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The gender gap in
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approach

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Tommaso Nannicini

**The gender gap in pension:
A cohort of birth approach**

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(INPS)

The gender gap in pension: A cohort of birth approach

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August 2023

Abstract

This paper analyzes the gender gap in retirement income. I use administrative data on the universe of Italian retirees, which are available from 1995 to 2022. I employ synthetic cohort techniques to determine men's and women's pension profiles and to characterize the evolution of the absolute and relative gender disparity. Last, I relate the evidence to the reforms of the social security system undertaken over the past 30 years.

Keywords: gender gap; pension; pension system reforms

JEL Classification: H55; D63; J16

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1. Introduction

An aspect of gender inequality that most rich countries share is the ‘pension gap’. According to the latest figures, from 2021, the gender pension gap at EU level stands at 27.1 %², which means that women in the EU aged over 65 received a pension that was on average more than a quarter lower than that of men. Although women receive lower pensions in all Member States, the extent of the gap varies widely and ranges between the highest values of Malta (41.5 %), followed by the Netherlands (38.1 %) and Austria (35.8 %), and the lowest values of Estonia (3.5 %), followed by Denmark (8.5 %) and Hungary (9.7 %). Understanding the extent of the pension gap and its causes is critical for the design of a pension system that intends to address inequalities and ensure well-being in retirement. Low income late in life is of particular concern since individuals at retirement age generally have fewer opportunities to boost their incomes by means of paid work.

This paper focuses on Italy where the Italian National Institute for Social Security (INPS) estimated the gap in retirement incomes between men and women to be 27%³ in 2022 and draws on rich administrative data to understand better its dynamics relative to the social security reforms that have been adopted over the past 30 years to curb pension expenditure and improve the sustainability of the public pension system.

Gender inequality at retirement is first of all the result of very different labor market experiences over the course of many decades. In Italy women face several challenges during their working lives, such as late entry into the labor market, discontinuous working careers, a pay gap, and early retirement due to family caregiving, which all contribute to lower pension incomes. However, the gender gap in pensions depends also on the capacity of the pension system to promote solidarity across genders and rich-to-poor redistribution in general. In Italy, the pension system has undergone several reforms starting from the early 1990s which have increased the age and years of contribution requirements to retire and have reduced the system generosity through a transition from defined benefit (DB) to (notional) defined contribution (NDC) schemes. Also, the DB system incorporated several redistributive tools like floors, ceilings, and redistributive accrual rates which were lost in the shift to the actuarially fair DC system.⁴ From a gender perspective, in NDC schemes, pension benefits are predominantly driven by employee and employer contributions which may exacerbate gender differences in retirement incomes as, relative to men, women have lower life-time earnings and, therefore, make

²Eurostat, available at https://ec.europa.eu/eurostat/web/products-datasets/-/ilc_pnp13

³ XXII Rapporto annuale, INPS 2023.

⁴ The DB scheme exhibited several redistributive features, including floors raising pension benefits to a minimum amount if they were lower, ceilings setting an upper bound to the earnings to be accounted for in the calculation of the pension, and an accrual rate which was decreasing in pensionable earnings (Brugiavini and Peracchi 2003).

lower contributions over their working lives. However, generally speaking, when it comes to quantifying the phenomenon of the working poor among women one should allow for family composition because female workers very often live in households with more than one income recipient. This has implications for their living conditions also after retirement. In fact, women are the primary beneficiaries of survivor's pensions which represent an important policy instrument to redistribute income from men to women and can play a mitigating role in gender disparities in pensions. Last, defined contribution formulas for actuarially fair annuities do not account for the gender gap in life expectancy and this is also a source of between-gender redistribution as women's mortality rates are lower.

This paper studies the gender gap in pensions from a cohort perspective to analyze its evolution over elderly's life and its changes across generations resulting from social security reforms and changes in labor market arrangements. An alternative to the cohort approach would be focusing on the gap at the date of retirement. However, this would imply a narrower perspective as the men and women retiring in some specific year may be very different in terms of age, careers and opportunities to retire. Also, such comparison may be misleading if one is interested in the impact on the gender gap of a reform that may take years to unfold and whose impact varies depending on the cohort of birth which determines the labor market conditions that (future) retirees face. Overall, cohort studies pulling together information on individuals who experienced a particular event, such as major changes in labor market arrangements or a pension reform, facilitate a thorough examination of processes of societal change and allow to distinguish between age and cohort effects (see Dale and Davies, 1994).

To document the gender gap in pensions and analyze its drivers we use administrative data on the universe of pensions paid by INPS, accounting for over 95% of the total, which are available from 1995 to 2022. For our purposes, we focus on retirees born between 1930 and 1964, aged between 50 and 90, who receive a work insurance-based public pension. Our sample excludes professionals contributing to private pension funds, the recipients of pensions from public employment because of lack of information on years of contribution, and the recipients of social assistance-type of pensions.

Based on a comparison of retirement incomes, we find that women's benefits are substantially lower than men's and the difference increases across cohorts with the average pensions of the younger generations of men being higher than the pensions of the older ones at any age, whereas the upward shift of women's pension age profiles is much smaller. The positive cohort effects are consistent with an increase in the years of contributions driven by pension reforms, besides higher earnings. Indeed, both men and women have experienced a lengthening of labor market participation, but women's years of contribution remain significantly lower than men's due to more fragmented careers, which imply also lower wages, and together explain women's smaller cohort effects.

