

EVALUATING THE IMPACT ON LABOUR AND PENSION WEALTH OF PUBLIC POLICIES: AN ASSESMENT OF THE CHANGING ITALIAN PENSION SYSTEM

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The evolution of the Italian pension system, and in particular changes in early retirement provisions along the transition path and due to new discretionary measure, may differently affect retirement behaviours, with significant economic consequences in the short run on income distribution and poverty as well as on the long run on wealth from pension and labour. In this paper we present new evidence on the effect of the recent seniority pension reform, considering the evolution using a dynamic aging approach. Our dynamic microsimulation model - calibrated to replicate the main demographic and economic features and retirement dynamics of the Italian economy - is used to examine behavioural changes along proposed pension reform paths.

In particular, we compare, under two “retirement behavioural rules” (*individual* and *family-bounded* rationality), how changes in the current transition path (**B**) due to the recent seniority pensions reform (**M**) can affect the trend of inequality and poverty among pensioners and the distribution of human capital (the distribution of wealth from actual wages and expected pensions) analyse intragenerational and intergenerational issues.

The impact of policy **M** may slow down the increase in income concentration and poverty, due to the transition to the defined contribution regime. In particular, the rise of the legal age seems to be particularly effective under *family bounded rationality* since it forces workers (especially females) to postpone retirement, rising in this way their pension annuity.

1. Introduction

Over the last decade the Amato (L.503/92), Dini (L.335/95) and Prodi (L.449/97) laws have substantially changed the evolution of the Italian pension system, gradually reducing the generosity of pension benefits and early retirement options and designed a long term transition towards a new sustainable regime.¹ Pensions were indexed to inflation (rather than to wages), the most generous pensions' eligibility and computation rules are going to be slowly but steadily abolished during a long transition phase (the so called “mixed regime”) towards a new contribution based regime (“contributivo”).² In this way a great part of the burden has been placed on the shoulders of younger and future generations. Moreover, the elimination of minimum pensions and wage indexation for social pensions tend to increase inequalities and poverty in the medium term, opening a larger role for welfare benefits.³ At the same time, the nextcoming early retirement of the baby-boomers have not been adequately dealt. Accordingly,

¹ However, due to serious budget constraints, reforms were mainly targeted to reduce expenditures. This concern and the pressures from strong interest groups obscured the need to design a satisfactory transition path towards the new regime and adequate redistribution schemes among pensioners.

² The reforms safeguarded the rights already acquired not only by pensioners but also by mature workers. Currently, seniority pensions requirements are an age of 57 and 35 years of contributions or 37 years of contributions (40 by 2008), regardless of the age. Cf. Brugiavini and Fornero (2001).

³ The non-indexation of pensions to wages has perhaps represented the only consistent savings, but transformed the lowest pensions from a social minimum into a biological one and recreated the “vintage pensions”, with probable future manoeuvres to eliminate them, on an equity basis. In this way lowest pensions will become insufficient to guarantee an adequate standard of living in the long run .

if life expectancy continues to rise, an increased fiscal burden that could aggravate the conditions of working generations if not opportunely adjusted, either increasing retirement age or reducing average pension benefits.

In this context, the Berlusconi government (L.448/01) raised social allowances for disadvantaged elders⁴ and more recently revised current transition rules for seniority pensions (L.243/04) in order to accelerate the transition (dis)incentivating the most mature generations to postpone (or take early) retirement, eliminating some of their privileges. This last measure, up to 2008, will incentivate employees in the private sector to postpone retirement, when they have matured requirement for the seniority pension. They may opt to cash the value of the annual social security contribution (amounting to 32.7% of the net wage representing around 43% of workers' gross wages) instead of pension benefits. In this case, however, their future pension annuity will be determined not considering this further working year but *as if* the workers had retired when they had matured the requisites. After 2008, minimum requirements for entering the seniority pensions will increase. The candidate should work at least 35 years, paying each year the amount of social security contribution to the system, and be at least 60 (61 if self-employed)⁵ instead of 57. However, women can also retire under the old requisites (57 of age) by switching to the new defined contribution regime.⁶ This reform also revised some of the parameters previously set for the defined contribution regime.⁷ For those who started working after 1996 and whose pensions would be computed using the defined contribution regime, it reinforces "seniority pensions", that were strongly weakened by the Dini law. In fact, it rises considerably the legal age to be candidate for retirement. In particular, the previous regulations, indeed, indicated the following requisites:

- 1) a legal age of 57 plus social security contribution paid at least for 5 years;⁸

⁴ This social relief intervention, increased lowest pensions to guarantee an individual monthly income of up to 516.46 euro, in favour of subjects who are 65 or older. In the short run, reducing poverty among pensioners, this policy represented a first step to tackle the problem caused by the elimination of minimum pensions and wage indexation. However, it will not remove the long run adverse consequences of indexing lowest pensions only to prices, cf. Vagliasindi (2003).

⁵ From 2010, the minimum age requirement would be raised by one year, with the possibility of a further increase in 2013.

⁶ The initial draft suppressed seniority pensions and raised age requirements to enter the old age pension system. The exception, now provided only for women, was for all workers, increasing the flexibility of the system. However, the condition of switching from defined benefit to defined contribution regime to enjoy early retirement represents a quite strong disincentive. For further details see Vagliasindi *et al.* (2004a).

⁷ The Dini law scheduled in 2005 the possibility to revise the technical parameters of the reformed pension system.

⁸ In order to disincentivate early retirement, Dini linked the wage replacement to the retirement age. That is, being everything equal except retirement age, the older the workers, the higher pensions' annuity.

2) 40 years of social security contribution, regardless the age.

The reform sets to 65 (60 for women) the new legal age. Furthermore, it also allows for the “defined contribution regime” workers the possibility to enter the pension system under the same requisites provided to the former generations to access seniority pensions.

Past evidence shows that workers may respond quickly, modifying their retirement choices, to different incentives present in the pension systems and especially to new government policies. These reactions, in turn, can or should inform government policy design to contrast the consequences of the ageing process. Based on the not fully satisfactory way of addressing such issues, this paper aims to shed some new light on the transition from one pension regime to another and to presents a bit more evidence on early retirement and its future evolution and its short run effects on income distribution and poverty as well as its the long run impact on wealth from pension and labour.

Our dynamic ageing microsimulation model reproduces the main Italian demographic and economic features and retirement dynamics. Individual retirement age depends on expected utility of workers, who maximise their benefits flow coming from all incomes, instead of sole pension benefits.⁹ The MIND (Micro Italy National Dynamics) model allows us to estimate the economic effects of different behaviours along the current and modified pension reform path (due to the last seniority pension reform).

For a policy maker that aim to enhance the economic well being of Italian workers and pensioners, information on wealth by generations, geographical area and occupational sector, are crucial. Only in this way he can examine the intragenerational and intergenerational effects of different policy options relative to the reform of the social security system. However, wealth estimates are not easily available, hence most of the analyses of distributional issues are based only on current and expected incomes. This may lead to incomplete and distorted results.

To avoid this outcome, we do not produce only simulation-based estimation of future income inequality and poverty trends among pensioners, but also the gross wealth from wages and expected pension flows (cumulated in working and likely retirement periods), considering individual behaviours in the labour market. Accordingly we can examine the way future trends of average per capita gross wealth from pension and labour cumulated in the working life and

⁹ Specifically, the paper describes simulation results relative to the future evolution of pension treatments, distinguishing between the rules applied to (private and public) dependent employees and to self-employed workers and considering behavioural reactions (in accordance with the *OV* model by Stock and Wise, 1990) to changing incentives, enlarging previous experiments discussed in Bianchi *et al.* (2003) and Vagliasindi *et al.* (2004a, 2004b) to assess the micro foundations of agents’ behaviour.

retirement period by generations born between 1950 and 1979 are affected. We consider 18 typologies on the basis of three individual characteristics: (1) sex (males, female), (2) geographical area (north, centre and south) and (3) occupational sector (public dependent, private dependent, self-employed worker). Data are made comparable by setting 2004 as the reference year and by discounting data with the real rate of interest and of growth of per capita GDP, as in intergenerational accounting.¹⁰

In what follows, in sections 2 we describe the MIND model and discuss the most relevant methodological issues, raised when one try to consider the evolution of average cumulated values of wages and pensions for different generations, obtained running 10 Monte Carlo simulations,¹¹ to reduce the outcome variability. Specifically, we consider intergenerational comparisons determined aggregating over a 5 years period. Building upon the previous work in section 3 we take into account the employment status (public and private employees, self employed workers) of the population.

In section 4 we try to describe the most accurate and correct way the evolution inequality trends and their causes, looking at the population over 25, 45 and pensioners. This constitutes the background for the subsequent sections 5, where we consider the main different features of relative and absolute poverty. Section 6 concludes the paper with some final remarks.

2. Lifetime wealth from wages and pensions

Using the MIND model we can derive, on the basis of alternative future scenarios, different outcomes to describe using various indexes. In this section we follow the evolution of the expected average per capita gross wealth accumulated in the working life and retirement period by generations born between the '50 and the '79.

The MIND model considers 18 typologies on the basis of three individual characteristics: (1) sex (males, female), (2) geographical area (north, centre and south) and (3) employment sector (public dependent, private dependent, self-employed worker). However, given the limited number of workers born on the same year, to have more reliable result we consider for each generation only three average types, based on employment sector (described in point 3).

In this way we can derive the evolution of the annual and life-time gross labour and pension incomes. This allows us to simulate the evolution of intragenerational and intergenerational

¹⁰ Differently from intergenerational accounting, our agent-based gender comparison between present and future generations doesn't assume neither the constancy of relative profiles (and of the relative discrimination for future generations; i.e. ratio between net tax burdens), nor the satisfaction of the intertemporal budget constraint. In fact, we consider behavioural changes as fiscal rules are modified along the transition path towards the new defined benefit regime.

¹¹ Replication i differs from replication j due to the random numbers used in the simulation of the model.

inequalities on individual basis given the model simplified hypothesis.

MIND simulates the evolution of the Italian demography and socio-economic phenomena related to labour market. The entry in the labour market, individual education and income levels are stochastically determined.¹² Given the characteristics \mathbf{x}_{it} of the individual i real income at time t (i.e. work career) is obtained from equation $\hat{y}_{it} = e^{(x_{it}b + \hat{u}_i)} (1 + g)^{t - t_0}$ where residuals \hat{u}_i are included as stochastic components, g is the real growth rate and t_0 the initial period.

