The demographic challenge on pension systems: empirical results from Italy

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Abstract. Population ageing in Italy is likely to accelerate in the next four decades. Thus, the proportion of the population over 65 years old is projected to strongly increase shifting from 20 per cent in 2010 to 32 per cent in year 2060 (Demographic Projections EUROPOP2010, released in April 2011 by Eurostat). Declining mortality trends, combined with low fertility rates and the approaching to retirement of the baby-boom generations, are, and majorly will be in the next decades, the socio-economic challenge to provide pension income to ageing population.

The effects of demographic changes on the Italian pension system are assessed based on projections provided by the Working Group on Ageing Population (AWG) of the Economic Policy Committee. Under used demographic and economic assumptions, AWG projections confirm the demographic pressure on the Italian pension system, which could reveal itself not sustainable in the long run as it relies exclusively on the pay-as-you-go scheme. Reforms aimed at containing the Italian pension expenditure have already been adopted, and further measures are planned for forthcoming years. Anyway, the pension system sustainability cannot be achieved if pension reforms continue to be based on the “goodness” of forecasting and do not move in the direction of the “logical sustainability”, namely towards a sustainability founded on evaluation rules of benefits and contributions linked to the effective situation of the pension system.

Keywords: population ageing, demographic changes, pension systems, logical sustainability.

JEL Codes: H55, J11.

1. Introduction

Population ageing, defined as the growth of the older age groups as shares of the total population, is occurring in the major part of the developed world, and in particular in Europe. This meaningful demographic phenomenon, which seems to have no precedents under historical point of view, is leading to changes in the context of existing social security programmes. In fact, the decline in the size of the working population has naturally a negative impact on the financing of social security schemes. This is truer for pay-as-you-go (PAYGO) pension systems, where current contributions are used to finance current pension expenditure for the retiree population. If the ratio of current pensioners to active contributors rises to very high levels, then the PAYGO pension system will be unable to meet its commitment to pay current benefits. For example, one has to think of baby-boom generations of several European countries, which in the next decades will reach retirement age and will not be supported by working generations of the same size. In such a case, the adequacy of pension benefits would require excessive burdens from future workers generations and the respect of the intergenerational equity would fail.

In Europe, pension systems differ widely in their structure and relations among different pillars and in the adjustments level in response to recent demographic and economic changes. In all countries, the issue of the ageing population, worsened by the impact of the economic crisis at global level, affects strongly on the financing of PAYGO pension systems and leads to changing the logical basics of pension systems.
The objective of this paper is to present expected demographic trends in Italy and to assess their effects on the Italian pension system. This analysis leans principally on the widely used projections of the Working Group on Ageing Population (AWG) of the EU’s Economic Policy Committee. It is produced comparing the Italian situation with some other European countries: France, Germany and United Kingdom, (which, together with Italy, represent major economies in Europe), Spain (one of the European most populous countries) and Sweden (which have implemented NDC scheme like Italy).

The paper is organized as follows. The next section presents fundamental aspects deriving from demographic dynamics based on the EU’s projections of the ageing population. In Section 3 we summarize the basic features of the Italian pension system and the main last reforms. In section 4 we look more closely to the Italian pension expenditure and its principal decomposition factors. In section 5 we deal with the issue of the sustainability assessment of pension systems with particular regard to the Italian one pension system and we consider the necessity of alternative indicators to control sustainability. The final section presents some concluding remarks.

2. The ageing challenge in Italy

During the last decades, Italy has been characterized by meaningful changes in its demographic patterns: the drop in fertility rates, the decline of mortality rates with the consequent notable increase in life expectancy. Furthermore, it has to be considered that there is a new population who inflows by immigration. The combination of these three aspects determines a marked change in the age structure of Italian population. We present the basic facts, based on the AWG projections in the 2012 Ageing Report, in the following.

Fertility rate. Total fertility rate, that is the average number of births for woman, has declined sharply in all the European countries after the post-war “baby boom”, with a peak above 2.5 in the second half of the 1960s, to below the natural replacement level of 2.1 births for woman, which ensures the population equilibrium. In Italy, the total fertility rate fell below the replacement level in 1975 and currently is among very lower ones, below 1.4 births for woman. According to the EUROPOP2010 population projection for the period 2010 to 2060, prepared by Eurostat, the total fertility rate is projected to rise from 1.59 in 2010 to 1.64 by 2030 and further to 1.71 by 2060 for the EU as a whole. In Italy the fertility rate is projected to slowly increase over the projection period, though remaining below the natural replacement rate (from 1.42 in 2010 to 1.57 in 2060).