The increase in the absolute (monetary) gender gap in pensions across cohorts does not necessarily imply an increase in the *relative* gender gap, defined as the ratio between the monetary difference in retirement income and men's average income. The latter is the standard metrics to quantify the gender gap in pensions. The relative gender gap age profiles suggest that the younger the cohort is, the lower the gap despite the larger monetary difference in average pensions. As an example, the relative gender gap in pension for the retirees of the 1950-54 cohort at age of 70 is 4 percentage points lower than that of the retirees of the 1945-49 cohort at the same age (ratios are 0.39 and 0.43, respectively). Besides this, the analysis suggests that survivor's benefits play a really important role in reducing the absolute and relative gender gap in pensions and the impact increases with retirees' age. For a sense of survivor's pensions impact, we consider again the retirees of the 1945-49 cohort. Their relative gender gap is quite stable around 0.43 at age 65 to 75, when excluding survivor's benefits. When including them, the gap is reduced at all ages: for the 65 years old it falls to around 0.40 and drops to just above 0.30 for the 75 years old.

Last, for what concerns the link between gender gap at retirement and social security reforms, we find an early and large impact on the gender difference in retirement age and in years of contribution, which have fallen significantly because the reforms acted in the direction not only of tightening the requirements, but also of making the requirements the same for men and women, whereas earlier on women could retire at a younger age and with fewer years of contribution. However, on the one hand, there has been a remarkable increase in women's age at retirement which has essentially closed the gender gap in age; on the other hand, a three year or more difference remains in years of contribution. Regarding the transition from a DB to a DC system, which can be expected to have a large negative impact on pension benefits, we find that for most retirees in our data the DB component is dominant. In fact, except for the youngest cohort, for over 80% of retirees the DC scheme applies only to the share of contributions paid after 2011 and most of their pension is still based on their earnings.

The rest of the paper is organized as follows. Part 2 briefly explains the Italian pension system and the reforms undertaken over the past 30 years. Part 3 describes the data. Part 4 focuses on individual pension benefits. It analyses their changes over time within and across cohorts the life cycle and relates observed patterns to the existing pension policies and to the labor market arrangements. Part 5 concludes.

2. Institutional Background

The Italian pension system is based on a pay-as-you-go mechanism, where pension benefits of retirees are financed by contributions paid by working age population (employees, employers and self-employed workers), as well as through general taxation. Starting from the nineties, the Italian pension system underwent a major reform process and moved gradually from a DB to a NDC system⁵. Currently, the NDC benefit formula applies to all workers who have entered the labor market after 1995. Their pension benefits are based on the total amount of contributions paid during the entire working life,⁶ notionally capitalized at the GDP nominal growth rate, and converted into an actuarially fair annuity through the application of a transformation coefficient that varies according to worker retirement age and is revised every two years to allow for changes in life expectancy. Workers who entered the labor market before the end of 1995 are applied a pro-rata mechanism such that their retirement benefits result from the application of the DB formula to the contributions paid up to some year and from the application of the NDC formula to the contributions paid after that year. The year threshold depends on the number of years of contribution in 1995.⁷ The workers who entered the labor market before the end of 1995 are also entitled to a top-up benefit if the amount of their pension is below a minimum (which was set to 503,27 euro in 2022). Such top up was abolished for those who entered the labor market after 1995.

Contributions entitle to social security benefits if specific requirements are met. Table 1 reports the age and contribution requirements for statutory old age pension and for statutory early retirement pension.

⁵ For details on the reforms, see Coda Moscarola and Fornero (2009) and Brugiavini and Galasso (2004).

⁶ Social security contributions are computed as a percentage, set by law, of gross income. In addition to work-related contributions, workers can increase their pensions by means of voluntary contributions (for periods of part-time work or to cover periods when no contributions were paid), figurative contributions (for such periods as the military service, accident at work or occupational disease, pregnancy, illness and redundancy, among others) and redemption contributions (credited upon request after payment of a redemption fee, for such periods as university studies and some instances of work abroad).

⁷ For workers with less than 18 years of contribution in 1995, the DB formula applies to pre-1996 contributions (Dini reform, Law 335/1995). For workers with 18 years of contribution or more in 1995, the DB formula applies to pre-2012 contributions (Monti-Fornero reform, Law 201/2011).

Table 1 – Old age pension and early retirements requirements

	Started contributing before 31/12/1995	Started contributing after 31/12/1995
	DB-NDC pro-rata system	NDC
Old age	67 years of age + 20 years of contributions	67 years of age + 20 years of contributions + benefits \geq 1,5 MP*
NDC old age		71 years of age + 5 years of contributions
Early retirement	42/41 years and 10 months of contributions for men/women	42/41 years and 10 months of contributions for men/women
NDC early retirement		64 years of age + 20 years of contributions + benefits \geq 2,8 MP*

(*) Minimum pension (MP) = 563,74 euro (INPS, Circ. N. 35, 3-4-2023)

As mentioned, one important public measure that contributes to reducing gender disparities in pensions are survivor's pensions, which are mainly received by women. According to the most recent statistics (OECD, 2018) in the OECD25 the share of women among the recipients of survivor pensions is above 85%. This is because women tend to live longer, be the younger partner in a couple and accumulate lower pension entitlements. Eligibility criteria for survivor's pensions and their amount and calculation vary across countries. In Italy, the benefit is universally provided to the surviving spouse, even if separated or divorced provided that alimony rights have been granted and that the spouse has not remarried. The amount of the benefit is computed as a percentage of the pension that the deceased was or would have been entitled to at the time of death.⁸ A spouse without dependent children or grandchildren receives 60% of the pension of the deceased, a spouse with one dependent child 80% and a spouse with two or more dependent children 100%. As part of the 1995 reform of the Italian social security system (Law 335/95), the survivor insurance scheme moved from universal to means tested for spouses with no dependent children.⁹

Finally, for our purposes it is worth mentioning that over time, in some specific years, more favorable early retirement rules have been exceptionally introduced. Over the recent past, the most popular

⁸ If the deceased is not retired at the time of death, the survivor's benefit is based on the pension that he or she would have been entitled to at the time of death, based on the pension contributions paid up to that date.

