	4.2	4.2	4.3	4.0	4.1	17.7	5.0	5.1	20.6	8.6	8.9	9.3	9.7	10.2	10.6
1981	DC	3.8	3.8	3.9	3.9	3.9	4.0	3.8	16.7	4.6	4.7	19.4	5.7	8.6	8.9	9.3	9.7	10.1	10.6
1982	DC	3.6	3.6	3.6	3.6	3.7	3.7	15.7	4.3	4.4	18.3	5.3	5.4	8.5	8.9	9.2	9.6	10.1	10.5
1983	DC	3.4	3.3	3.3	3.4	3.4	3.3	4.1	4.1	17.3	4.9	5.0	20.1	8.5	8.8	9.2	9.6	10.0	10.4
1984	DC	3.1	3.1	3.1	3.1	3.1	55.0	3.8	16.3	4.6	4.7	19.0	5.6	8.4	8.8	9.1	9.5	9.9	10.3
1985	DC	2.9	2.9	2.8	2.8	52.1	5.6	15.5	4.3	4.4	18.0	5.2	5.3	8.4	8.7	9.1	9.5	9.9	10.3
1986	DC	2.7	2.6	2.6	49.3	5.2	5.3	4.1	4.1	17.0	4.9	5.0	19.7	8.4	8.7	9.0	9.4	9.8	10.2
1987	DC	2.4	2.4	46.6	4.9	4.9	5.0	3.8	16.0	4.6	4.6	18.6	5.5	8.3	8.6	9.0	9.3	9.7	10.1
1988	DC	2.2	44.1	4.6	4.6	4.7	4.7	15.2	4.3	4.3	17.6	5.2	5.2	8.3	8.6	8.9	9.3	9.7	10.0
1989	DC	41.7	4.3	4.3	4.4	4.4	4.4	4.1	4.1	16.6	4.9	4.9	19.2	8.3	8.6	8.9	9.2	9.6	9.9
1990	DC	4.1	4.1	4.1	4.1	4.1	4.1	3.9	15.7	4.6	4.6	18.2	5.4	8.2	8.5	8.8	9.2	9.5	9.8
1991	DC	3.9	3.9	3.9	3.9	3.8	3.8	14.9	4.3	4.3	17.2	5.1	5.1	8.2	8.5	8.8	9.1	9.4	9.7
1992	DC	3.7	3.6	3.6	3.6	3.6	3.5	4.1	4.1	16.3	4.8	4.8	18.8	8.2	8.5	8.7	9.0	9.3	9.6
1993	DC	3.5	3.4	3.4	3.3	3.3	3.2	3.9	15.5	4.5	4.5	17.8	5.3	8.1	8.4	8.6	8.9	9.2	9.5
1994	DC	3.2	3.2	3.1	3.1	3.0	50.5	14.7	4.3	4.3	16.9	5.0	5.0	8.1	8.3	8.6	8.8	9.1	9.4
1995	DC	3.0	3.0	2.9	2.8	47.9	5.2	4.1	4.1	16.0	4.7	4.7	18.3	8.1	8.3	8.5	8.7	9.0	9.2
1996	DC	2.8	2.7	2.6	45.4	4.9	4.9	3.9	15.1	4.4	4.4	17.4	5.1	8.0	8.2	8.4	8.6	8.9	9.1
1997	DC	2.6	2.5	43.0	4.6	4.6	4.6	14.4	4.2	4.2	16.5	4.8	4.8	7.9	8.1	8.3	8.5	8.8	9.0
1998	DC	2.4	40.7	4.4	4.4	4.3	4.3	4.0	4.0	15.6	4.6	4.6	17.8	7.8	8.0	8.2	8.4	8.7	8.9
1999	DC	38.6	4.2	4.1	4.1	4.1	4.0	3.8	14.8	4.3	4.3	16.9	5.0	7.8	7.9	8.1	8.4	8.6	8.8
2000	DC	4.0	4.0	3.9	3.9	3.9	3.8	14.1	4.2	4.1	16.1	4.7	4.7	7.7	7.9	8.1	8.3	8.5	8.7

TAX - MALE BLUE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	57.5	103.9	109.7	110.0	110.3	110.5	57.5	103.9	109.7	110.0	110.3	110.5	57.5	103.9	109.7	110.0	110.3	110.5
1946	DB	58.0	109.3	109.6	109.9	110.2	110.5	58.0	109.3	109.6	109.9	110.2	110.5	58.0	109.3	109.6	109.9	110.2	110.5
1947	DB	63.1	109.3	109.6	109.8	110.1	112.0	63.1	109.3	109.6	109.8	110.1	112.0	63.1	109.3	109.6	109.8	110.1	112.0
1948	DB	62.7	109.2	109.5	109.8	111.8	112.0	62.7	109.2	109.5	109.8	111.8	112.0	62.7	109.2	109.5	109.8	111.8	112.0