Retirement age is individually decided on the basis of the Stock and Wise (1990) option value model estimated each year until the optimal age of retirement is reached. Workers postpone retirement since the expected value of their utility to retire is growing over time.¹³ We can deal with different “retirement behavioural rules”, when workers determine their retirement age following *individual rationality (IR)*, maximising their individual benefits flow coming from labour (with $\alpha = 0.25$ and $r = 2.5\%$) and pension incomes, or when *family bounded rationality (FB)* applies decide their retirement age (with $\alpha = 0.125$ and $r = 8\%$).¹⁴ Under **FB** worker are eager to retire (placing less value on the benefit from labour income) and more myopic (using a higher discount rate for actualising future benefit streams). Moreover, the husband’s retirement decision influences the retirement of the working wife, who anticipates retirement with a probability $\pi = 10\%$ (20% if public dependent).¹⁵

Under the two retirement behavioural rules (*individual rationality* and *family bounded*

¹² Probabilities are derived from ISTAT data on the 1999 labour force and from the SHIW sample depending on the geographical area. Following Andreassen, Fredriksen and Ljones (1993), income levels are estimated with the standard semilog specification suggested by Mincer (1974) considering age, age², sex, education, hours worked, occupational sectors (dependent, self-employed, public) and geographical areas (North, Centre, South), see Bianchi, Romanelli, Vagliasindi (2001).

¹³ The value to retire in t^* at time t equal to $V_t(t^*) = \sum_{s=t}^{t^*-1} (1+r)^{t-s} \alpha Y_s + \sum_{s=t^*}^S (1+r)^{t-s} B_s(t^*)$, depends on the value of actualised flows of wage incomes αY and pensions $B(t)$, depending on workers’ characteristics, related benefits and requisites and time t . The option value of postponing retirement is:

$$OV_t(t+1) = E_t[V_t(t+1)] - E_t[V_t(t)] = \alpha Y_t - B_t(t) + \sum_{s=t+1}^S (1+r)^{t-s} (B_s(t+1) - B_s(t)).$$

¹⁴ These two alternative behaviours may be useful as boundary cases in the context of retirement choice, since they are able to encompass a number of intermediate behaviours. under *individual (family bounded) rationality* workers consider the net benefit of 1 € from their wage as equivalent to 0.25 € (0.125 € from their pension, when $\alpha = 0.25$ ($\alpha = 0.125$) and discount future pension at the rate $r = 2.5\%$ ($r = 2.5\%$). In practice, workers tend to retire later under *individual rationality* to enjoy longer the higher wage incomes (cf. Vagliasindi, Romanelli and Bianchi, 2004a and 2004b). To avoid corner solutions, we have set a social constraint to retire at 66 for dependent workers at 67 for public and 68 for self employed.

¹⁵ The MIND model, has already been used to examine the effects of the initial proposal to reform seniority pensions (extended also to public employees) on pension expenditures, income concentration and poverty in Vagliasindi, Romanelli and Bianchi, 2004a and 2004b assuming that the wife will anticipate retirement with a probability $\pi = 20\%$ (30% if public dependent) if the husband has retired.

rationality), we compare (from 1995 to 2085) two alternative social security policy scenarios (*B* and *M*). In the *basic scenario* (*B*) we assume that the current state of affairs remains the same, while in the *modified scenario* (*M*) we consider the impact of the reform proposed by the Italian Welfare Minister to reduce future seniority pensions, the so called Maroni's reform.

By considering the mean values of 10 Monte Carlo replications,¹⁶ in what follows we compare the average gross wealth from wages and pensions of the generations born between the '50 and the '79. In this way, we can analyse the evolution of retirement wealth under defined benefit system (considering the individuals born until 1959), under the mixed one (considering those born between 1960 and 1974) and under the defined contribution (considering the individuals born from the 1975).¹⁷ Specifically, we consider the discounted flows of simulated annual individual wages Y_j cumulated by each individual worker when he decides to retire, and the expected present value of their future pensions B_s that they will enjoy till they reach their 74th year if male (81st if female). Hence, we are using the values that we use for forecasting workers' retirement behaviours and their reactions to changes in incentives in the transition phase.

Let us first consider methodological issues. We define W_θ as the average (per worker) discounted total wealth for generation born (all individuals i belonging to this generation; i.e. $i \in \theta$). W_θ may be decomposed into lifetime wealth from labour WR_θ and pensions WP_θ . As already said these are derived from the discounted flows of annual individual wages Y_j and pensions B_s of all the member of the generation θ , who retired. Hence, we consider only those workers who reach their chosen retirement age p . Accordingly, as in the real world, the individuals we consider under different retirement behavioural rules and social security policy scenarios are not necessarily the same.

Moreover, to refer to the variables that influences retirement decisions and to have comparable data, we use individual expected data, since all pensioners are assumed to reach the same age S (equal to 74 years for men and 81 for women). Obviously, these are different from the one we can cumulate when each individual dies, depending on the realised retirement periods.

Let us consider individual data: for individual i we define R_{ip} as the cumulated values of wages Y_j , capitalised in the contribution years a , before retirement p , determined by his choice.

¹⁶ 10 replications seem enough to ensure reliable results, reducing by 90% the variance of the mean values, introduced by the dynamic ageing approach. According to Wolf (2000) "in survey-data item-imputation applications of the multiple-imputation technique, a small number (say 3-6 replications) has been viewed as sufficient" (cf. p.24).

¹⁷ The linkage of the pension regimes with the age of individuals is to some extent arbitrary, e.g. some individual born in 1975 or 1976 will be under the defined contribution regime instead of the mixed one. However, this distinction is true on average and very useful for comparing wealth from wages and pensions of different generations and to attribute them to the influence of different regimes.

$$[1] \quad R_{ip} = \sum_{j=p-a}^{p-1} Y_{ij} (1+r)^{p-1-j}$$

On the other hand P_{ip} the wealth from pensions of individual i is the cumulated values of discounted pensions B_s , he expect to perceived up to age S .

$$[2] \quad P_{ip} = \sum_{s=p}^S B_{is} (1+r)^{p-s-1}$$

Considering the individual values for all the member of the generation θ we obtain the average gross wealth from wages WR_{θ} and pensions WP_{θ} of the workers who reach retirement. However, to have comparable values for all generations we chose the same reference year $T^{\circ} = 2004$ for all individuals, and discount data with the same real interest rate ($r = 2.5\%$). Moreover, we chose the final generation $\theta^{\circ} = 79$ as the reference one and accordingly we consider their per capita GDP as the standard of value. Hence, like in intergenerational accounting,¹⁸ we multiply each generations' average gross wealth with the relevant real rate of growth of per capita GDP, i.e. the rate of per capita GDP at the entry in the labour market, i.e. assumed to be when they are 25.

$$[3] \quad WR_{\theta} = E_{i \in \theta} R_{ip} (1+g)^{\theta^{\circ}-\theta} (1+r)^{-T+p}$$

$$[4] \quad WP_{\theta} = E_{i \in \theta} P_{ip} (1+g)^{\theta^{\circ}-\theta} (1+r)^{-T+p}$$

In formula [3] and [4], we take expectations since we consider 10 Monte Carlo replications, considering 90 years (covering the period from 1995 and 2085), hence the value reported are average values based on the outcomes of 10 replications, where different individuals and different possible career are considered.

Moreover, in what follows to obtain a more clear-cut picture, avoiding annual fluctuations we aggregate over generations considering periods of 5 years, i.e. $\Theta_v = \{\theta_v, \theta_{v+1}, \theta_{v+2}, \theta_{v+3}, \theta_{v+4}\}$.

$$[5] \quad WR_{\Theta} = E_{\theta \in \Theta} WR_{\theta}$$

$$[6] \quad WP_{\Theta} = E_{\theta \in \Theta} WP_{\theta}$$

¹⁸ This procedure is related to the analysis of dynamic fiscal policy and of the intergenerational inequality index. For a general reference, see Auerbach and Kotlikoff (1987), Kotlikoff (1993). For an application to the Italian case see Franco et al. (1994), Sartor (1997) and for the pensions system Boll, Raffelhuschen and Walliser (1994). Differently from intergenerational accounting, our comparison between present and future generations doesn't imply the constancy of relative profiles, the satisfaction of the intertemporal budget constraint, an equal general tax burden and a constancy of the relative discriminations among groups for future generations (i.e. ratio between net tax burdens). In fact, we have expressly considered that behaviours change (in accordance with the OV hypothesis) as fiscal and contributive rules are modified and that current deficit of the pensions system could not be postponed and paid by future generations.

Let us consider the function of total wealth and denoting with W_{IR}^M and W_{IR}^B (W_{FB}^M and W_{FB}^B) total wealth from wages and pensions, respectively under *M* and *B* (i.e. in the *modified* and in the *basic* scenarios) with *individual rationality* (*family bounded rationality*) retirement behaviour. Fig. 1 reports the average per capital total wealth of five generations of Italian citizens (males and females), during the average estimated life cycle (equal to 74 for males and 81 for females). In general, under *individual rationality* the estimates of total wealth show a sharp increase for the second generation and smaller ones for the third and fourth ones (born in the '60ies). The trend is instead decreasing for the last two generations. However, even if the ones born in the late '70ies have a higher total wealth than the first generation (born in the early '50ies). The impact of the reform proposed by the Italian Welfare Minister is to increase the total wealth of the first four generations (born in the '50ies and '60ies) in a limited and decreasing way.

Under *family bounded rationality* total wealth sharply increases for the second generation but remain stable for the third and fourth ones (born in the '60ies). Afterwards, total wealth shows a sharp decrease for the generations born in the '70ies, so that the last generation enjoys roughly the same total wealth than the first generation. In this case the impact of the Maroni's reform is larger and the increase in total wealth affects all the generations apart from the last one.