⁹ Specifically, the replacement rate drops to 45% if the survivor's income is above three times the annual minimum pension, 36% if above four times the annual minimum pension and 30% if above five times the annual minimum pension. The replacement rate is based on a measure of individual taxable income, that includes all forms of labor income from employment and self-employment, retirement income, pensions and retirement annuities, capital income and rental income. The minimum pension level is set by law each year.

scheme was the so-called *Quota 100* allowing workers with at least 38 years of contribution and at least 62 years of age in 2019-2021 to retire early. The age threshold was raised to 64 in 2022 (*Quota 102*). Females can retire early also under the so-called *Opzione donna* scheme if 58 years old (59 if self-employed) with at least 35 years of contribution by the end of 2021. Requirements were tightened in 2022. Under *Opzione donna*, retirement benefits are computed based on the NDC formula regardless of the timing of the years of contribution.

3. The data

For our analysis, we rely on administrative data on the universe of Italian retirees from the National Institute for Social Security. The pension data archive is available starting from 1995 and provides detailed information on all the benefits that the Institute pays to any individual during the year, including old-age pensions, early retirement benefits, invalidity, survivors, and guaranteed minimum pensions. For each benefit, the data set includes the date of first payment and the amount paid each year with details on any supplement and can be merged with other archives to recover some demographics and information about retirees' careers.

For our purposes, we focus on the individuals born in 1964 or earlier, to have a large enough number of retirees for each birth year, and after 1930, to compare workers retiring immediately before the reforms to workers involved in the transition from DB to NDC schemes. We drop those aged less than 50 at retirement and the over-90 years old. We consider only the workers who have contributed to a public pension plan and exclude professionals, such as lawyers, accountants, and architects among others, who contribute to private pension funds subject to fund specific rules. Last, we restrict the analysis to old-age or early retirement benefits, work insurance-based invalidity benefits and survivor's pensions and exclude all types of guaranteed minimum and means-tested benefits, which are types of social assistance and go well beyond the concept of pension annuity from a contribution career. Professionals and social assistance-type of pension beneficiaries correspond to around 20% of the retirees. Since some individuals receive more than one pension, we add all benefits up and distinguish only between worker's pensions and survivor's benefits to appraise the role of the latter in closing gender gaps because the beneficiary of most survivor pensions are women. When individual retirement income, be it worker's or survivor's pension, results from more than one benefit, we use the characteristics (years of contribution and date of first payment) of the highest one.

Our sample consists of over 285 million observations on over 16 million individuals and spans 28 years, from 1995 to 2022. Table 2 reports some information on sample composition. The sample includes slightly more men than women despite, in the population, female pension recipients are more than

male recipients.¹⁰ The difference arises because the sample excludes the beneficiaries of guaranteed minimum pensions, of civil incapacity and of long-term care benefits which are granted primarily to women. The last 3 columns of the table focus on the sample that will be used in the analysis, which excludes all recipients of a pension from public employment because of lack of information on years of contribution and first year of employment for public employees. Overall, one out of four retirees receives a survivor pension; among women, the incidence is almost one out of two. Also, for more than one out of five women, survivor pensions are the only benefit.

Table 2 – Sample composition

	All	Males	Females	No public employees*	Males	Females
Males	51.8%			53.4%		
Public employees	18.9.0%	17.2%	20.6%	-	-	-
w/survivor pension	26.6%	7.4%	46.9%	25.8%	6.8%	47.5%
w/survivor pension only	10.6%	1.4%	20.4%	10.8%	1.3%	21.7%
<i>Retirees</i>	<i>16,255,561</i>	<i>8,425,339</i>	<i>7,830,222</i>	<i>12,949,373</i>	<i>6,919,755</i>	<i>6,029,618</i>

(*) We exclude the recipients of a public pension, both worker pension and survivor benefit recipients.

3.1 Summary statistics

To examine the gender gap in pensions we use cohort techniques with cohorts defined over the date of birth of retirees at five-year ranges. Table 3 provides details on our cohort definition and on cell size. The average cell size is 1.6 million observations. The lower share of males of the oldest cohorts is due to the fact that we observe these cohorts later in life when the number of (women) survivor’s pension beneficiary is largest. Notice that although our sample spans 28 years of data, we observe the 3 youngest cohorts over a shorter horizon because we exclude those who retire before turning 50 years old.

¹⁰ In Italy, in 2022, the retirees were over 16 million and social security payments amounted to over 320 billion. Women were 52% and received 44% of the benefits (INPS, 2023).

Table 3 – Cohort composition

Cohort	Year of birth	Average cell size	Share of males	Years in the sample	Ages observed
1	1930-1934	1,819,158	0.47	1995-2022	61-90
2	1935-1939	1,861,311	0.48	1995-2022	56-87
3	1940-1944	1,671,818	0.52	1995-2022	51-83
4	1945-1949	1,635,677	0.55	1995-2022	50-77
5	1950-1954	1,174,474	0.57	2000-2022	50-73
6	1955-1959	653,187	0.51	2005-2022	50-67
7	1960-1964	216,644	0.51	2010-2022	50-63

Table 4 reports cohort-level means of retirement related variables, including years of contributions, retirees' age when they started contributing to social security and the year when they did. The recipients of survivor pensions only (almost 2 million retirees, 91% of whom are women) are excluded from the sample for these statistics because retirement related variables would refer to the deceased who might be part of a cohort that is different from that of the pension beneficiary. Last, notice that the starting date of social security contribution payment may be different from the date when one started working as she may have started with an informal job.