1949	DB	62.4	109.2	109.4	111.6	111.8	112.0	62.4	109.2	109.4	111.6	111.8	112.0	62.4	109.2	109.4	111.6	111.8	112.0
1950	DB	62.0	109.1	111.4	111.6	111.8	112.0	62.0	109.1	111.4	111.6	111.8	112.0	62.0	109.1	111.4	111.6	111.8	112.0
1951	DB	61.6	111.3	111.5	111.6	111.8	112.0	61.6	111.3	111.5	111.6	111.8	112.0	61.6	111.3	111.5	111.6	111.8	112.0
1952	DB	63.6	111.3	111.5	111.7	111.9	112.0	63.6	111.3	111.5	111.7	111.9	112.0	63.6	111.3	111.5	111.7	111.9	112.0
1953	DB	63.5	111.4	111.5	111.7	111.9	112.1	63.5	111.4	111.5	111.7	111.9	112.1	63.5	111.4	111.5	111.7	111.9	112.1
1954	DB	63.3	111.4	111.5	111.7	111.9	112.1	63.3	111.4	111.5	111.7	111.9	112.1	63.3	111.4	111.5	111.7	111.9	112.1
1955	DB	63.1	111.4	111.6	111.7	111.9	112.1	63.1	111.4	111.6	111.7	111.9	112.1	63.1	111.4	111.6	111.7	111.9	112.1
1956	DB	62.9	111.4	111.6	111.7	111.9	112.1	62.9	111.4	111.6	111.7	111.9	112.1	62.9	111.4	111.6	111.7	111.9	112.1
1957	PR	31.2	31.1	106.1	36.2	36.6	37.1	34.1	47.7	35.5	35.9	52.5	37.7	39.5	40.2	41.0	41.8	42.7	43.6
1958	PR	29.1	101.2	33.8	34.2	34.6	35.0	45.0	33.2	33.5	49.5	35.2	35.6	37.8	38.5	39.3	40.1	41.0	41.9
1959	PR	96.6	31.4	31.7	32.1	32.5	32.9	30.8	31.1	46.5	32.7	33.1	51.6	36.1	36.8	37.6	38.4	39.3	40.2
1960	PR	29.1	29.4	29.7	30.0	30.4	30.7	28.8	43.6	30.3	30.6	48.4	32.4	34.4	35.1	35.9	36.7	37.6	38.5
1961	PR	27.0	27.3	27.6	27.9	28.2	28.6	40.8	27.9	28.2	45.3	29.9	30.3	32.7	33.4	34.1	35.0	35.9	36.8
1962	PR	25.0	25.2	25.5	25.8	26.1	26.4	25.5	25.8	42.3	27.4	27.8	47.5	31.0	31.7	32.4	33.3	34.1	35.1
1963	PR	22.9	23.1	23.4	23.7	24.0	24.3	23.5	39.4	24.9	25.3	44.3	27.1	29.2	29.9	30.7	31.5	32.4	33.3
1964	PR	20.8	21.1	21.3	21.5	21.8	92.5	36.5	22.6	22.9	41.1	24.6	25.0	27.5	28.2	29.0	29.8	30.7	31.6
1965	PR	18.8	18.9	19.2	19.4	87.4	23.6	20.2	20.5	38.0	22.1	22.5	43.3	25.8	26.5	27.2	28.1	28.9	29.9
1966	PR	16.7	16.8	17.0	82.5	21.0	21.4	18.2	35.0	19.6	20.0	40.0	21.8	24.0	24.7	25.5	26.3	27.2	28.1
1967	PR	14.6	14.7	77.7	18.6	18.9	19.3	32.1	17.3	17.6	36.9	19.3	19.7	22.3	23.0	23.8	24.6	25.5	26.4
1968	PR	12.5	73.1	16.1	16.5	16.8	17.2	15.0	15.2	33.7	16.8	17.2	39.0	20.6	21.3	22.1	22.9	23.8	24.7
1969	PR	68.6	13.8	14.1	14.4	14.7	15.1	12.9	30.7	14.4	14.7	35.7	16.5	18.9	19.6	20.3	21.2	22.0	22.9
1970	PR	11.5	11.7	12.0	12.3	12.6	12.9	27.8	12.0	12.3	32.5	14.0	14.4	17.2	17.9	18.6	19.4	20.3	21.2
1971	PR	9.5	9.7	9.9	10.2	10.5	10.8	9.7	10.0	29.4	11.5	11.9	34.5	15.5	16.2	16.9	17.7	18.6	19.5