Life expectancy. Since 1960, there have been significant increases in life expectancy at birth, especially for women, in all European countries. In Italy the gains in life expectancy between 1960 and 2009 have been about 12 years (11.9 for men and 12.2 for females), which are higher than the average gains for the EU-27. There is no consensus between demographers if such trend will be going on over the next decades or if there is a natural biological limit to longevity (Oeppen and Vaupel, 2002). Assuming continuous decline in mortality trends, the baseline scenario of EUROPOP2010 projects large increases in life expectancy at birth (7.9 years and 6.5 years for males and females, respectively). In Italy, the projected increase in life expectancy is less marked for males (6.6 years and 5.6 years for males and females, respectively), but one has to observe that Italy, together with Sweden, France and Spain, experiences one of the highest life expectancies at birth (78.9 years and 84.2 in 2010 for males and females, respectively).

Net migration. Net migration flows per country are characterised by high variability: traditionally, Germany, France and the United Kingdom record the largest number of immigrants but, in the last decades, also Italy has been experiencing a meaningful rise of migration flows, which has transformed itself from a traditional emigration country to an immigration destination. According to the EUROPOP2010 projections, for the EU as a whole, annual net flows are projected to increase until to 2020 and thereafter to decline by
Furthermore, they will be concentrated to a few destination countries, first among these Italy with 15.4 millions of people cumulated up to 2060.

Such dynamics of fertility, life expectancy and migration affect the age structure of populations, which is projected to outstanding changes in coming decades. According to the EUROPOP2010 projections, in Italy, the share of young people (aged 0-14) will be roughly constant (14% in 2010, 12% in 2060), while people aged 15-64 will be subject to a substantial decline, from 66% in 2010 to 56% in 2060 as a share of total population. The proportion of people aged over 65 is projected to be much larger, moving from 20% in 2010 to 32% in 2060; this is due both to the arrival at age 65 and more of the numerous cohorts born in the 1950’s and 1960’s and to gains in life expectancy continuing over the projection period.

3. Overview of the Italian pension system and its main reforms

In response to the challenge of ageing, Italy has been implementing pension system reforms starting from nineties with the goal to achieve the long-term sustainability. In 1995, the Dini’s reform introduced the Notional Defined Contribution (NDC) pension scheme, which has shifted the Italian pension system from a defined benefit to a defined contribution pension scheme. Sweden also reformed its pension system and implemented NDC pension scheme in 2001, with a 15-years transition period (e.g., Palmer, 2000). Latvia and Poland are also experiencing NDC pension systems.

NDC pension systems are substantially based on PAYGO financing; in some cases, as for the Sweden, they are provided by an assets component. In such schemes the individual pension is calculated at the retirement on the basis of real paid contributions, in obedience to the actuarial equity principle at individual level. These schemes are defined “Notional” because contributions are only virtually accumulated in individual accounts, while are really used to pay current pension benefits. A complete review of NDC schemes and their features and implementations in several different countries is in Holzmann and Palmer (2006).

In Italy, the Dini’s reform has planned for a very long transition period in which the old DB and the new DC scheme will go in parallel, producing a considerable forward shift of the reform effect. The NDC regime reform is fully applied only for generations younger than the baby-boom ones, namely to individuals entered in the labour market after 1996. People who accumulated contributions at least for 18 years at the end of 1995 will keep the old defined benefit (DB) regime, while people with less of 18 years of contributions in 1995 will see their pension calculated partly DB and partly NDC.

The Italian old pension system was implemented in the fifties in a period characterised by growing economic development, low life expectancies and high fertility rates. This scheme planned the payment of income-linked benefits and resulted in a not fair pension system as it damaged individuals who worked longer and paid larger contributions. With the subsequent slowdown of the economic and demographic growth, the Italian pension system could not be able to face own commitments towards its participants. Therefore, the pension reform in Italy had as primary goal to realize a pension system sustainable in the long-run, linked to the real economic growth, equipped with fair actuarially rules.

Hence, in the new pension system the principle of pension benefits calculation is based on actuarial rules linking contributions paid in to pensions that will be received. The total contribution rate on the employee’s gross remuneration is equal to 33% (9.2% paid by the employed and 23.8% paid by the employer).