The years of contribution are sharply increasing across cohorts with younger cohorts contributing to social security for over 10 years more than the older ones.¹¹ Cohort 1 retirees appear to start paying social security contributions at a relatively old age compared to younger cohorts. This is most likely due to the fact that they started working right after the end of the Second World War and probably carried out undeclared, cash-paid work for several years before turning to formal employment.

As to age at retirement, we should exclude the two youngest cohorts because a large fraction of the individuals born between 1955 and 1964 is still to retire. Then, we find that the age at retirement increases relatively little. So far, over the period covered by our data, the age at retirement has increased by approximately 4 years over the twenty years running from the average date of retirement of the 1930-34 cohort to that of the 1950-54 cohorts. Most of the increase in years of contribution comes from a substantial decrease in the age when workers start paying social security contributions.

¹¹ The years of contributions of the youngest cohort (cohort 7) retirees are relatively low. This is due to the fact that for this cohort we observe only those who retire between 50 and 63, i.e., only the individuals who have relatively short careers.

Table 4 – Summary statistics (excluding survivor pensions)¹²

Cohort	Year of birth	Year of first contribution	Age at first contribution	Years of contribution of pensions	Age at retirement
1	1930-1934	1962	30.2	24.1	56.8
2	1935-1939	1960	22.7	26.5	57.0
3	1940-1944	1961	19.0	28.3	57.5
4	1945-1949	1965	18.3	30.2	58.8
5	1950-1954	1971	18.6	32.9	61.1
6	1955-1959	1975	17.7	38.6	59.9
7	1960-1964	1979	17.2	37.0	57.3

Table 5 summarizes gender differences. The most striking feature is that, with the exception of the two eldest cohorts, women start paying social security contributions not much later than men, nor they retire earlier. Despite that, the years of contribution are significantly lower, which is consistent with a much more fragmented career.

Table 5 – Summary statistics (excluding survivor pensions)

Cohort	Yr of birth	Yr of 1 st contribution		Age at 1 st contribution		Yrs of contribution		Age at retirement	
		Women	Men	Women	Men	Women	Men	Women	Men
1	1930-1934	1965	1960	33.2	27.9	20.7	27.1	55.4	57.9
2	1935-1939	1961	1959	23.7	21.9	22.3	29.8	55.6	58.1
3	1940-1944	1962	1961	19.6	18.6	24.5	30.8	57.7	57.4
4	1945-1949	1966	1965	18.5	18.2	26.8	32.6	59.0	58.7
5	1950-1954	1970	1971	18.5	18.6	29.4	35.0	61.4	61.0
6	1955-1959	1975	1974	17.6	17.7	35.5	38.9	59.5	60.1
7	1960-1964	1979	1978	17.6	17.0	33.7	36.8	57.5	57.3

Table 6 summaries the years of contribution of survivor's pensions and the age when the spouse of the deceased starts receiving it. Based on a comparison with table 4, the years of contribution of survivor pensions are lower than those of old age or early retirement pensions and the difference has increased. That may result from the fact that the deceased was older and possibly of an older cohort whose career and retirement behaviors were different from those of the retirees of the cohort of the survivor pension recipient. The share of men receiving a survivor's pension is low, around 15%.

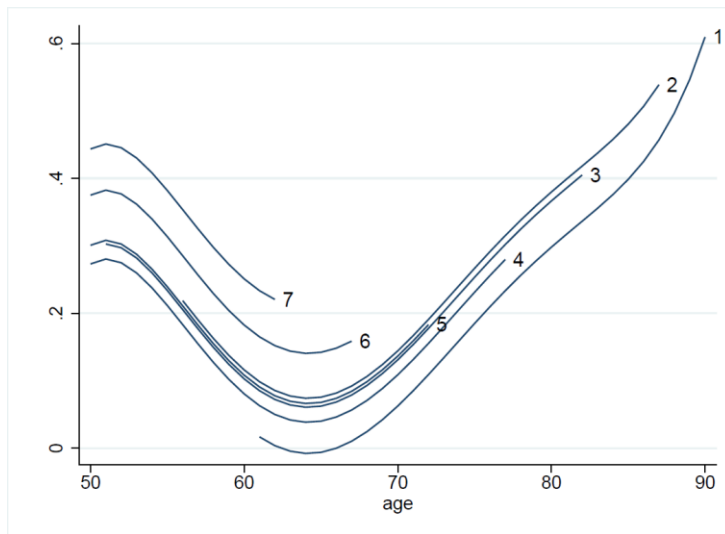
¹² Means are computed as averages taken across cohort members regardless of the years each member is in the sample in order not to overweight those who live longer.

Table 6 – Survivor pensions

Cohort	Year of birth	Years of contribution	Share of males	Age at reception		
				<i>All</i>	<i>Women</i>	<i>Men</i>
1	1930-1934	23.6	0.15	68.8	68.2	72.6
2	1935-1939	25.5	0.14	67.6	67.3	69.5
3	1940-1944	27.0	0.14	64.7	64.7	64.9
4	1945-1949	29.0	0.13	63.8	63.9	63.5
5	1950-1954	29.7	0.13	61.2	61.3	60.6
6	1955-1959	29.4	0.15	57.7	57.9	56.3
7	1960-1964	28.3	0.17	54.1	54.5	52.5