1972	PR	7.6	7.8	8.0	8.3	8.5	8.7	7.9	26.5	9.3	9.6	31.4	11.3	14.0	14.6	15.4	16.1	17.0	17.9
1973	PR	5.8	5.9	6.1	6.3	6.5	6.7	23.7	7.2	7.4	28.3	9.0	9.3	12.5	13.1	13.8	14.6	15.4	16.2
1974	DC	3.9	4.0	4.1	4.3	4.4	84.0	5.1	5.2	24.9	6.7	6.9	29.9	10.8	11.4	12.1	12.8	13.6	14.4
1975	DC	3.6	3.7	3.8	3.9	78.7	7.8	4.8	23.2	6.0	6.3	27.9	7.8	10.7	11.3	12.0	12.7	13.5	14.3
1976	DC	3.3	3.3	3.4	73.7	7.1	7.4	21.6	5.5	5.7	26.0	7.1	7.4	10.7	11.2	11.9	12.6	13.4	14.2
1977	DC	3.0	3.0	69.1	6.5	6.8	7.0	5.0	5.2	24.3	6.5	6.8	29.1	10.6	11.2	11.8	12.5	13.3	14.0
1978	DC	2.7	64.7	6.0	6.2	6.4	6.6	4.8	22.7	6.0	6.2	27.2	7.6	10.5	11.1	11.7	12.4	13.2	13.9
1979	DC	60.6	5.5	5.6	5.9	6.0	6.2	21.2	5.5	5.6	25.4	7.0	7.3	10.5	11.0	11.6	12.3	13.1	13.8
1980	DC	5.0	5.2	5.3	5.5	5.7	5.9	5.0	5.2	23.7	6.4	6.7	28.4	10.4	11.0	11.6	12.2	13.0	13.7
1981	DC	4.8	4.9	5.0	5.2	5.3	5.5	4.8	22.2	5.9	6.1	26.6	7.5	10.4	10.9	11.5	12.2	12.9	13.6
1982	DC	4.5	4.6	4.7	4.8	5.0	5.1	20.7	5.4	5.6	24.8	6.9	7.1	10.3	10.8	11.4	12.1	12.8	13.5
1983	DC	4.2	4.3	4.4	4.5	4.6	4.7	5.0	5.2	23.2	6.4	6.6	27.7	10.3	10.8	11.3	12.0	12.7	13.4
1984	DC	3.9	4.0	4.1	4.2	4.2	76.6	4.8	21.7	5.8	6.0	25.9	7.4	10.2	10.7	11.3	11.9	12.6	13.3
1985	DC	3.7	3.7	3.8	3.8	71.9	7.3	20.3	5.4	5.5	24.3	6.8	7.0	10.2	10.7	11.2	11.8	12.5	13.2
1986	DC	3.4	3.4	3.5	67.5	6.8	7.0	5.0	5.1	22.7	6.3	6.5	27.1	10.1	10.6	11.1	11.8	12.4	13.1
1987	DC	3.1	3.1	63.3	6.3	6.4	6.6	4.8	21.2	5.8	6.0	25.4	7.2	10.1	10.5	11.1	11.7	12.3	13.0
1988	DC	2.9	59.3	5.8	5.9	6.1	6.2	19.9	5.4	5.5	23.8	6.7	6.9	10.0	10.5	11.0	11.6	12.2	12.9
1989	DC	55.6	5.4	5.5	5.6	5.8	5.9	5.0	5.1	22.2	6.2	6.4	26.5	10.0	10.4	11.0	11.5	12.1	12.8
1990	DC	5.0	5.1	5.2	5.3	5.4	5.5	4.8	20.8	5.8	5.9	24.8	7.1	9.9	10.4	10.9	11.5	12.1	12.7
1991	DC	4.8	4.8	4.9	5.0	5.1	5.2	19.5	5.4	5.5	23.3	6.6	6.8	9.9	10.3	10.8	11.4	12.0	12.6
1992	DC	4.5	4.6	4.6	4.7	4.8	4.8	5.0	5.1	21.8	6.2	6.3	26.0	9.8	10.3	10.8	11.3	11.9	12.5
1993	DC	4.3	4.3	4.4	4.4	4.5	4.5	4.8	20.4	5.7	5.9	24.4	7.0	9.8	10.2	10.7	11.3	11.8	12.4
1994	DC	4.0	4.0	4.1	4.1	4.1	70.8	19.2	5.4	5.4	22.9	6.5	6.7	9.7	10.2	10.7	11.2	11.8	12.4
1995	DC	3.8	3.8	3.8	3.8	66.5	6.9	5.0	5.1	21.4	6.1	6.2	25.5	9.7	10.1	10.6	11.1	11.7	12.3
1996	DC	3.5	3.5	3.5	62.5	6.5	6.6	4.8	20.1	5.7	5.8	24.0	6.9	9.7	10.1	10.6	11.1	11.6	12.2