The standard retirement age, initially fixed in a range between 57 and 65 years, has been increasing over the last 15 years by consecutive waves of reforms both for old-age pensions and for early retirements. Currently, in Italy the minimum age for pension eligibility in the public sector is set at 65 years for men and 60 years for women. One of the later reforms in 2010 has further increased to 65 years the minimum pension age for women starting from 2012. De facto, the actual effect of pension is further postponed of 12
months by means of the so-called “exit window” mechanism. The access to the retirement is allowed at ages lower than 66 years only with a minimum contribution of forty years at least. Other transitory rules, combining age at retirement with a minimum contribution period, are provided for the early retirement. Starting from 2015 the minimum age for pension eligibility is adjusted every three years at changes in life expectancy at 65 years, as measured by the National Statistical Institute over the preceding three-years; such changes are estimated equal to an increase of three months starting from 1st January 2015.

At the retirement the pension is calculated in relation to the whole contribution amount, namely the sum of contributions paid during the entire active life and yearly revaluated at the average growth rate of GDP over the previous five years. At the time of retirement, the contribution amount is converted in annuity by means of transformation coefficients, which are depending on the age at the retirement and are the same for male and females. Since January 2010, new transformation coefficients are applied. In order to keep transformation coefficients linked to the current demographic dynamics, they are subjected to a three-years revision, instead of every ten years as foreseen in Dini’s law 335/95, according to changes in life expectancy at the age of retirement (Law no.127/2007).

The formula of coefficients calculation uses actuarial rules specific of life annuities and it is depending on demographic and normative parameters. Among these, two elements are particularly relevant as they can produce disequilibria: survival probabilities and the rate of return on pension benefits recognized during the retirement phase.

In the coefficients’ computation, survival probabilities are evaluated on past trends. The real possibility of future imbalances derives from the assigning to the retiring individual, aged, e.g., 65 years, survival probabilities that, for ages over 65 years, are relative to individuals belonging to previous generations and, hence, lower. Frequent revisions of the coefficients can reduce this disequilibrium because updated transformation coefficients integrate the effect of the increasing survival probabilities. However, as during the retirement phase there is any revision of coefficients, continuous improvements of survival probabilities would be financially compensated through reduction of the rate of return on the pension liability for retirees. This means that the rate to explicitly credit to the retirees’ pension liability would be reduced by the implicit demographic rate (Angrisani, 2008; Angrisani and Di Palo, 2006).

Pensions are indexed only to prices during the retirement phase, but in the transformation coefficient it is recognized, and hence ensured in advance, a real rate of return (fixed equal to 1.5%) on the retiree pension liability. This leads to the effect of an initial payout of more generous pensions, but leads to systematic imbalances of the pension system if the rate of return on the pension liability results to be different from that included in the coefficient.

4. The Italian pension expenditure

According to the AWG report (2009), the level of the pension expenditure, measured as the ratio of the pension expenditure to GDP, is expected to globally register a small negative change decline in the period 2007-2060 for Italy, see Table 1. Although with very different degree of variation, in the other considered countries the total change in the level of the pension expenditure is expected to be positive, except for the Sweden that keeps an averagely stable level.
Table 1: Projections of the public pension expenditure to GDP (Source of Data: Economic Policy Committee)

Looking globally to data, Italy seems to have reached the goal of the containment of the pension expenditure. Actually, we have to note that Italy starts from the highest level of pension expenditure in Europe (14% of GDP) and that the change in the pension expenditure level, in its whole, masks the consistent increase over 2025-2055, which is the period time coinciding with the retirement of the baby-boom generations (people born in the sixties). Hence, we have to look more closely to the above illustrated trend, considering the four factor driving the pension expenditure.

4.1. The four factors driving the change in the public pension expenditure

The decomposition of the pension expenditure has derived considering the impact of the following four ratios:

1. The old-age dependency ratio, namely the ratio between the population aged over 65 years to the population aged 15-64 years;
2. The coverage ratio, namely the ratio of pensioners of all ages to the population aged over 65 years;
3. The inverse of the employment ratio, namely the ratio of the population aged 15-64 to working population;
4. The benefit ratio, namely the average pension to the average wage, this last approximated by the GDP per worker.