Figure 1 shows survivor's pension diffusion across cohorts and displays the ratio of survivor's benefit recipients to the total number of retirees by cohort. Cohort smoothed age profiles are obtained by regressing cohort data on a full set of cohort dummies and a fifth-order age polynomial. All contours are U-shaped. Survivor pension beneficiaries account for a relatively large share of retirees among the less than 60 years old. As an example, for the 1960-64 cohort, they account for around 35% of retirement income recipients (cohort 7 in figure 1). Many of these pensions probably originate from the contributions of spouses who were still working at the time of death. The share of survivor's pension beneficiaries raises again over 35% among the retirees in their eighties. The incidence of these pensions is lowest among the 60-70 years old, i.e. when the number of retirees (the denominator) is largest. The two youngest cohorts exhibit very large cohort effects with the share of survivor's benefit beneficiaries 10-15 percentage points higher compared to older cohorts. This is due to pension reforms which progressively increased retirement age. As a result, cohort 6 and 7 retirees at young ages are very few and this makes the incidence, but not necessarily the number, of survivor's pensions appear larger.

Figure 1 – Share of survivor pensions' beneficiaries



Note: cohorts are based on the year of birth and are at 5-year intervals. Cohort 1 refers to the retirees born between 1930 and 1934, cohort 2 refers to the retirees born between 1935 and 1939, ... and cohort 7 2 refers to the retirees born between 1960 and 1964.

Last, table 7 reports some measures of exposure to reforms. First of all, it reports the share of retirees who retired before 1993, when the reference period of the earnings used to compute DB pensions was increased from (last) 5 to 10 years for private sector employees and from (last) 10 to 15 years for the self-employed. This was the first important reform of the system and those who retired before 1993 enjoyed the most favorable benefit calculation. The share of these retirees is significantly large only among those born before 1940. In the following column, the table reports the share of workers who retired before 2012. Indeed, year 2012 marks a turning point for the Italian social security system because in 2012 the fundamental Monti-Fornero reform came into effect, gradually increasing retirement requirements and extending the DC formula to all workers. The DC scheme was introduced in 1996, but it did not apply to workers with 18-years of contribution or more at the end of 1995. As a consequence of the Monti-Fornero reform, all workers retiring after 2011 had whole or part of their pension benefits based on their contributions.¹³ The share of pre-2012 retirees declines rapidly across cohorts because the number of individuals meeting retirement requirements by 2012 is necessarily lower the younger the cohort is. In our sample, the vast majority of retirees of the four oldest cohorts retired before 2012, when the Monti-Fornero reform was adopted, and therefore have a DB pension. The last column of the table reports the share of workers with 18 years of contribution or more by 1995. To these workers, the DC formula applies only to contributions paid after 2011, whereas to those

¹³ Actually, if the requirements for retirement had been fulfilled by the end of 2011, the worker was entitled to the pension determined according to old rules regardless of the moment when she claimed it and, consequently, even if she retired after 2011. However, in practice most workers retire as soon as they are entitled to.

with less than 18 years of contributions in 1995, it applies to all contributions paid after 1995. Hence, for the latter, pension benefits are more strictly related to the length of their careers and to their earnings. The diffusion of pensions with a large DC quota is non negligible only for the retirees born after 1960, many of whom did not have 18 years of contribution in 1995.

Table 7 – Cohort exposure to reforms

Cohort	Year of birth	Share of retirees* with:		
		Year of retirement ≤ 1992	Year of retirement ≤ 2011	'1995 – year of first contribution' > 18
1	1930-1934	0.63	0.85	0.97
2	1935-1939	0.32	0.85	0.98
3	1940-1944	0.10	0.85	0.98
4	1945-1949	0.01	0.79	0.97
5	1950-1954	-	0.39	0.93
6	1955-1959	-	0.08	0.86
7	1960-1964	-	0.02	0.61

(*) Survivor benefit recipients are excluded.

As to differences in the exposure to reforms by gender, table 8 shows that the shares of women retiring before 1993 or before 2012 and benefitting from less tight retirement requirements and a more favorable treatment calculation is smaller than the share of men because of the tendency of women to meet retirement requirements later due to more fragmented careers.

Table 8 – Cohort exposure to reforms: gender differences

Cohort	Share of retirees* with:					
	Year of retirement ≤ 1992		Year of retirement ≤ 2011		'1995 – year of first contribution' > 18	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
1	0.61	0.65	0.72	0.98	0.96	0.99
2	0.34	0.31	0.72	0.98	0.97	1.00
3	0.07	0.12	0.72	0.97	0.97	1.00
4	0.01	0.01	0.77	0.81	0.98	0.98
5	-	-	0.33	0.44	0.92	0.92
6	-	-	0.06	0.09	0.88	0.84
7	-	-	0.02	0.03	0.63	0.60

(*) Survivor benefit recipients are excluded.

4. Gender differences in pensions by cohort

Figure 2 plots the mean monthly gross pension of men (panels (a) and (c)) and women (panels (b) and (d)), by cohort, excluding (panels (a) and (b)) and including (panels (c) and (d)) survivor benefits. Mean monthly pensions are computed as average of the benefits that retirees receive at various ages. Since we use 5-year cohorts, cohort members turn a specific age in different years.

Several features of the contours should be noticed. First, women's benefits are substantially lower than men's and the difference, captured by the vertical distance between men's and women's contours, increases with age, so that the gender difference in mean pensions is relatively larger for older retirees. Indeed, contours are upward sloping, especially for men, and flatten out around 80 years. Several factors help to explain the positive slope. First, the older the mean age is, the larger the share of retirees with long careers and many years of contribution is, which imply higher mean retirement benefits. Clearly, the inflow of higher-income retirees slows after some age, and this explains the flattening of the contours at very old ages. Second, pensions are subject to partial automatic adjustments for inflation. Hence, individual pensions tend to increase over time, i.e., as individuals age. Last, the contours are affected by income-related differential mortality so that the older the age of the cohort is, the wealthier its (alive) members are, on average.