1997	DC	3.3	3.2	58.6	6.0	6.2	6.3	18.9	5.3	5.4	22.5	6.4	6.6	9.6	10.1	10.5	11.0	11.6	12.1
1998	DC	3.0	55.0	5.7	5.8	5.8	5.9	5.0	5.1	21.1	6.0	6.1	25.1	9.6	10.0	10.5	11.0	11.5	12.1
1999	DC	51.6	5.3	5.4	5.5	5.5	5.6	4.8	19.8	5.6	5.7	23.5	6.8	9.6	10.0	10.4	10.9	11.4	12.0
2000	DC	5.0	5.1	5.1	5.2	5.3	5.3	18.6	5.3	5.4	22.1	6.4	6.5	9.5	9.9	10.4	10.9	11.4	11.9

TAX - FEMALE WHITE C.		Scenario B95						Scenario B07						Scenario AB					
		retirement age						retirement age						retirement age					
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	34.0	38.0	45.8	49.0	91.0	92.0	34.0	38.0	45.8	49.0	91.0	92.0	34.0	38.0	45.8	49.0	91.0	92.0
1946	DB	34.3	42.2	45.3	48.5	90.8	91.8	34.3	42.2	45.3	48.5	90.8	91.8	34.3	42.2	45.3	48.5	90.8	91.8
1947	DB	38.4	41.6	44.8	47.9	90.6	93.3	38.4	41.6	44.8	47.9	90.6	93.3	38.4	41.6	44.8	47.9	90.6	93.3
1948	DB	37.8	41.1	44.2	47.4	92.3	93.2	37.8	41.1	44.2	47.4	92.3	93.2	37.8	41.1	44.2	47.4	92.3	93.2
1949	DB	37.3	40.6	43.7	49.0	92.1	93.1	37.3	40.6	43.7	49.0	92.1	93.1	37.3	40.6	43.7	49.0	92.1	93.1
1950	DB	36.8	40.1	45.3	48.7	92.0	93.0	36.8	40.1	45.3	48.7	92.0	93.0	36.8	40.1	45.3	48.7	92.0	93.0
1951	DB	36.1	41.6	44.9	48.3	91.9	92.8	36.1	41.6	44.9	48.3	91.9	92.8	36.1	41.6	44.9	48.3	91.9	92.8
1952	DB	37.8	41.3	44.6	47.9	91.7	92.7	37.8	41.3	44.6	47.9	91.7	92.7	37.8	41.3	44.6	47.9	91.7	92.7
1953	DB	37.4	40.9	44.2	47.6	91.6	92.6	37.4	40.9	44.2	47.6	91.6	92.6	37.4	40.9	44.2	47.6	91.6	92.6
1954	PR	20.9	20.8	20.8	20.6	20.6	98.4	22.9	34.4	24.1	24.3	38.3	25.8	29.9	30.5	31.1	31.9	32.6	33.4
1955	PR	19.2	19.1	19.0	18.8	93.6	24.4	32.2	22.2	22.4	35.9	23.8	24.1	28.6	29.2	29.9	30.6	31.3	32.1
1956	PR	17.6	17.4	17.3	89.0	22.4	22.6	20.5	20.6	33.6	21.8	22.1	37.6	27.4	28.0	28.6	29.3	30.0	30.8
1957	PR	15.9	15.7	84.8	20.4	20.6	20.8	18.8	31.4	20.0	20.1	35.1	21.5	26.2	26.8	27.4	28.1	28.8	29.5
1958	PR	14.2	80.8	18.6	18.7	18.9	19.0	29.2	18.2	18.3	32.8	19.5	19.7	25.0	25.5	26.1	26.8	27.5	28.2
1959	PR	77.1	16.8	16.9	17.0	17.1	17.2	16.4	16.5	30.5	17.7	17.8	34.3	23.8	24.3	24.9	25.5	26.2	26.9
1960	PR	15.1	15.2	15.2	15.3	15.4	15.4	14.8	28.3	15.8	16.0	31.9	17.2	22.6	23.1	23.6	24.3	24.9	25.6
1961	PR	13.5	13.5	13.6	13.6	13.6	13.6	26.2	14.1	14.2	29.6	15.3	15.4	21.3	21.9	22.4	23.0	23.6	24.3
1962	PR	11.9	11.9	11.9	11.9	11.8	11.8	12.5	12.5	27.3	13.5	13.5	31.0	20.1	20.6	21.2	21.8	22.4	23.0