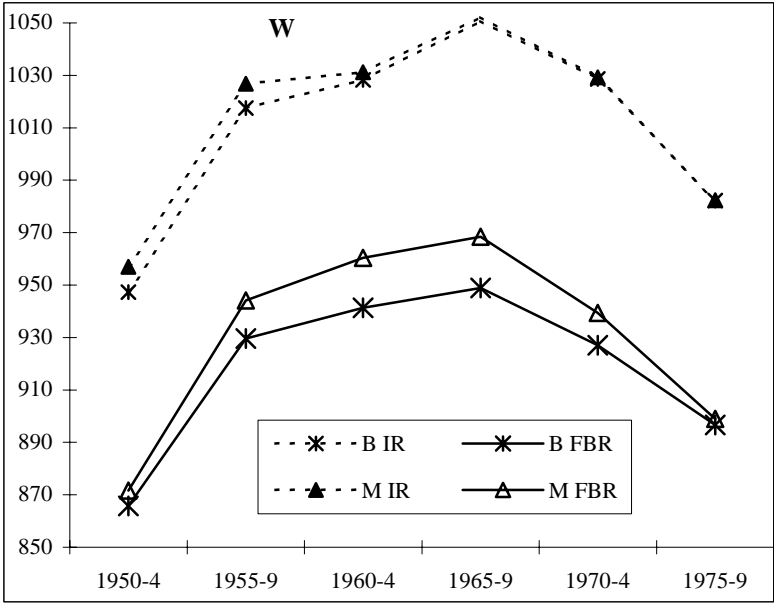


Fig. 1 Average total wealth (from wages and pensions) per worker (hp. B and M, thousand €)

In practice, the retirement behaviour due to *individual rationality* implies greater reactions from future generations to the changes in the pension regimes due to the past reforms and to the recent one, allowing them to increase total wealth. The difference in the trend of total wealth, brought by the two different retirement behaviour are increasing with time and hence seem due to the changes in incentives brought by the transition to the new social security regime.

Due to differences in the evolution of careers and pension rules we are interested in expected per worker wealth trends for the three employment sector (private and public employees and self-employed workers) and on the different impacts of the recent seniority pension reforms. To answer to these questions, in what follows, we will examine separately wealth from wages and pension, distinguished by employment sector.

In Fig. 2a and Fig. 2b consider the different source of wealth under the *modified* and the *basic* scenarios, with *individual* and *family bounded* rationality, representing the average wealth from wages and pension of five generations of workers. In this way we consider the trend of wealth from wages and pension WR_{IR}^M and WR_{IR}^B (WR_{FB}^M and WR_{FB}^B), respectively under *M* and *B* (i.e. in the *modified* and in the *basic* scenarios) with *individual* (*family bounded*) *rationality* retirement behaviour.

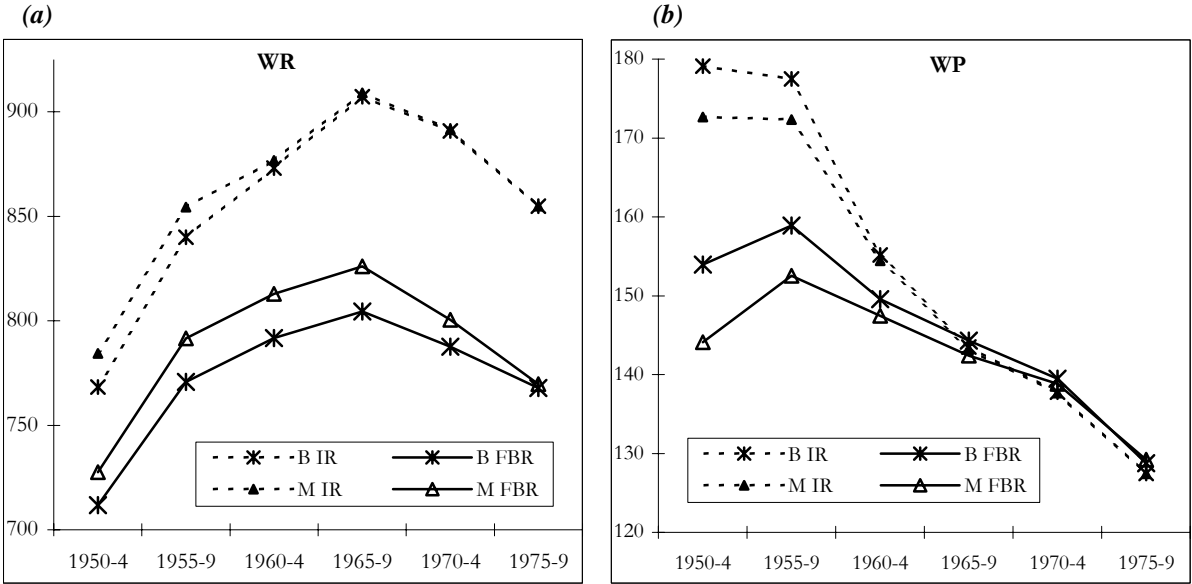


Fig. 2 Wealth from wages WR and pensions WP per worker (hp.B and M, thousand €)

The estimates of wealth from wages show a sharp increase for the second generation and smaller ones for the third and fourth ones (born in the ‘60ies). The trend is instead slowly decreasing for the last two generations. Hence, these generations (born in the ‘70ies) have a higher total wealth than the first generation (born in the early ‘50ies). With *individual rationality*, workers enjoy higher wealth from wages and the impact of the seniority pension reform proposed is to increase the total wealth of the first four generations (born in the ‘50ies and ‘60ies) in a limited and decreasing way, due to an increased retirement age. Under *family bounded rationality*, the impact of the latest reform is larger and the increase in total wealth affects all the generations, increasing the length of their working period, apart from the last one. On the other hand, apart from the second generation, wealth from pension show a decreasing trend (-28.5% under IR and -15.1% under FB); smaller in scenario M (-26% under IR and -9%

under FB).

3. Sectoral differences in the lifetime wealth from wages and pensions

Let us first consider total wealth under the *modified* and the *basic* scenarios, with *individual* (IR) and *family bounded* (FBR) rationality. Fig. 3a and Fig. 3b reports the average wealth of five generations of workers (D, private dependent workers; SE, self-employed; P, public employees) entitled to pension treatment, under the two behavioural rules. We denote with DW_{IR}^M and DW_{IR}^B (DW_{FB}^M and DW_{FB}^B) total wealth from wages and pensions of private dependent workers, under IR (or FB) with policy M and B.

The trend shown by total wealth, distinguished by type of worker, are very similar under *individual* and *family bounded* rationality, apart from a downward shift under the second behaviour. While the wealth of private employees has an increasing trend since early '70ies, the wealth of self-employed has a steeper path, reaching its maximum in the late '60ies. Finally, the wealth of public dependent workers shows a decreasing trend since early '60ies, but it displays a relevant reduction in the '70ies, when it is lower than the wealth of private employees.

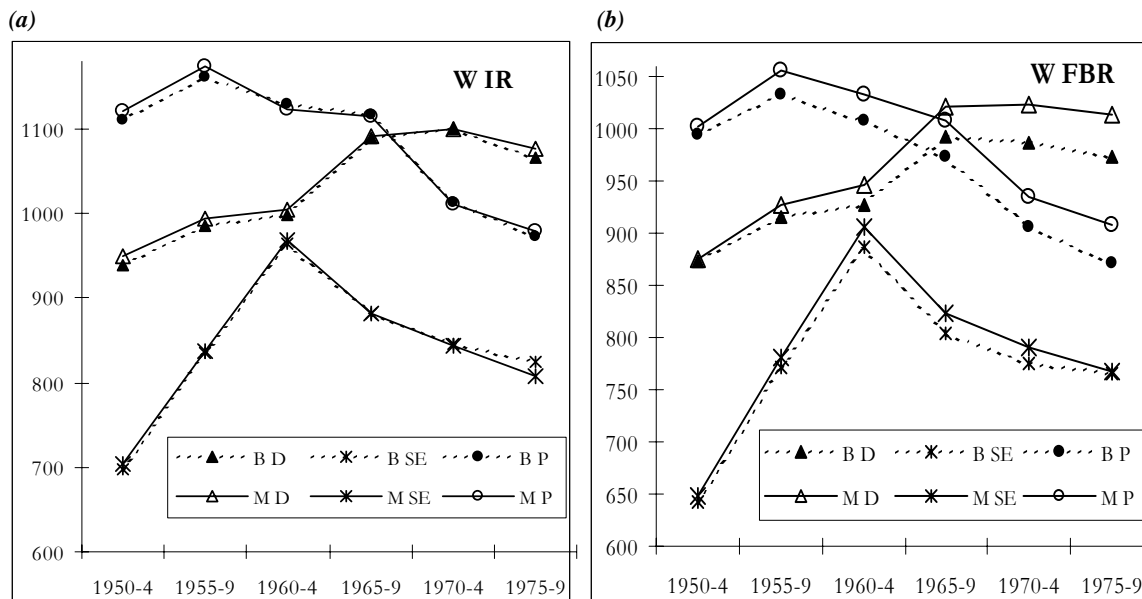


Fig. 3 Average total wealth per type of worker (hp. B and M, thousand €)

Policy M produces different impacts depending on the behavioural rule adopted by individuals. Under *individual* rationality the seniority pension reform has no relevant impact on self-employed' total wealth, at the most showing a slight effects on the first (and latest) generations. The manoeuvre produces an increase, even if very small, in total wealth of public and private employees. In particular, the rise concerns the oldest and youngest generations, highlighting an effective role of the policy in inducing workers to postpone retirement. As expected, intermediate generations do not show any relevant change in their retirement behaviour, since

the reform doesn't really modify the normative framework within which they operate. In practice, the increase in the legal age for seniority pensions simply ratifies a behaviour already followed by individually rational agents, due to the changing incentives along the reform path.¹⁹ Also latest generations tend to postpone retirement, anticipating in this way the provision of the new reform. However, in this case, the set of possible choices has been considerably reduced, especially for male-workers, forcing them to retire not before an age of 65. In case of *individual* rationality this provision only determines a very small forward shift in retirement age.²⁰ Conversely the introduction of the reform, when *family bounded* rationality is assumed, produce a significant and increasing effect, rising total wealth more than 2% on average. In fact, as far as private and public employees are concerned, the younger generations seem to be the most affected (the employees postpone retirement by 3 years on average, while self-employed workers by 1.5 years), probably because the manoeuvre raises considerably the minimum age requisites to enter the system for those under the defined contribution regime. A less marked profile is shown by the self-employed, where the effect dies out so that the youngest generation are not significantly affected. We may wonder how much the expected wealth trends are influenced by the different sources of income and reactions to policy measure. In particular, we are interested in the impact of the changes in the pension regimes (and whether it has favoured any type of workers), as well as in the reasons of the strange impact of the recent reforms of seniority pensions that shows a tendency to increase wealth (instead of decreasing it). Does the increase in wealth indicate a higher well-being or the opposite, being just an obliged effect due to the decrease of pension benefits that induces workers to retire later? In what follows, we try to answer these questions, by examining separately wealth from wages and pension.