Another interesting feature are the large positive cohort effects of men's contours such that benefits are higher at all ages the younger the cohort is, for cohorts 1 to 5. The upward shift of women's contours is much smaller, and this results in an increase in the income difference at all ages. In other words, the absolute (monetary) gender gap in pensions is higher at all ages, the younger the cohort is. The remarkable difference between cohorts 1 to 5 and cohorts 6 and 7 is that the former are the least affected by social security reforms. Their share of retirees who retired before 2012, when the Monti-Fornero reform came into effect, ranges between 85 and 40%, but even those who retired afterwards had a substantial number of years of contributions paid before 1995. Hence, the pensions of cohorts 1 to 5 retirees are by far mostly DB-based, and hence strictly related to earnings and to the years of contribution. The positive cohort effects are consistent with an increase in the years of contributions driven by pension reforms and in (nominal) mean earnings. Both men and women have experienced a lengthening of their careers. However, significant differences in years of contribution remain. In fact, women have increasingly started paying social security contributions not much later than men, nor they retire earlier. However, their careers are more fragmented and this results in fewer years of contribution than men and also in lower wages (besides the wage gap issue). These, together, explain the smaller cohort effects.

Another feature of the figure that is worth noticing is the slight drop that men's contours exhibit after age 65. This is due to the inflow in the pool of retirees of workers claiming old age retirement whose statutory age for these cohorts was just 65 years. The drop in average pension comes from the fact that the years of contribution and the wages of most old-age retirees are lower than the years of contribution and the wages of early retirement pension beneficiaries.¹⁴ The contribution requirement for the former is 20 years versus 41/42 years for the latter. Hence, the pensions of the former are generally lower. For women, a similar, but much more pronounced drop is at 60, which is the statutory retirement age for most women of cohorts 1 to 5.

Last, a word must be spent on the contours of cohorts 6 and 7, that we observe between the ages of 50 and 67, and of 50 and 62. The pensions of the retirees of these cohorts are lower than those of older cohorts (negative cohort effects) at all ages until age 60. These cohorts are the most affected by the reforms. For them, retirement before 60 years of age is very uncommon and exceptional, comes with short careers and, consequently, low pensions as their benefits have a non-negligible DC element.

The contours of panels (c) and (d) also include survivor's benefits. Such inclusion has two effects one should allow for. On the one hand, the pension of the retirees whose spouse dies increases, which raises the contours. On the other, in the case of spouses with no retirement income, including survivor's pension beneficiaries may lower the contours because survivor's benefits are a fraction of the pension of the deceased and therefore are on the low end of the pension distribution.

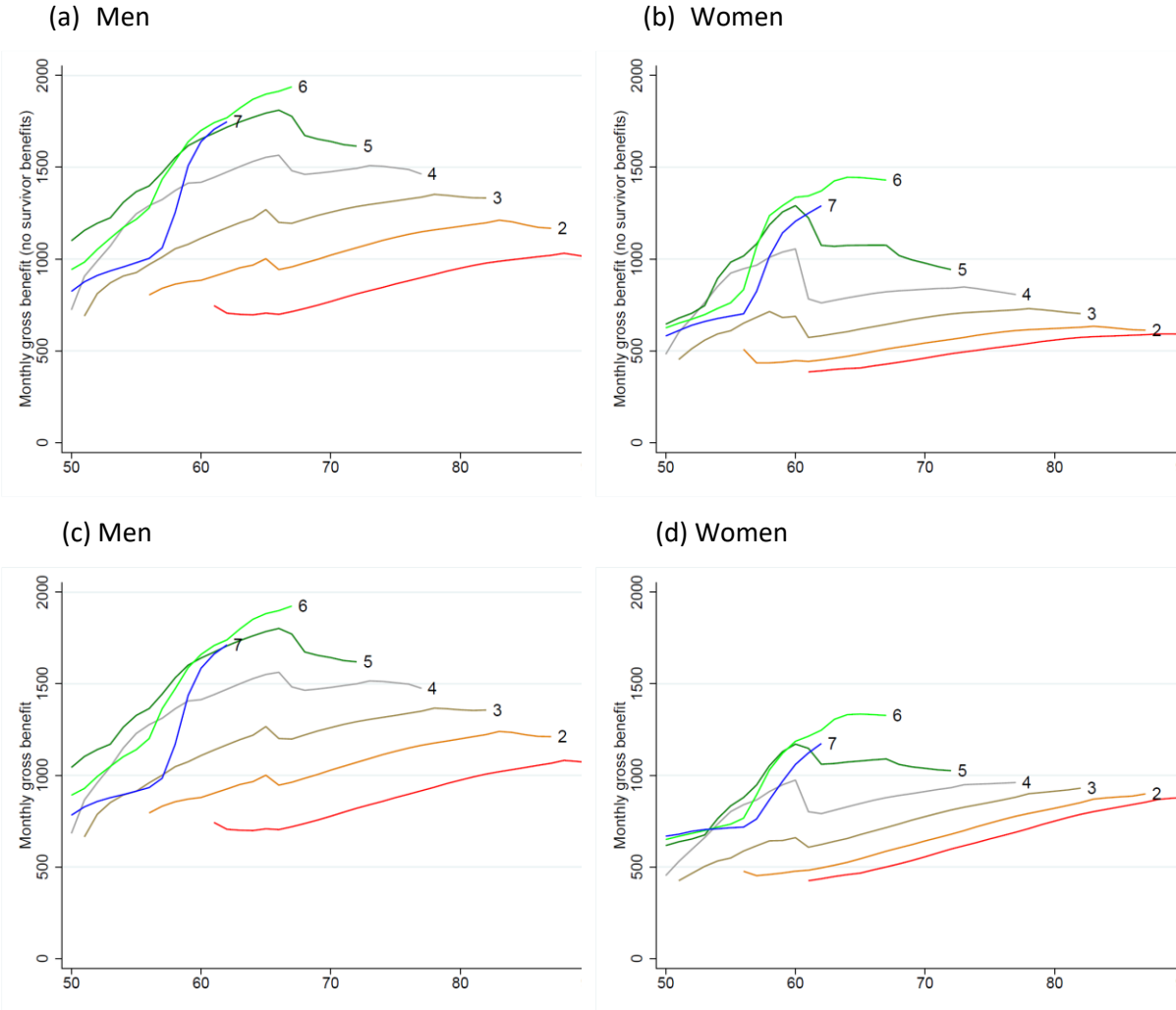
As expected, given the low incidence of survivor's pensions among men, the impact on men's contours is negligible,¹⁵ except for the two youngest cohorts whose contours shift slightly down for ages 50-60 because survivor's pension recipients entering the sample receive relatively low benefits. A similar downward shift is recorded for women of cohort 6 and 7. This implies that for several 50-60 years old women pension recipients (but also men) of the two youngest cohorts, survivor pensions are their only form of retirement income. In contrast, the impact of survivor's pensions on the other women contours is positive, which suggest that, as expected, survivor's benefits increase women retirement income on average.¹⁶