1963	PR	10.3	10.2	10.2	10.1	10.0	10.0	10.9	25.2	11.7	11.8	28.7	12.9	18.9	19.4	19.9	20.5	21.1	21.7
1964	PR	8.7	8.6	8.5	8.4	8.3	71.6	23.1	10.1	10.1	26.4	11.1	11.1	17.8	18.2	18.7	19.3	19.8	20.5
1965	PR	7.0	6.9	6.8	6.6	67.9	10.0	8.5	8.5	24.2	9.3	9.3	27.7	16.6	17.0	17.5	18.0	18.6	19.2
1966	PR	5.4	5.2	5.1	64.2	8.3	8.2	6.9	22.1	7.7	7.7	25.4	8.6	15.4	15.8	16.3	16.8	17.4	17.9
1967	PR	3.8	3.6	60.7	6.6	6.5	6.5	20.1	6.1	6.0	23.2	6.9	6.8	14.2	14.6	15.1	15.6	16.1	16.6
1968	PR	2.2	57.4	5.0	4.9	4.8	4.7	4.6	4.5	21.0	5.2	5.1	24.4	13.1	13.4	13.9	14.4	14.9	15.4
1969	PR	54.2	3.5	3.4	3.2	3.1	2.9	3.0	19.0	3.7	3.6	22.1	4.3	11.9	12.3	12.7	13.2	13.6	14.1
1970	PR	2.0	1.8	1.7	1.6	1.4	1.2	17.0	2.2	2.0	20.0	2.7	2.6	10.7	11.1	11.5	12.0	12.4	12.9
1971	DC	0.4	0.2	0.0	-0.2	-0.4	-0.6	0.7	0.5	17.5	1.2	1.0	20.6	9.4	9.8	10.2	10.6	11.0	11.5
1972	DC	0.0	-0.2	-0.4	-0.6	-0.8	-1.1	0.3	16.3	0.9	0.7	19.2	1.4	9.4	9.7	10.1	10.5	10.9	11.4
1973	DC	-0.3	-0.5	-0.8	-1.0	-1.3	-1.6	15.2	0.7	0.5	18.0	1.1	0.9	9.3	9.7	10.0	10.5	10.9	11.3
1974	DC	-0.6	-0.9	-1.2	-1.4	-1.7	65.1	0.5	0.3	16.8	0.9	0.7	19.7	9.3	9.6	10.0	10.4	10.8	11.2
1975	DC	-1.0	-1.2	-1.5	-1.8	61.4	1.1	0.2	15.7	0.7	0.5	18.4	1.1	9.2	9.6	9.9	10.3	10.7	11.1
1976	DC	-1.3	-1.6	-1.9	57.8	0.8	0.6	14.7	0.5	0.3	17.3	0.8	0.6	9.2	9.5	9.9	10.3	10.6	11.0
1977	DC	-1.6	-2.0	54.3	0.6	0.4	0.2	0.4	0.2	16.2	0.6	0.4	18.9	9.2	9.5	9.8	10.2	10.6	11.0
1978	DC	-2.0	51.1	0.5	0.3	0.0	-0.3	0.1	15.1	0.5	0.3	17.7	0.7	9.1	9.4	9.8	10.1	10.5	10.9
1979	DC	48.0	0.3	0.1	-0.1	-0.4	-0.7	14.2	0.3	0.1	16.6	0.5	0.3	9.1	9.4	9.7	10.1	10.4	10.8
1980	DC	0.2	0.0	-0.3	-0.5	-0.8	-1.2	0.2	0.0	15.5	0.4	0.1	18.2	9.1	9.4	9.7	10.0	10.4	10.7
1981	DC	-0.1	-0.3	-0.6	-0.9	-1.2	-1.6	-0.1	14.6	0.3	0.0	17.0	0.4	9.0	9.3	9.6	9.9	10.3	10.6
1982	DC	-0.4	-0.7	-1.0	-1.3	-1.7	-2.1	13.7	0.2	-0.1	16.0	0.3	0.0	9.0	9.3	9.6	9.9	10.2	10.6
1983	DC	-0.7	-1.0	-1.4	-1.7	-2.1	-2.5	0.1	-0.2	15.0	0.1	-0.2	17.4	9.0	9.2	9.5	9.8	10.2	10.5
1984	DC	-1.0	-1.4	-1.7	-2.1	-2.5	58.9	-0.2	14.0	0.0	-0.2	16.4	0.1	8.9	9.2	9.5	9.8	10.1	10.4
1985	DC	-1.4	-1.7	-2.1	-2.5	55.5	-0.1	13.2	0.0	-0.3	15.3	0.0	-0.4	8.9	9.1	9.4	9.7	10.0	10.4
1986	DC	-1.7	-2.1	-2.5	52.2	-0.1	-0.5	-0.1	-0.4	14.4	-0.1	-0.5	16.7	8.9	9.1	9.4	9.7	10.0	10.3
1987	DC	-2.0	-2.4	49.2	-0.2	-0.6	-0.9	-0.4	13.5	-0.2	-0.5	15.7	-0.3	8.8	9.1	9.3	9.6	9.9	10.2
1988	DC	-2.3	46.3	-0.3	-0.6	-1.0	-1.4	12.7	-0.3	-0.6	14.7	-0.4	-0.7	8.8	9.0	9.3	9.6	9.9	10.2