Let us now consider the trends of wealth from wages and pension under the two scenarios, with *individual (IR)* and *family bounded (FBR)* rationality. Fig. 5a and Fig. 5b depict the average wealth from wages and pension of five generations of workers entitled to pension treatment, under the two behavioural rules. We denote with DWR_{IR}^M and DWR_{IR}^B (DWR_{FB}^M and DWR_{FB}^B) wealth from wages of private dependent workers, under *IR* (or *FB*) with policy *M* and *B*.

The trend displayed by wealth from wages (in Fig. 5a and b) is similar to the trend shown by total wealth in Fig. 3a and Fig. 3b. Policy *M* (seniority pension reform) produces no relevant

¹⁹ In case of *individual* rationality, previous works have determined an age of at least 60 as the average retirement age that characterizes the generations under the mixed pension regime. For further details, see Vagliasindi et al. (2004b).

²⁰ Under the defined contribution regime retirement age influences the return of the social security contributions, through a parameter called "transformation coefficient". In fact, the pension annuity is determined multiplying contributions by this coefficient, which rises with retirement age.

impact under *individual* rationality on wealth from wages and a significant and increasing effect under *family bounded* rationality with private and public dependent workers.

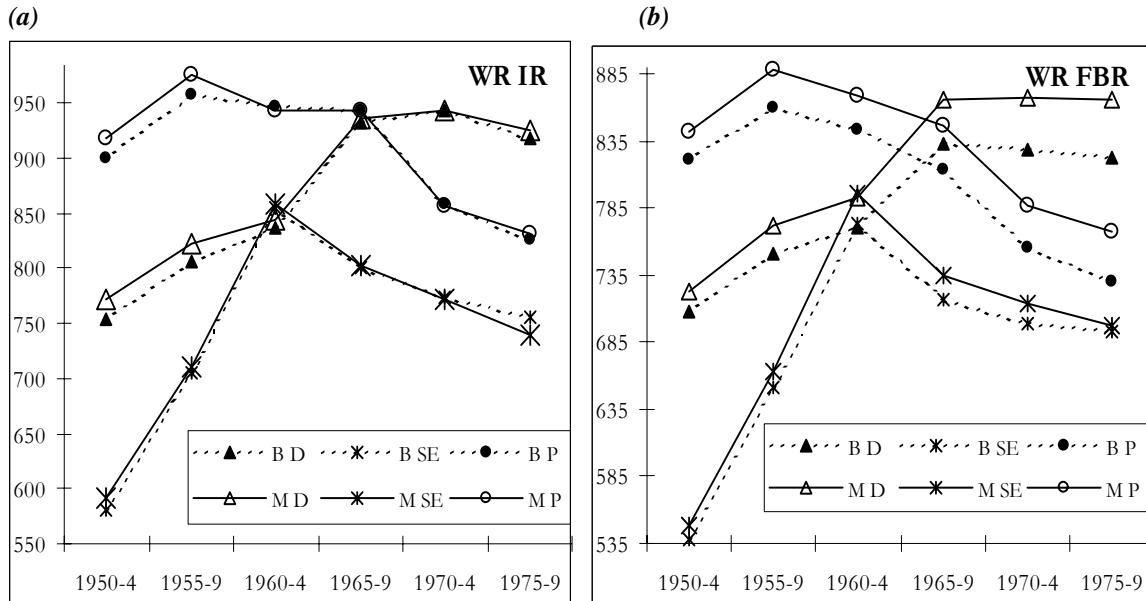


Fig. 4 Wealth from wages WR per type of worker (hp.B and M, thousand €)

The trend shown by wealth from wages are very similar under *individual* and *family bounded* rationality, apart from a downward shift under the second behaviour. As before, private dependent workers' wealth (DWR) increases since early '70ies, while the wealth of self-employed (SWR) reaches it maximum (and the former) in the late '60ies and public employees' wealth (PWR) decreases since early '60ies.

As in the case of total wealth, policy *M* produces no relevant impacts on wealth from wages under *individual* rationality apart from the first (and latest) generations, inducing specially public and private employees to postpone retirement. The change in incentives are greater under *family bounded* rationality. The policy produces a significant and increasing effect, as far as private and public employees are concerned, affecting more younger generations. A minor impact is shown on self-employed, where the effect dies out so that the youngest generation are not significantly affected.

Finally, in Fig. 5a and Fig. 5b we consider the trend of wealth from pension WP_{IR}^M and WP_{IR}^B (FWR_{FB}^M and FWR_{FB}^B), respectively under *individual* (*family bounded*) rationality and with policy *M* and *B* for self-employed, private and public employees.

Apart for the first generation of self-employed (and public employees under *FBR*), wealth from pension shows a decreasing trend, sharper in scenario *B* and under *IR*. As before, policy *M* produces a minor impact under *individual* rationality on wealth from pensions apart from the first generations of public and private employees due to retirement postponement. The impacts

are greater and decreasing under *family bounded* rationality, affecting older generations. Self-employed are less affected than other types of workers.

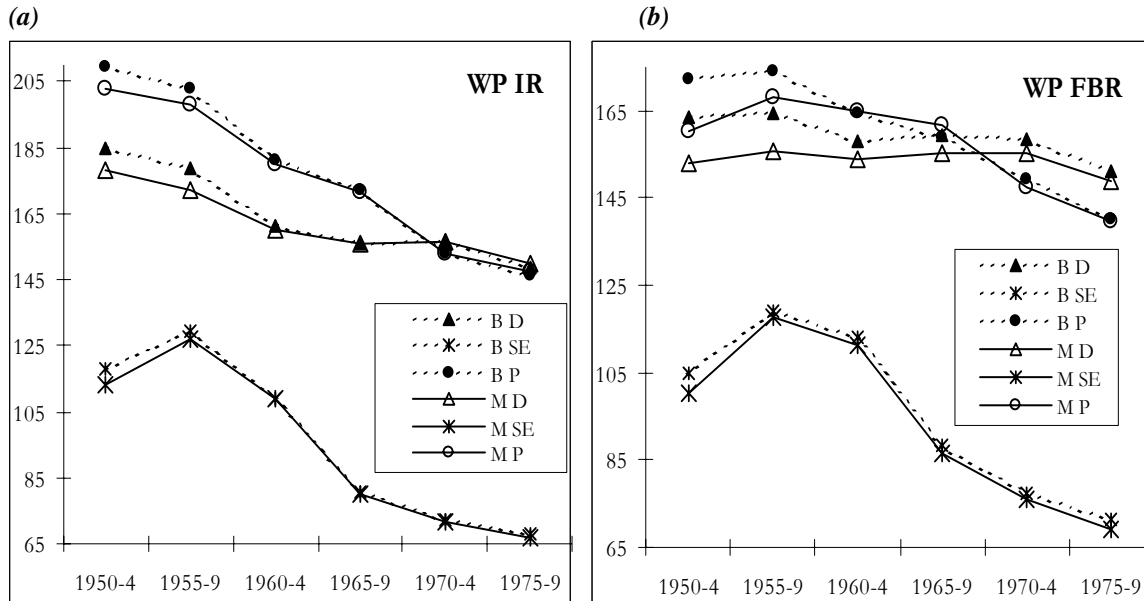


Fig. 5 Wealth from pensions WP per type of worker (hp.B and M, thousand €)

Hence, considering wealth from wages and pension, we see how the differences in the trends shown by the two retirement behaviours are increasing with time and are emphasized by the transition to the new defined contribution social security regime.

Considering the impact of the reform, we can conclude that, in general, because of higher retirement ages, the increase in labour wealth overcompensates for the decrease in wealth from pension, producing on the whole an increase in total wealth.

Our analysis of the sectoral differences in the labour market and in pension schemes can be extended using as indexes the ratio between wealth from wages or from pensions, respectively IL and IP , of private and public employees and self-employed workers:

$$[7] \quad IL_{DS} = WR_D / WR_S$$

$$[8] \quad IP_{DS} = WP_D / WP_S$$

Specifically, to obtain a smoother and clear-cut picture, we consider in this case a moving average over a period of 3 years.

Through these indexes (in Fig. 6a, Fig. 6b and Fig. 6c) we can derive a measure of the relative advantage of each type of workers in terms of wealth from wages and pension and how the structure of the pension system influences its evolution.

In the following for brevity sake, we limit ourselves to the analysis of the dynamics produced by the current reformed pension system.