¹⁴ In 2022, the mean old-age pension was 889 euros versus a mean early retirement pension of 1,915 euros (XX Rapporto annual, INPS 2023).

¹⁵ The number of men receiving a survivor's pension is low because men's life expectancy is lower than women's and women's participation in the labor market is lower than men's. Besides this, survivor's benefits are means-tested. Since men's income is higher than women's, men's survivor's benefits tend to be lower.

¹⁶ The appendix reports the contours of figure 2 in panels that allow a direct comparison of the contours of men and women of the same cohort.

Figure 2 – Retirement benefits by cohort and gender



Note: cohorts are based on the year of birth and are at 5-year intervals. Cohort 1 refers to the retirees born between 1930 and 1934, cohort 2 refers to the retirees born between 1935 and 1939, ... and cohort 7 2 refers to the retirees born between 1960 and 1964.

4.1 The gender gap in pensions by cohort

The most common approach in the literature to measure the gender gap in retirement income is in terms of difference between men’s and women’s average pension in percentage points of men’s average pension (Bettio et al. 2013; OECD 2021; Cribb et al. 2023), which can be written as follows:

$$GGP = \frac{\mu_m - \mu_f}{\mu_m}$$

where μ_m and μ_f denote average men and woman retirement income, respectively.¹⁷

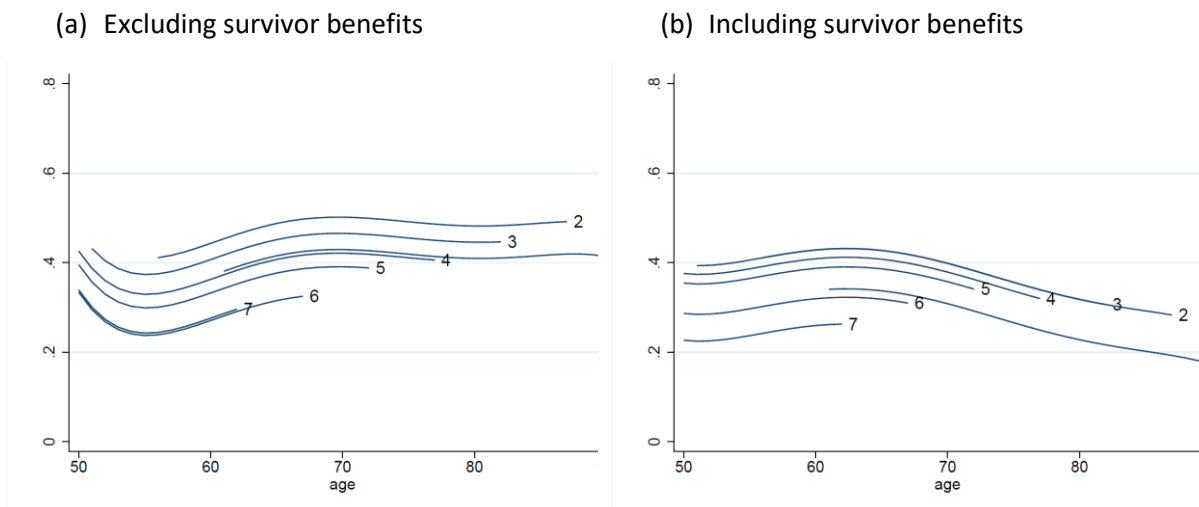
Figure 3 plots the gender gap in pensions and displays the cohort-corrected smoothed age profiles of the *GGP* index. When survivor benefits are not included in retirement income (panel (a)), the gap increases slightly at age 60 to 70 for all cohorts, which is consistent with the increase in the pension benefit difference recorded earlier and resulting in pension income contours that were steeper for men than for women. Beyond 70 years the *GGP* contours are essentially flat.