1989	DC	43.5	-0.3	-0.6	-1.0	-1.4	-1.8	-0.3	-0.6	13.8	-0.4	-0.8	16.0	8.8	9.0	9.2	9.5	9.8	10.1
1990	DC	-0.3	-0.7	-1.0	-1.4	-1.8	-2.2	-0.6	13.0	-0.5	-0.8	15.0	-0.6	8.7	9.0	9.2	9.5	9.7	10.0
1991	DC	-0.7	-1.0	-1.4	-1.7	-2.2	-2.7	12.2	-0.5	-0.8	14.1	-0.7	-1.1	8.7	8.9	9.2	9.4	9.7	10.0
1992	DC	-1.0	-1.3	-1.7	-2.1	-2.6	-3.1	-0.5	-0.8	13.3	-0.7	-1.1	15.4	8.7	8.9	9.1	9.4	9.6	9.9
1993	DC	-1.3	-1.7	-2.1	-2.5	-3.0	-3.6	-0.8	12.5	-0.7	-1.1	14.4	-1.0	8.7	8.9	9.1	9.3	9.6	9.9
1994	DC	-1.6	-2.0	-2.4	-2.9	-3.4	53.6	11.7	-0.7	-1.1	13.6	-1.0	-1.4	8.6	8.8	9.1	9.3	9.5	9.8
1995	DC	-1.9	-2.4	-2.8	-3.3	50.6	-1.3	-0.7	-1.0	12.7	-1.0	-1.4	14.7	8.6	8.8	9.0	9.3	9.5	9.8
1996	DC	-2.2	-2.7	-3.2	47.6	-1.2	-1.7	-1.0	12.0	-1.0	-1.4	13.9	-1.4	8.6	8.8	9.0	9.2	9.5	9.7
1997	DC	-2.6	-3.0	44.8	-1.2	-1.6	-2.1	11.3	-0.9	-1.3	13.0	-1.3	-1.8	8.6	8.8	9.0	9.2	9.4	9.7
1998	DC	-2.9	42.2	-1.2	-1.6	-2.0	-2.5	-0.9	-1.3	12.3	-1.3	-1.7	14.1	8.5	8.7	8.9	9.2	9.4	9.6
1999	DC	39.7	-1.1	-1.5	-2.0	-2.4	-3.0	-1.2	11.5	-1.3	-1.7	13.3	-1.8	8.5	8.7	8.9	9.1	9.3	9.6
2000	DC	-1.1	-1.5	-1.9	-2.3	-2.9	-3.4	10.8	-1.2	-1.6	12.5	-1.7	-2.2	8.5	8.7	8.9	9.1	9.3	9.5

TAX - FEMALE BLUE C.		Scenario B95						Scenario B07						Scenario AB					
				retirement age						retirement age						retirement age			
cohort/scheme		60	61	62	63	64	65	60	61	62	63	64	65	60	61	62	63	64	65
1945	DB	64.3	68.7	121.3	121.4	121.5	121.6	64.3	68.7	121.3	121.4	121.5	121.6	64.3	68.7	121.3	121.4	121.5	121.6
1946	DB	64.9	73.9	121.4	121.5	121.5	121.6	64.9	73.9	121.4	121.5	121.5	121.6	64.9	73.9	121.4	121.5	121.5	121.6
1947	DB	70.1	73.6	121.4	121.4	121.5	123.5	70.1	73.6	121.4	121.4	121.5	123.5	70.1	73.6	121.4	121.4	121.5	123.5
1948	DB	69.8	73.3	121.4	121.5	123.6	123.6	69.8	73.3	121.4	121.5	123.6	123.6	69.8	73.3	121.4	121.5	123.6	123.6
1949	DB	69.4	73.0	121.4	123.7	123.7	123.7	69.4	73.0	121.4	123.7	123.7	123.7	69.4	73.0	121.4	123.7	123.7	123.7
1950	DB	69.1	72.7	123.8	123.8	123.8	123.8	69.1	72.7	123.8	123.8	123.8	123.8	69.1	72.7	123.8	123.8	123.8	123.8
1951	DB	68.7	74.9	123.9	123.9	123.9	123.9	68.7	74.9	123.9	123.9	123.9	123.9	68.7	74.9	123.9	123.9	123.9	123.9
1952	DB	71.0	74.8	124.0	124.0	124.0	124.0	71.0	74.8	124.0	124.0	124.0	124.0	71.0	74.8	124.0	124.0	124.0	124.0