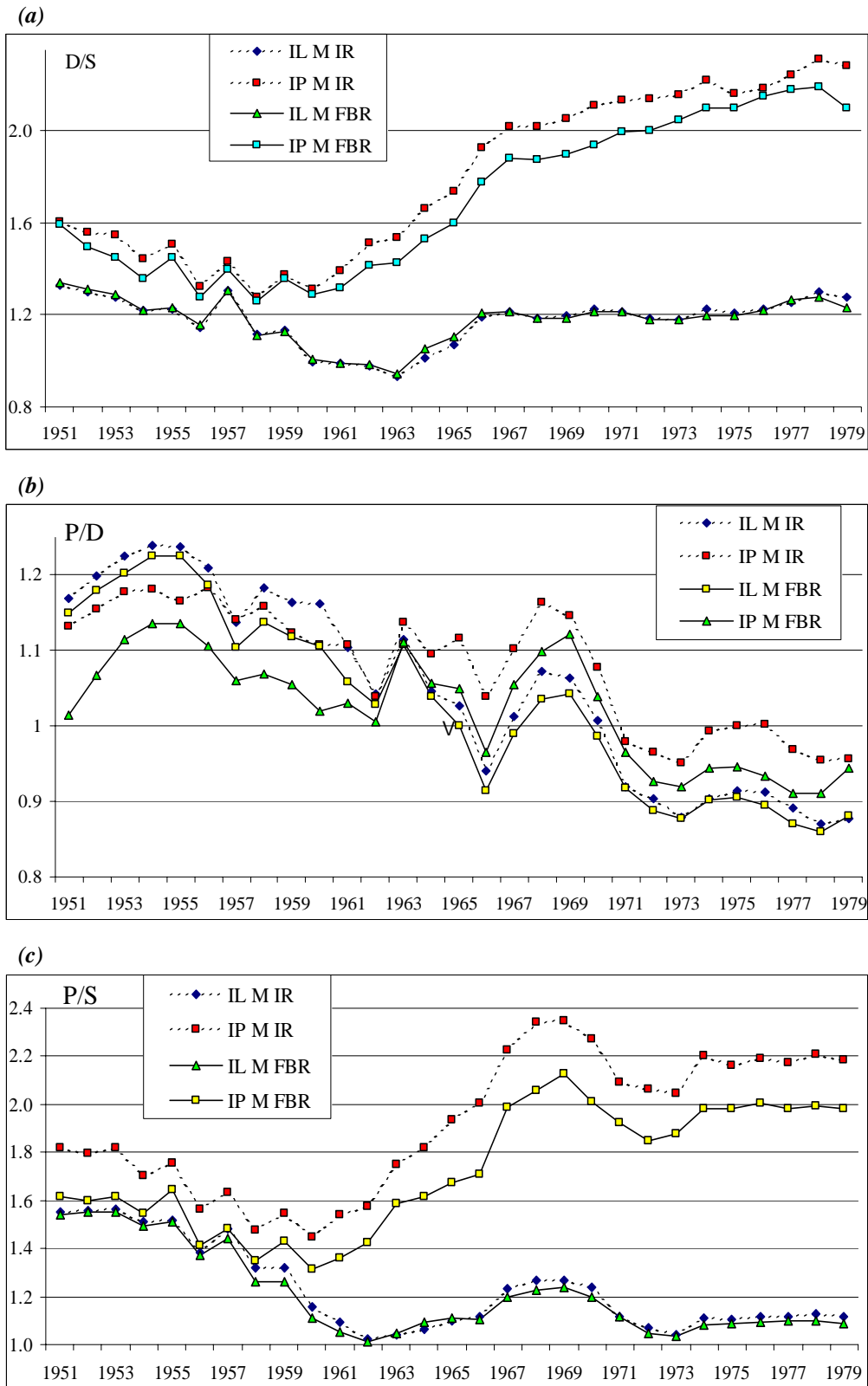


Fig. 6 IR and IP ratios under *individual and family bounded rationality* (hp. M)

Independently from the behavioural rule adopted (*individual rationality or family bounded rationality*), the results show for the older generations a clear advantage of the public employees over the private dependent workers in terms of wealth from wages, being IL_{PD} greater than one. However, this benefit displays a steadily decreasing trend that at the very end changes the

direction of the advantage. Precisely for the latest generations (starting from 1971) our index IL_{PD} becomes lower than 1, indicating that the previous gap has been completely absorbed and even reversed. IP_{PD} , our measure for pension wealth disparity, follows a very similar trend even if less steeper²¹. This difference in the decreasing coefficient seem to suggest that public employees gain a relative privilege in terms of pension treatments starting from the early '60ies.

Confronting public employees with self-employed workers Fig. 6c shows a decrease of the relative advantage in terms of wealth from wages, being IL_{PD} decreasing, while there is an increasing trend in terms of pension benefits, being IP_{PD} rising from the early '60ies (after a first initial reduction) tending towards one. Hence, public employees seems to gain a relative privilege with respect to self-employed in terms of pension treatments, starting from the early '60ies being the two curves (IR_{PS} and IP_{PS}) divergent. We reach similar results under *family bounded rationality*, even if the privilege is reduced, since also in this case IR_{PD} and IP_{PD} start to diverge from the early '60ies after having followed similar trends.

On the other hand, under *individual rationality*, private dependent workers maintain their relative advantage with respect to self-employed till the early '60ies with strong gains afterwards being the two curves divergent; IR_{DS} increasing and IP_{DS} decreasing. Under *family bounded rationality*, the gain is reduced, but also in this case IR_{PD} and IP_{PD} diverges from the early '60ies after having followed similar trends.

Whether or not this represents a privilege of dependent workers with respect to self-employed depends on the different social contributions paid by dependent workers (higher) and self-employed (lower). In any case there is an increasing relative advantage of dependent workers as self-employed social contributions are increasing.

Since social contributions rates tend to 33% for dependent workers and 20% for self-employed, the ratio between the total amount of contribution paid by the two categories should tend towards 1.7. Our results show average values around 1.9 both under *IR* and *FBR*. IP_{DS} values are lower for generations born before 1965 and higher onwards. Hence, oldest generations of

²¹ We have estimate, using OLS, the presence of a statistically significant (at 95% confidence level) negative trend both for IL_{PD} and IP_{PD} . The estimated coefficients for the trend (of the 29 observations), under *IR* and under *FBR*, are shown below:

	IL_{PD} <i>IR</i>	IP_{PD} <i>IR</i>	IL_{PD} <i>FBR</i>	IP_{PD} <i>FBR</i>
Constant	1.26 (0.0162)	1.20 (0.0164)	1.23 (0.0155)	1.12 (0.0189)
Trend	-0.014 (0.00092)	-0.008 (0.00095)	-0.013 (0.00091)	-0.006 (0.0011)
R^2	0.89	0.71	0.88	0.54

St.d in parenthesis.

self-employed seem to be privileged with respect to dependent workers; a privilege removed with the introduction of the define contribution regime. The very same considerations apply also to public employees and self-employed.

4. The concentration of annual income distribution from human capital.

In the previous section, we considered the evolution of expected gross wealth from labour and pension incomes, looking at intergenerational differences and sectoral inequalities among average workers belonging to the same generations. This analysis has provided interesting information about the average life-time incomes from labour and pension, for a hypothetical population of workers who retired and lived their expected period. To further enhance our analysis we may investigate how the actual incomes from labour and pension are distributed among different generations and types of workers during their actual life in each different period (e.g. considering one year out of five from 2000 to 2055). Dynamic microsimulation allows us to simulate all the future labour and pension incomes.

In particular, we can examine the evolution of the income distribution over time, computing the Gini index, and of poverty considering the Sen index. In practice, we follow a *cross-sectional* approach and determine income concentration and the trend of poverty each five years considering the equivalent family income of the individuals older than 25 or 45, adopting the ISTAT equivalence scale. In this way we gain an instantaneous picture of the income inequality present in the various periods among individuals.

The incidence of each family is weighted by the number of all individual members at least 25 or 45 years old. Hence, we consider not only the impact of family on each worker's individual income but take into account also people who actually may not retire or even enter the labour force. Obviously, this type of analysis gives us only an approximate indication of how lifetime incomes are distributed. In fact, the distribution period by period can be volatile and assume peculiar configurations that do not represent the real situation of the individuals.²²

One of the features of the income distribution analysis that deserves our attention is poverty. To investigate the relative and absolute poverty among individual at least 25 or 45 years old, we need to assume a poverty thresholds. In particular, we adopt the following thresholds (*TR* and *TA*) for relative and absolute poverty (based on families with 2 components in 1999 prices and

²² In this respect, one should evaluate inequality and poverty over life time incomes, but this poses many problems since we can only record the future value of equivalent family incomes from labour and pension collected by an individual during her life. Moreover, considering actual values instead of expected ones, we may have two agents perfectly identical apart from the length of life, who hence enjoy different amount of life-time income.

scaled using the ISTAT equivalence scale):

[9] $TR_{99} = \text{€}7,732$ indexed to incomes;

[10] $TA_{99} = \text{€}2,353$ indexed to prices.

Table 1 Quota of the examined generations present in the population in each period

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055
1955-1959	6.5%	6.4%	6.3%	6.2%	6.0%	5.6%	5.0%	4.1%	2.9%	1.6%	0.6%	0.1%
1960-1964	6.4%	6.3%	6.3%	6.3%	6.2%	6.0%	5.7%	5.2%	4.3%	3.1%	1.7%	0.7%
1965-1969	7.0%	7.0%	7.1%	7.1%	7.1%	7.1%	6.9%	6.6%	6.0%	5.0%	3.7%	2.2%
1970-1974	7.3%	7.3%	7.3%	7.5%	7.6%	7.6%	7.5%	7.4%	7.0%	6.5%	5.5%	4.1%
1975-1979	7.9%	7.9%	8.0%	8.1%	8.3%	8.5%	8.5%	8.5%	8.4%	8.1%	7.5%	6.4%

Table 2 Quota of the examined generations present in the population of pensioners in each period

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055
B FBR												
1950-1954	3.5%	4.7%	11.6%	17.4%	20.3%	18.5%	15.6%	12.7%	9.1%	5.2%	2.1%	0.6%
1955-1959	3.1%	3.1%	3.6%	11.1%	16.8%	19.4%	17.4%	15.5%	12.8%	9.2%	5.5%	2.3%
1960-1964	3.6%	3.6%	3.6%	3.8%	11.0%	18.3%	20.8%	19.5%	17.4%	14.4%	11.0%	6.8%
1965-1969	3.8%	3.8%	3.9%	3.8%	3.8%	11.8%	18.8%	21.5%	20.1%	18.1%	15.5%	11.9%
1970-1974	3.8%	3.9%	3.9%	3.9%	3.8%	3.5%	12.0%	19.5%	23.7%	22.5%	20.8%	18.0%
1975-1979	3.1%	3.1%	3.2%	3.2%	3.2%	3.0%	2.7%	7.3%	15.7%	20.4%	19.8%	18.5%
B IR												
1950-1954	3.7%	4.4%	10.8%	17.4%	22.9%	22.6%	19.9%	15.9%	11.0%	6.1%	2.5%	0.7%
1955-1959	3.6%	3.6%	3.7%	10.2%	15.5%	23.5%	22.2%	19.4%	15.3%	10.8%	6.4%	2.7%
1960-1964	4.3%	4.4%	4.4%	4.3%	7.7%	14.2%	26.0%	24.4%	20.9%	16.9%	12.7%	7.9%
1965-1969	4.8%	5.0%	5.1%	4.9%	4.8%	6.0%	12.7%	26.3%	24.2%	21.2%	18.0%	13.8%
1970-1974	5.1%	5.2%	5.3%	5.4%	5.5%	5.3%	5.4%	10.8%	27.7%	26.5%	24.2%	20.9%
1975-1979	4.1%	4.2%	4.3%	4.3%	4.7%	4.7%	4.2%	3.7%	7.2%	23.3%	23.0%	21.6%
M FBR												
1950-1954	3.7%	4.9%	9.0%	18.0%	21.1%	19.6%	16.7%	13.5%	9.7%	5.5%	2.2%	0.6%
1955-1959	3.3%	3.3%	3.8%	8.0%	17.2%	20.6%	18.6%	16.5%	13.6%	9.8%	5.8%	2.5%
1960-1964	3.8%	3.8%	3.9%	4.0%	8.3%	18.8%	22.3%	20.7%	18.5%	15.3%	11.6%	7.3%
1965-1969	4.1%	4.1%	4.3%	4.2%	4.1%	7.6%	18.6%	22.8%	21.4%	19.2%	16.4%	12.7%
1970-1974	4.2%	4.3%	4.5%	4.5%	4.3%	4.1%	8.3%	18.3%	25.2%	23.9%	22.0%	19.1%
1975-1979	3.5%	3.5%	3.7%	3.7%	3.7%	3.6%	3.2%	5.2%	13.8%	21.7%	20.9%	19.7%
M IR												
1950-1954	3.9%	4.6%	8.0%	17.9%	23.1%	22.8%	20.0%	15.9%	11.0%	6.1%	2.4%	0.7%
1955-1959	3.8%	3.7%	3.9%	7.3%	15.5%	23.6%	22.3%	19.4%	15.3%	10.8%	6.4%	2.7%
1960-1964	4.4%	4.5%	4.6%	4.5%	7.1%	14.2%	26.1%	24.5%	20.9%	16.9%	12.7%	7.9%
1965-1969	4.9%	5.0%	5.3%	5.1%	4.9%	5.3%	12.6%	26.4%	24.2%	21.2%	17.9%	13.8%
1970-1974	5.1%	5.2%	5.5%	5.6%	5.6%	5.3%	5.0%	10.8%	27.7%	26.5%	24.1%	20.9%
1975-1979	4.1%	4.2%	4.5%	4.5%	4.7%	4.7%	4.3%	3.7%	7.1%	23.3%	23.0%	21.6%