If we exclude the oldest, 1930-34, cohort, cohort effects are negative, and range between 4 and 7 percentage points. This means that the gender gap of the retirees born, for example, between 1940 and 1944 (cohort 3) is 4 percentage points larger than the gap of the retirees born between 1945 and 1949 (cohort 4) on average. The gender gap of the retirees born between 1955 and 1964 (cohorts 6 and 7) is lowest, around 27%. The contours of panel (b) include survivor's benefits and survivor's benefit beneficiaries. This shifts downward the contours of all cohorts. Besides this, the contours become downward sloping after the age of 65. This implies that, for the retirees of any cohort, compared to when they were 65 years old, the gender gap in pensions drops by 5 percentage points or more after they turn 70.

The negative cohort effects of *GGP* contours apparently conflict with the evidence in figure 2 where the monetary gender difference in pensions was higher, at all ages, the younger the cohort was, implying positive cohort effects. The two pieces of evidence can be reconciled by noticing that the same variation of the absolute pension gap may generate different variations of *GGP* depending on which average pension is changing more.

¹⁷ The *GGP* index is obtained by dividing the absolute (monetary) gender gap by men average pension income. Hence, it turns out to be sensitive to variations of men's benefits. Furthermore, it exhibits three other drawbacks: (1) It is not decreasing with rich-to-poor group-transfers. In fact, an income transfer from an individual of the richer group to an individual of the poorer group may reduce or increase the index. (2) It does not satisfy monotonicity, in that it is not monotonically increasing with μ_m if $\mu_m > \mu_f$, and vice versa. (3) It does not satisfy the anonymity property since it is not independent of the identity of the group as the index changes if the gender identities of the two groups are switched.

Figure 3 – The gender pension gap by cohort



Note: cohorts are based on the year of birth and are at 5-year intervals. Cohort 1 refers to the retirees born between 1930 and 1934, cohort 2 refers to the retirees born between 1935 and 1939, ... and cohort 7 2 refers to the retirees born between 1960 and 1964.

5. Concluding remarks

Understanding the evolution of the gender gap at retirement is particularly important because it provides information that can be used to correct for undesirable aspects of social security systems.

This paper takes a cohort approach and uses administrative data on the universe of Italian retirees and takes a year-of-birth cohort approach to study the gender gap at retirement and the impact on such gap of the social security reforms that have been adopted in Italy to curb pension expenditure. We find that, for the retirees born between 1930 and 1954, the gender disparity in mean retirement income has increased across cohorts. If, instead of looking at the absolute difference in average pensions, we consider the relative difference as most of the literature does, i.e. we divide the difference by men's average pension, we obtain a different picture. In fact, we find that the (relative) gender gap decreases across cohorts and the impact of survivor's benefits is large as they reduce the gap markedly. In fact, when including survivor's pensions, the relative gap contours not only shift downwards for all cohorts, but they also become downward sloping after 65 years of age. Hence, although they do not eliminate the gap, survivor's benefits appear important to reduce the gender disparity in pensions, especially very late in life.

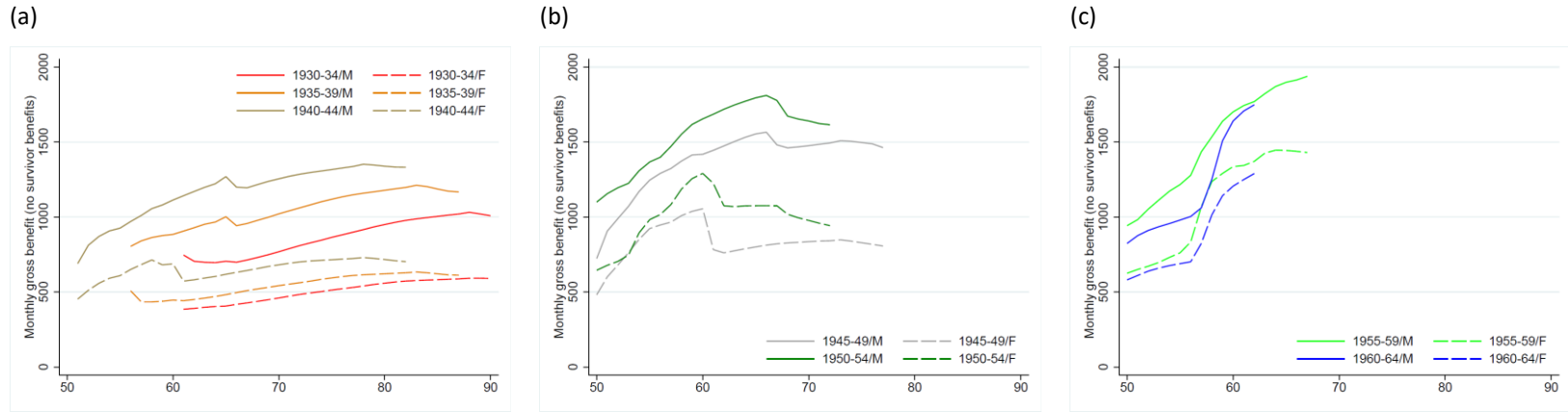
Regarding the social security reforms, we find evidence that their impact has been small and limited to the 1955-59 and 1960-64 (youngest) cohorts. The main goals of these reforms were to delay retirement and to link benefits to contributions. As to the first goal, although the picture is incomplete

because most of the two youngest cohorts are still to retire, retirement age has increased, but less than one would expect. For the two youngest cohorts, early retirements have come with a significant reduction in pension benefits. As to the second goal, i.e. shifting to a DC system and ultimately lowering pensions, we find that for most retirees in our data the DB component is dominant. In fact, except for the youngest cohort, for over 80% of retirees the DC scheme applies only to the share of contributions paid after 2011 and most of their pension is based on their earnings.

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Appendix – Figure A1: Retirement benefits, excluding survivor benefits, by cohort and gender



Appendix – Figure A2: Retirement benefits, including survivor benefits, by cohort and gender