1953	DB	70.8	74.7	124.1	124.1	124.1	124.1	70.8	74.7	124.1	124.1	124.1	124.1	70.8	74.7	124.1	124.1	124.1	124.1
1954	DB	70.7	74.6	124.1	124.1	124.1	124.1	70.7	74.6	124.1	124.1	124.1	124.1	70.7	74.6	124.1	124.1	124.1	124.1
1955	DB	70.6	74.4	124.2	124.2	124.2	124.2	70.6	74.4	124.2	124.2	124.2	124.2	70.6	74.4	124.2	124.2	124.2	124.2
1956	PR	33.9	33.6	33.3	120.7	38.6	38.8	37.0	37.0	52.6	38.2	38.3	57.5	44.6	45.1	45.8	46.4	47.2	48.0
1957	PR	31.4	31.1	115.1	36.1	36.2	36.3	34.6	49.6	35.6	35.7	54.2	37.0	42.6	43.2	43.8	44.5	45.3	46.1
1958	PR	28.9	109.7	33.5	33.6	33.7	33.8	46.6	33.1	33.2	51.0	34.4	34.5	40.7	41.3	41.9	42.6	43.4	44.2
1959	PR	104.6	31.0	31.1	31.1	31.2	31.3	30.7	30.7	47.8	31.8	31.9	52.8	38.7	39.3	40.0	40.7	41.5	42.3
1960	PR	28.6	28.6	28.6	28.7	28.7	28.7	28.3	44.7	29.3	29.4	49.4	30.7	36.8	37.4	38.0	38.8	39.5	40.4
1961	PR	26.2	26.1	26.1	26.2	26.2	26.1	41.7	26.8	26.8	46.1	28.0	28.2	34.9	35.4	36.1	36.8	37.6	38.5
1962	PR	23.7	23.7	23.6	23.6	23.6	23.6	24.3	24.3	42.9	25.5	25.5	48.0	32.9	33.5	34.2	34.9	35.7	36.5
1963	PR	21.3	21.2	21.1	21.1	21.0	20.9	21.9	39.7	22.9	23.0	44.6	24.3	31.0	31.6	32.2	33.0	33.8	34.6
1964	PR	18.8	18.7	18.6	18.5	18.4	100.8	36.7	20.4	20.4	41.3	21.6	21.7	29.0	29.6	30.3	31.1	31.8	32.7
1965	PR	16.3	16.2	16.0	15.9	95.3	19.9	17.9	17.9	37.9	19.0	19.1	43.2	27.0	27.7	28.4	29.1	29.9	30.8
1966	PR	13.8	13.6	13.5	89.8	17.3	17.4	15.5	34.7	16.5	16.5	39.7	17.7	25.1	25.7	26.4	27.2	28.0	28.8
1967	PR	11.3	11.1	84.5	14.7	14.8	14.8	31.6	13.9	14.0	36.3	15.1	15.2	23.1	23.8	24.5	25.2	26.0	26.9
1968	PR	8.7	79.4	12.1	12.2	12.2	12.1	11.5	11.5	32.9	12.6	12.6	38.2	21.2	21.8	22.5	23.3	24.1	24.9
1969	PR	74.4	9.6	9.6	9.6	9.6	9.5	9.0	29.6	10.0	10.0	34.7	11.2	19.2	19.9	20.6	21.3	22.1	23.0
1970	PR	7.2	7.1	7.1	7.0	7.0	6.8	26.4	7.5	7.4	31.3	8.6	8.6	17.3	17.9	18.6	19.4	20.2	21.0
1971	PR	4.8	4.7	4.6	4.5	4.3	4.2	5.1	5.0	27.9	6.1	6.0	33.2	15.4	16.1	16.7	17.5	18.3	19.1
1972	PR	2.4	2.2	2.1	1.9	1.7	1.5	2.8	24.7	3.6	3.5	29.6	4.6	13.6	14.2	14.9	15.6	16.3	17.1
1973	DC	0.0	-0.3	-0.5	-0.7	-1.0	-1.3	21.1	1.2	1.1	25.6	2.0	1.8	11.5	12.1	12.7	13.4	14.1	14.9
1974	DC	-0.4	-0.7	-1.0	-1.2	-1.5	93.7	0.9	0.8	23.7	1.6	1.4	28.6	11.5	12.0	12.7	13.3	14.0	14.7
1975	DC	-0.8	-1.1	-1.4	-1.7	87.4	1.9	0.5	21.9	1.2	1.1	26.5	1.9	11.4	12.0	12.6	13.2	13.9	14.6
1976	DC	-1.3	-1.6	-1.9	81.5	1.6	1.4	20.3	1.0	0.8	24.6	1.6	1.4	11.4	11.9	12.5	13.1	13.8	14.5