The values include old age, seniority and survivor pensioners

In what follows we analyse the simulated distribution of equivalent family incomes among people over 25 and 45, based on the values of 10 Monte Carlo replications, considering 60 years (covering the period from 1995 and 2055).²³ This allows us to consider the wealth from wages

²³ As said before: a) between 2000 and 2020 the defined benefit system prevails, b) subsequently the mixed regime takes over (coexisting with pensions already liquidated with the previous one), c) finally, after 2035 only the defined contribution scheme survives (even if there can still be pensioners retired

and pensions of elderly (people over 45) of the generations born in the '50, who have 45 years in 1995) and who will die before 2055.

This part of the analysis, using the *cross-sectional* approach, can be linked to the previous one that uses the *life time* incomes, considering the quota of the 6 aggregated generation (over periods of 5 years).

Table 1 and Table 2 provide the quota of each generation in the population of over 25 and over 45 in each examined period.

Using the Gini index, we can gain some useful information about the actual distribution of annual incomes from labour and pension among different generations under the two different assumed retirement behaviours (*individual* and *family bounded* rationality) in the *basic* and the *modified* scenario. With the *cross-sectional* approach (in Fig. 7 and Fig. 8) we consider the trend of income concentration of equivalent family income each five years from 2000 to 2055, looking at the mean values of the Gini index obtained from 10 Monte Carlo replications.

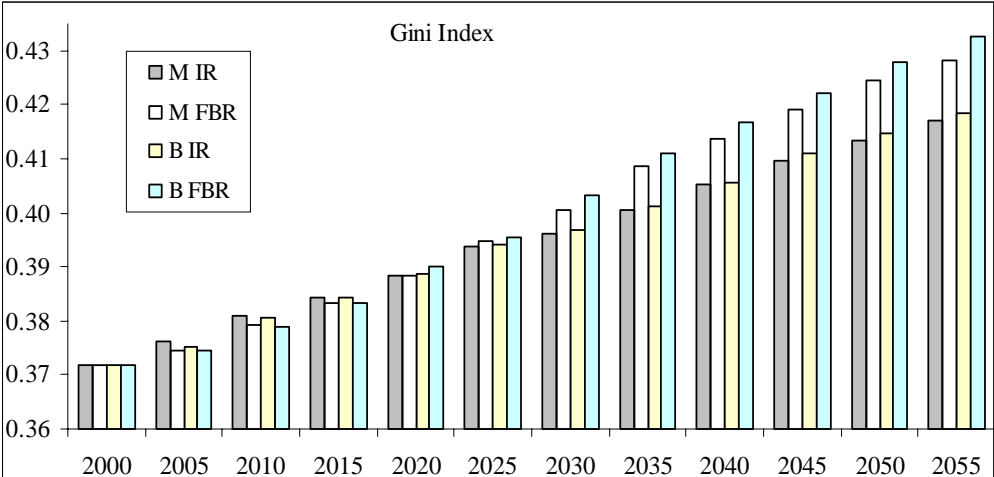


Fig. 7 Trend of Gini index of family income over 25

In particular, Fig. 7 allows us to examine the evolution of the income distribution over time among people over 25 to gain a general idea of inequality, while in Fig. 8 we restrict our analysis to inequality only among people over 45.

The Gini index shows how the inequality in the distribution of incomes increases in the whole period. This result holds under *individual* and *family bounded* rationality, in the *basic* and *modified* scenarios. *Family bounded* rationality produces greater income concentration from 2030. The Maroni reform raises inequality among elderly from 2005 till 2015, reducing concentration from 2025, due to the rise in average pensions of workers that have been obliged or incentivated to postpone retirement.

under the “mixed” and defined benefit regimes).

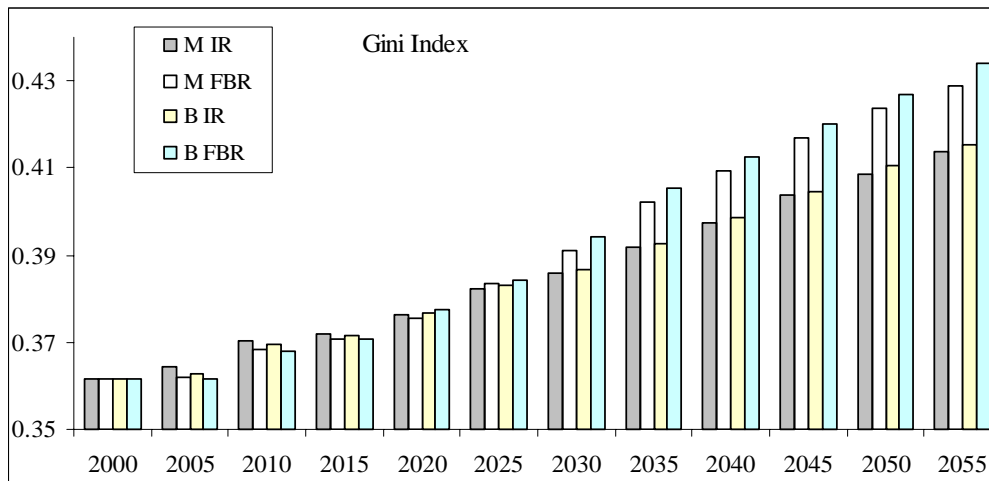


Fig. 8 Trend of Gini index of family income over 45

In Fig. 9 we restrict our analysis to inequality only among pensioners taking into account the direct impact of the changes in pension regimes.

The picture is different restricting the analysis only to inequality among elderly pensioners. Inequality is lower among pensioners than among the whole populations (over 25 or 45), since we do not consider workers and unemployed.

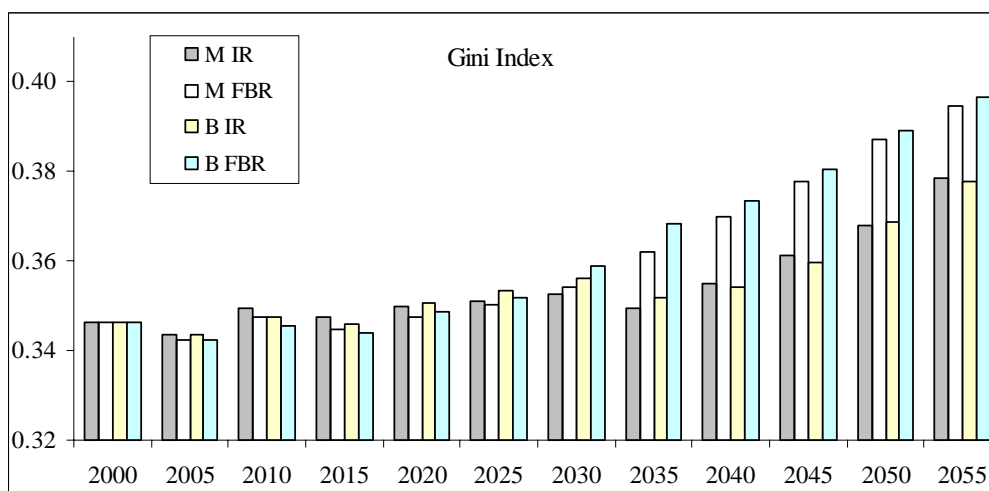


Fig. 9 Trend of Gini index of family income of pensioners

In this case we have initially a decreasing trend due to the increase of social pensions among poor elderly, so that the increasing trend seems to start from 2015. Moreover, the differences due to the different behaviours are more clear-cut. Under *individual* rationality we have a reduced level of inequality, while under *family bounded* rationality we observe substantially higher values and an exponential growth (from 2030), due also to the loss of female workers pension benefits who retire earlier..

The Maroni reform raises inequality from 2008 till 2015 while the reverse is true especially under *family bounded rationality*. Focusing on the years where retirement under defined

contribution regime start to prevail (2035-2040), the new manoeuvre reduces the problem of females' early retirement, forcing all workers to retire later, thus rising pension annuities. The economic effect of the Maroni reform vanish in 2055.

5. Poverty trends in the distribution of income from human capital

Once analysed inequality trend, we are interested in the evolution of the relative and absolute poverty, following as before the *cross-sectional* approach. Hereafter, we analyse these trends using the Sen index modified by Shorrocks (1995), which summarizes several dimensions of poverty (diffusion, intensity and concentration) and hence represents an useful indicator. In particular, we compare the evolution of the relative and absolute poverty.

In particular, Fig. 10 depicts the absolute poverty trends of equivalent family incomes of over 25 (on the left) and 45 (on the right) over the period 2000-2055, looking both at wage and pension incomes. The Sen index shows quite similar trends but different levels and slopes, depending on the unit of analysis, lower and with a slighter decrease if only over '45 are considered. This may depend on the elimination of the lower initial wages and the increase of social pension aimed at supporting low incomes. Poverty among pensioners' families is quite higher and the decreasing trend less steep under *family bounded* rationality, notably from 2030.

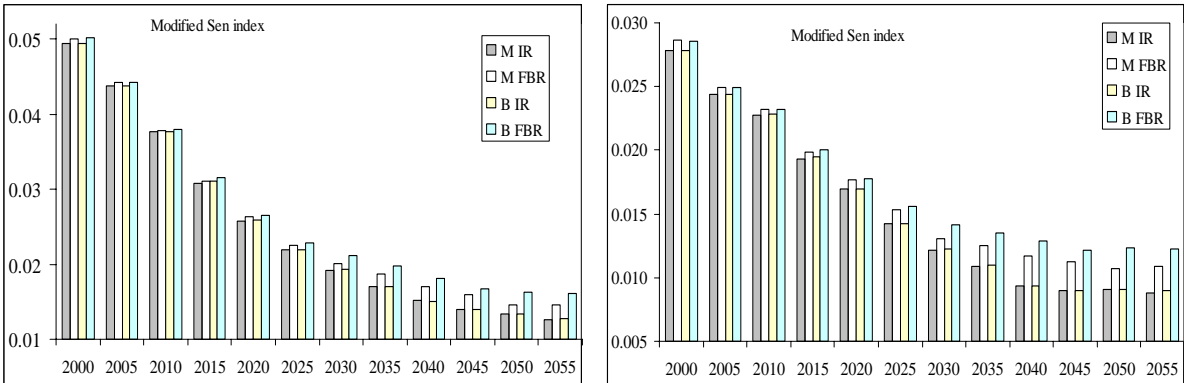


Fig. 10 Modified Sen index of absolute poverty of over 25 and 45

The recent seniority pension reform (scenario *M*) seems to produce on the whole a positive effect on poverty, even if small and temporary under *individual* rationality. This seems to depend on the rise of incomes due to retirement postponements, so that workers continue first to earn higher wages and then enjoy higher pensions.

Fig. 11 depicts the *relative* poverty trends of equivalent family incomes of over 25 (on the left) and over 45 (on the right) from 2000 to 2055, which show a very dissimilar patterns with respect to absolute poverty. However, also in this case we find higher levels (right from the start) considering the population over 25.

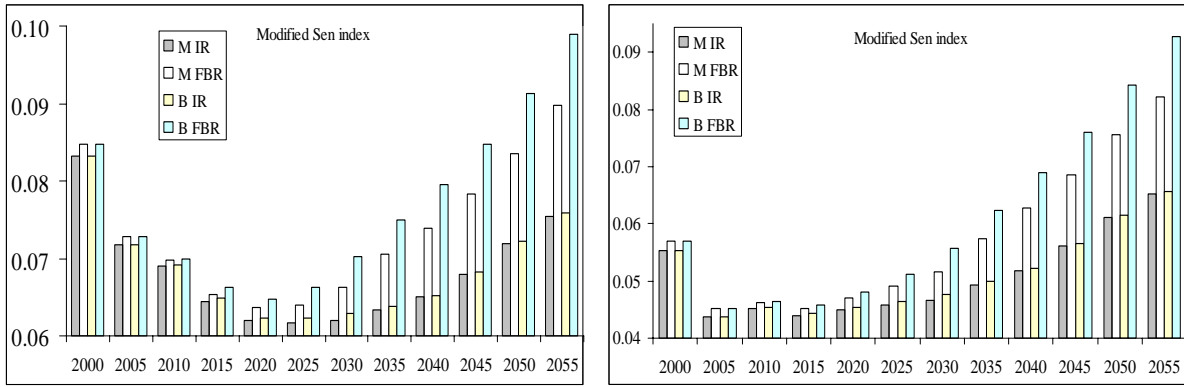


Fig. 11 Modified Sen index of relative poverty of over 25 and 45

Overall, the Sen indices reveal clear increasing trends (after an initial sharp decrease), stronger under *family bounded* rationality. The substantial fall in poverty, emerging in 2005 can be attributed to the introduction of the income support action in 2002. However, at the present, this manoeuvre provide only a temporary rise of social allowances and its effect vanishes in the medium run. The two profiles (over 25 or 45) are a bit different, in the first case, indeed, before the rise from 2025 we have an initial decreasing phase.

The increase of social pension aimed at supporting low incomes, may have an impact on the initial decrease of poverty while the generalization of the defined contribution regime after 2035, seems to have a negative impact. The recent seniority pension reform (scenario *M*) seems to produce a strong positive effect on poverty under *family bounded* behaviour, inducing especially female workers to retire later, instead of following their retired husband.

This effect seems due to the lower level of poverty diffusion determined by individual rationality. Since those close to the threshold succeed in escaping from poverty, its intensity and concentration substantially rise and this increases the value of the Sen index.

Fig. 12 and Fig. 14 portray the absolute and relative poverty diffusion trends, considering, from 2000 to 2055, equivalent family wage and pension incomes of over 25 and 45.

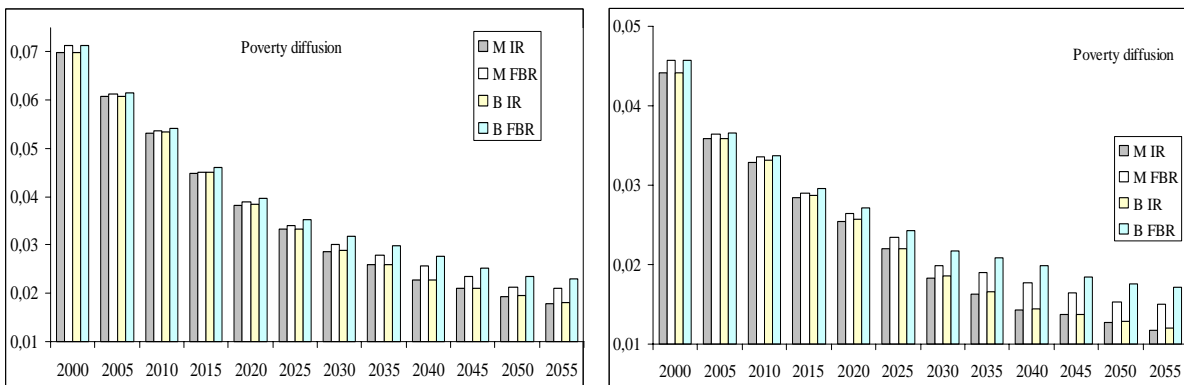


Fig. 12 Poverty diffusion of absolute poverty of over 25 and 45

With absolute poverty, (Fig. 12) diffusion trends are decreasing like the Sen index (in Fig. 10), but higher and linear. As Fig. 13 shows this is due to the rising concentration trend among poor, also associated to an increase in the intensity of poverty. With over 45 levels and slopes of poverty diffusion trends are reduced.

The decreasing trend is lighter under *family bounded* rationality. In this framework, diffusion seems to mainly determine the profile of the Sen index. In fact, the climbing shapes inequalities among poor and poverty intensity do not overwhelm the fall in poverty diffusion, leading to positive conclusions in terms of poverty reduction.

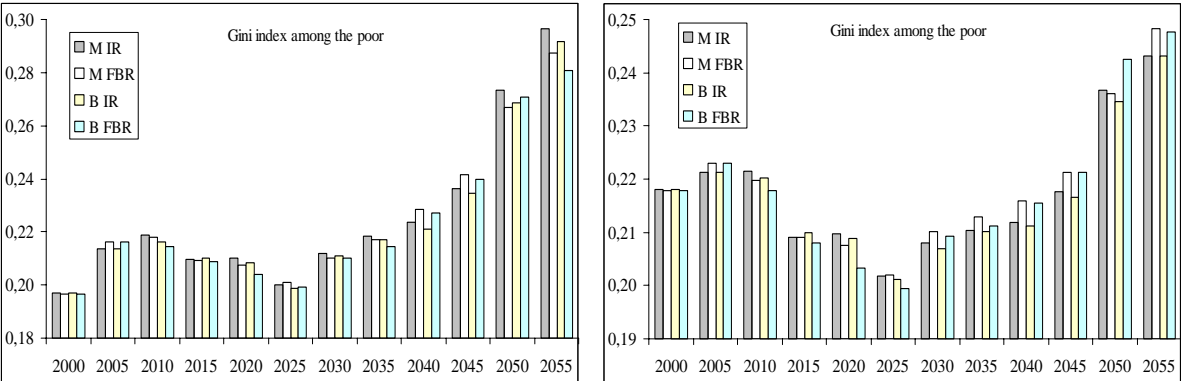


Fig. 13 Gini among absolute poor (over 25 and 45)

Looking at the concentration of wage and pension incomes among absolute poor we find similar patterns in Fig. 13a and b (among over 25 on the left and 45 on the right). After an initial decrease (following the increase of social pension) there is a clear increasing trends from 2025. The policy supporting low incomes, may have in fact initially raised poverty intensity while the transition towards the defined contribution regime causes the final negative impact.

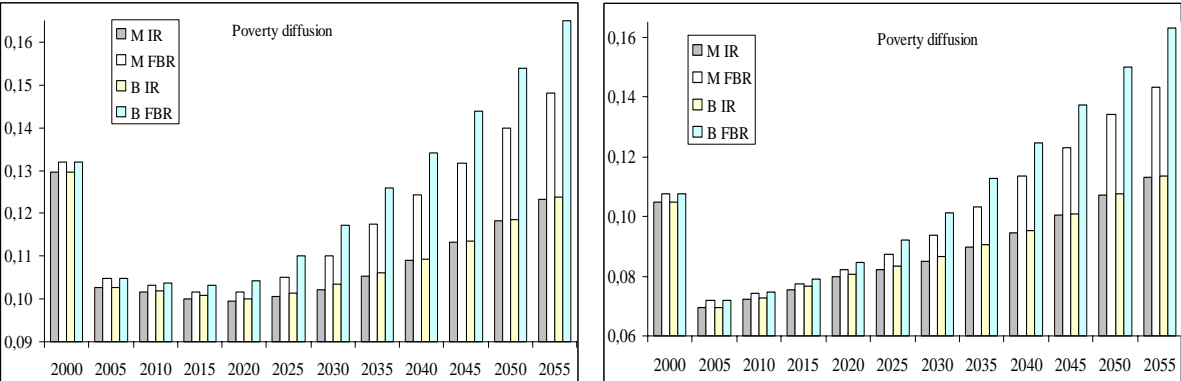


Fig. 14 Poverty diffusion of relative poverty of over 25 and 45

Conversely, with relative poverty, (Fig. 14) diffusion trends are increasing like the Sen index (in Fig. 11), which however shows lower levels and slopes, due to the falling trend of poverty intensity and of concentration among poor as shown in Fig. 15. For over 45, levels and slopes of

poverty diffusion trends are even more reduced. The increase is sharper under *FBR*.