1977	DC	-1.7	-2.0	76.0	1.2	1.0	0.8	0.7	0.5	22.8	1.2	1.0	27.4	11.3	11.8	12.4	13.0	13.7	14.3
1978	DC	-2.1	70.9	0.9	0.8	0.5	0.2	0.4	21.1	0.9	0.8	25.5	1.5	11.3	11.8	12.3	12.9	13.6	14.2
1979	DC	66.0	0.7	0.5	0.3	0.0	-0.3	19.6	0.7	0.5	23.7	1.2	0.9	11.2	11.7	12.3	12.8	13.5	14.1
1980	DC	0.5	0.3	0.0	-0.2	-0.5	-0.9	0.5	0.3	21.9	0.9	0.6	26.4	11.2	11.7	12.2	12.8	13.4	14.0
1981	DC	0.2	-0.1	-0.4	-0.7	-1.1	-1.5	0.2	20.4	0.6	0.4	24.5	1.0	11.1	11.6	12.1	12.7	13.3	13.9
1982	DC	-0.2	-0.5	-0.9	-1.2	-1.6	-2.0	18.9	0.5	0.2	22.8	0.8	0.5	11.1	11.5	12.0	12.6	13.2	13.8
1983	DC	-0.6	-1.0	-1.3	-1.7	-2.1	-2.6	0.3	0.1	21.1	0.5	0.2	25.4	11.0	11.5	12.0	12.5	13.1	13.7
1984	DC	-1.0	-1.4	-1.8	-2.2	-2.7	84.8	-0.1	19.6	0.3	0.1	23.6	0.5	11.0	11.4	11.9	12.4	13.0	13.6
1985	DC	-1.4	-1.8	-2.2	-2.7	79.2	0.4	18.3	0.2	-0.1	21.9	0.3	0.0	10.9	11.4	11.8	12.4	12.9	13.5
1986	DC	-1.8	-2.2	-2.7	73.9	0.2	-0.2	0.1	-0.2	20.3	0.2	-0.2	24.4	10.9	11.3	11.8	12.3	12.8	13.4
1987	DC	-2.2	-2.7	68.9	0.1	-0.3	-0.7	-0.3	18.9	0.0	-0.3	22.7	0.1	10.8	11.2	11.7	12.2	12.7	13.3
1988	DC	-2.6	64.3	-0.1	-0.4	-0.8	-1.3	17.6	-0.1	-0.4	21.1	-0.1	-0.5	10.8	11.2	11.6	12.1	12.6	13.2
1989	DC	59.9	-0.2	-0.5	-0.9	-1.3	-1.8	-0.1	-0.5	19.6	-0.2	-0.6	23.4	10.7	11.1	11.6	12.1	12.5	13.1
1990	DC	-0.2	-0.6	-1.0	-1.4	-1.8	-2.4	-0.5	18.2	-0.3	-0.7	21.8	-0.4	10.7	11.1	11.5	12.0	12.5	13.0
1991	DC	-0.6	-1.0	-1.4	-1.8	-2.4	-2.9	16.9	-0.4	-0.7	20.2	-0.5	-1.0	10.7	11.0	11.5	11.9	12.4	12.9
1992	DC	-1.0	-1.4	-1.9	-2.3	-2.9	-3.5	-0.4	-0.8	18.8	-0.6	-1.0	22.5	10.6	11.0	11.4	11.9	12.3	12.8
1993	DC	-1.4	-1.8	-2.3	-2.8	-3.4	-4.1	-0.8	17.5	-0.6	-1.0	20.9	-0.9	10.6	10.9	11.3	11.8	12.2	12.7
1994	DC	-1.8	-2.2	-2.7	-3.3	-3.9	77.4	16.3	-0.7	-1.1	19.5	-0.9	-1.5	10.5	10.9	11.3	11.7	12.2	12.6
1995	DC	-2.1	-2.7	-3.2	-3.8	72.3	-1.2	-0.7	-1.1	18.1	-1.0	-1.5	21.6	10.5	10.8	11.2	11.7	12.1	12.6
1996	DC	-2.5	-3.1	-3.7	67.5	-1.2	-1.8	-1.0	16.9	-1.0	-1.4	20.1	-1.4	10.5	10.8	11.2	11.6	12.0	12.5
1997	DC	-2.9	-3.5	62.9	-1.2	-1.7	-2.3	15.7	-1.0	-1.4	18.8	-1.4	-2.0	10.4	10.8	11.1	11.5	12.0	12.4
1998	DC	-3.3	58.7	-1.2	-1.7	-2.3	-2.9	-0.9	-1.4	17.5	-1.4	-1.9	20.8	10.4	10.7	11.1	11.5	11.9	12.3
1999	DC	54.8	-1.2	-1.7	-2.2	-2.8	-3.4	-1.3	16.3	-1.4	-1.8	19.4	-1.9	10.4	10.7	11.0	11.4	11.8	12.3
2000	DC	-1.1	-1.6	-2.1	-2.7	-3.3	-4.0	15.1	-1.3	-1.8	18.0	-1.9	-2.5	10.3	10.6	11.0	11.4	11.8	12.2