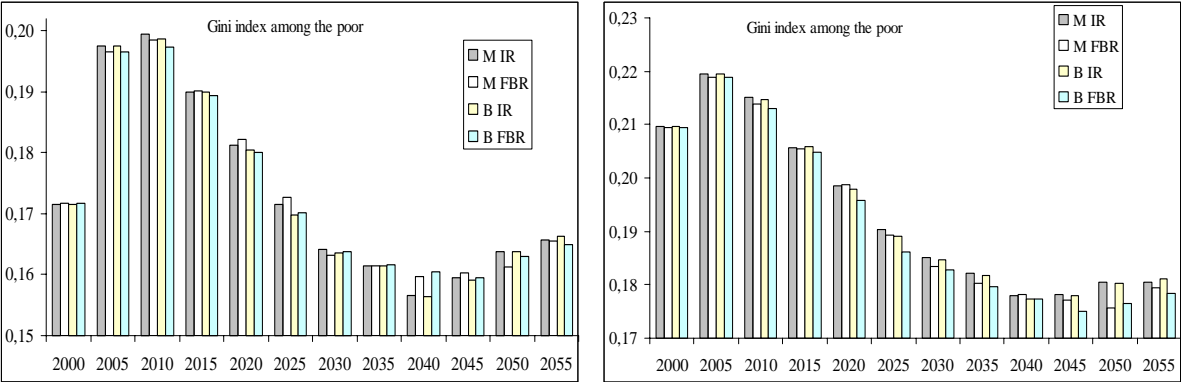


Fig. 15 Gini among relative poor (over 25 and 45)

The effect of the seniority pension reform, in the *wealth* analysis, is positive on wages but negative on pension incomes, indicating the incentive to postpone retirement. Hence we may expect that the reduction of absolute poverty is slighter and the rise of relative poverty sharper if we consider only pension incomes.

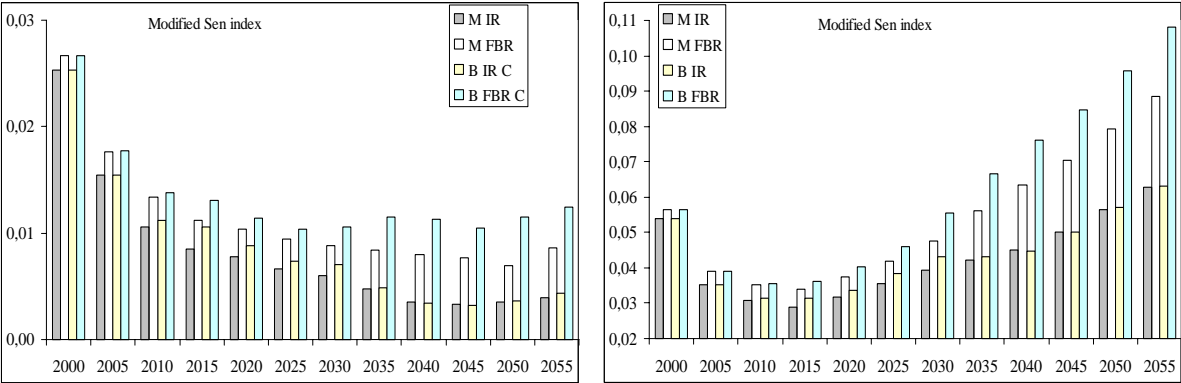


Fig. 16 Modified Sen index of absolute and relative poverty of pensioners

This result is evident confronting the Sen index among poor pensioners in Fig. 16 with the Sen index among poor workers over 45 Fig. 10b and Fig. 11b. The decrease is sharper under *individual* rationality and with the recent seniority pension reform (scenario *M*). This policy is more effective in reducing poverty under *family bounded* rationality, forcing workers (especially wives) to retire later. As before these trends are determined by poverty diffusion whose trends are slightly decreasing for absolute poverty and quickly rising for relative poverty (Fig. 17).

As in Fig. 13 income concentration is rising among absolutely poor pensioners with a sharp increase in poverty intensity after 2040, due to the generalization of the defined contribution regime especially under *individual* rationality (Fig. 18a).

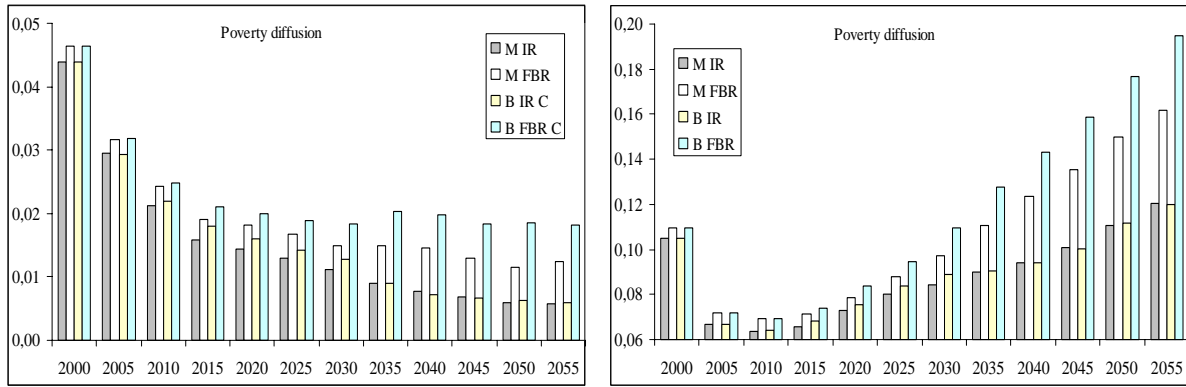


Fig. 17 Poverty diffusion of absolute and relative poverty of pensioners

Concentration among relative poor (Fig. 18b) is instead decreasing till 2030 under *family bounded* rationality (and 204 under *individual* rationality) with a sharply raising trend than in Fig. 15, where we consider also wages. The increase is even more severe under *family bounded* rationality and under scenario **B**. This explains why the seniority pension reform is more effective in reducing relative poverty under *family bounded* rationality.

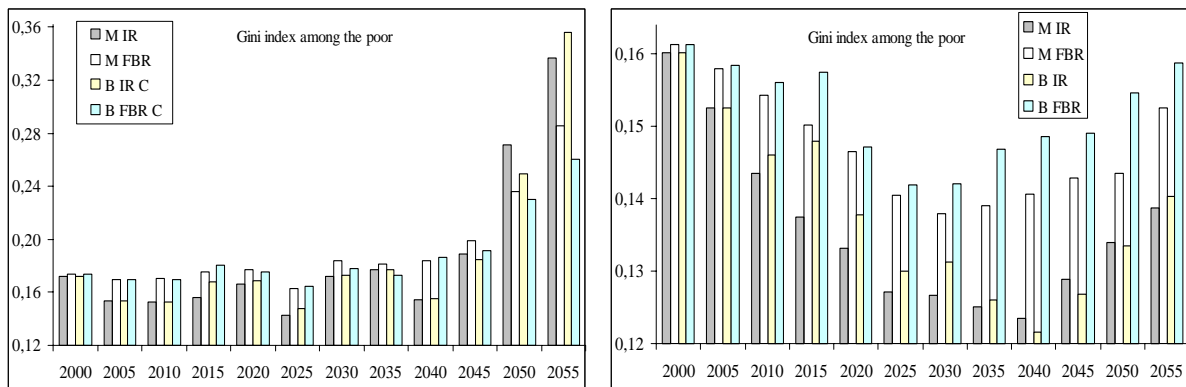


Fig. 18 Gini among absolute and relative poor pensioners

6. Conclusion

The economic impact of the slow transition phase of the Italian pension system towards the new defined contribution regime (reached after 2035) and the introduction of the new seniority pension reform (increasing minimum requirements for seniority pensions after 2008) will affect the behaviour and welfare of many citizens, posing the complex issue of evaluating such policies. The agent based dynamic microsimulation technique used in the MIND model seems an appropriate instrument to assess the economic impact of public policies on: (i) average wealth from labour and pension of different workers and generations and (ii) inequality and poverty in the income distribution.

In this respect, the study has been developed along two different approaches considering: (i) the average *expected wealth* from labour and pension of workers born between 1950 and 1979 and (ii) the *cross-section* distribution of equivalent family incomes of individuals (older than 25 and

45) and pensioners.

The analysis of the expected gross wealth provides interesting information about the distribution of life-time incomes from labour and pension among different generations and between working sectors. This analysis focuses on generations born between 1950 and 1979 and the differences between public dependent, private dependent, self-employed workers and has relevant policy implications. The estimates of labour income wealth show how these differences do not tend to shrink over time, although the dynamics behind this result are a bit different due to the recent seniority pension reform and the degree of individual rationality of the agents. The first generations under *individual* rationality and for all the generations under *family bounded* rationality, driving workers to postpone retirement, increasing wealth from wages and contrasting in this way the reduction in female pension benefit gap.

It is also interesting to complete the analysis investigating how the actual incomes are distributed among different generations (with a *cross-sectional* approach) determining income concentration over the equivalent family incomes of the individuals older than 25 and 45 and of pensioners. Different conclusions can be reached depending on the examined population and used poverty definition. However, overall, we can observe a generalized increasing trend of inequality that is emphasized by a *family bounded* behavioural model. The other important aspect we have investigated is relative poverty. In this case, the effects of the Maroni reform is in general positive, producing a substantial reduction if *family bounded* rationality is assumed.

The methodology presented in this work provides some preliminary analysis of the distributional effects caused by policy changes, both for the cohorts involved in the pension transition period and for those that will be fully subject to the new defined contribution system. However, further analysis is needed and alternative indicators can be developed. In particular, we could try to draw general conclusions about the factors determining workers' pension choices. Starting from single agents, belonging to different generations, we could estimate alternative explanatory variables - consisting in money's worth measures, such as pension wealth and its marginal variations – to evaluate their changes in the coming years as a result of the pension reforms path.

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