The decomposition of the pension expenditure derives from the following identity\(^2\)

\[
P_{\text{exp}} = \frac{P_{\text{exp}}}{GDP} = \frac{\text{Pop65} + \text{Number of pensioners}}{\text{Pop15} - 64} \times \frac{\text{Pop15} - 64}{\text{Pop65} + \text{Number of workers}} \times \frac{\text{Average Pension}}{\text{Number of workers}} \times \frac{\text{Average Wage}}{\text{GDP}}
\]

with \(\text{Average Wage} = \frac{\text{Average Pension}}{\text{Number of workers}}\).

The change in levels of the pension expenditure to the GDP is given by the sum of contributions produced by each factor. Each one contribution is obtained multiplying the growth rate of each factor by the initial value of the pension expenditure to GDP. In following Table 2 the contribution of each of the four factor is reported.

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\(^2\) In the AWG report (2009) the average wage is approximated by the GDP per hours worked, that is

\[
P_{\text{exp}} = \frac{\text{Pop65} + \text{Number of pensioners}}{\text{Pop15} - 64} \times \frac{\text{Pop15} - 64}{\text{Pop65} + \text{Number of workers}} \times \frac{\text{Average Pension}}{\text{GDP}} \times \frac{\text{Hours worked15} - 71}{\text{Number of workers}}
\]

The last factor in the above decomposition produces the interaction effect reported in Table 2.
Decomposition of the public pension expenditure to GDP ratio over 2007-2060 (% of GDP)

<table>
<thead>
<tr>
<th>Country</th>
<th>2007 level</th>
<th>Dependency ratio contribution</th>
<th>Coverage ratio contribution</th>
<th>Employment effect contribution</th>
<th>Benefit ratio contribution</th>
<th>Interaction effect</th>
<th>2060 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU (27 countries)</td>
<td>10.1</td>
<td>8.7</td>
<td>-2.6</td>
<td>-0.7</td>
<td>-2.5</td>
<td>-0.6</td>
<td>12.5</td>
</tr>
<tr>
<td>Germany</td>
<td>10.4</td>
<td>7.9</td>
<td>-1.9</td>
<td>-0.8</td>
<td>-2.2</td>
<td>-0.8</td>
<td>12.8</td>
</tr>
<tr>
<td>Spain</td>
<td>8.4</td>
<td>10.7</td>
<td>-0.9</td>
<td>-0.9</td>
<td>-1.7</td>
<td>-0.5</td>
<td>15.1</td>
</tr>
<tr>
<td>France</td>
<td>13.0</td>
<td>8.4</td>
<td>-2.2</td>
<td>-0.5</td>
<td>-4.0</td>
<td>-0.7</td>
<td>14.0</td>
</tr>
<tr>
<td>Italy</td>
<td>14.0</td>
<td>10.4</td>
<td>-3.2</td>
<td>-1.1</td>
<td>-5.5</td>
<td>-1.0</td>
<td>13.6</td>
</tr>
<tr>
<td>Sweden</td>
<td>9.5</td>
<td>5.6</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-4.3</td>
<td>-0.6</td>
<td>9.4</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6.6</td>
<td>4.2</td>
<td>-1.4</td>
<td>-0.3</td>
<td>0.5</td>
<td>-0.3</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Table 2: Decomposition of the public pension expenditure (Source: Commission service, EPC 2009).

**Old-age dependency ratio.** This indicator provides the measure of the demographic burden for working generations. As in previous Table 2, it produces the main contribution to the change in levels of the pension expenditure. The inverse of this ratio is called support ratio. According to projections in EUROPOP2008, for countries of EU27 as a whole the old–age-dependency ratio in 2010 starts at 0.2592, which means a support ratio of about four persons of working age for each person aged 65+, to reach in 2060 the value of 0.5255, that is in 2060 only two persons will be in working age for each person over 65. Such a situation is lately severe in Italy for which the old–age-dependency ratio is projected to reach the value 0.5658 in 2060, see following Figure 1.

**Coverage ratio.** The number of retirees usually exceeds the population over 65 years, as pensions are available at younger ages of 65, which is generally the standard age for pension eligibility. In general, a higher age at retirement is associated with a lower proportion of pensioners below age 65 and, hence, with a lower coverage ratio. In all the considered countries, the coverage ratio is projected decreasing, see following Table 3. This reflects a general decreasing of the pensioners’ number below age 65 as the consequence of the increasing of the exit age from the labour market caused, in some cases like, e.g., Italy, by the recent implemented pension reforms. The projected decreasing in the coverage ratio contributes in a relative decreasing in the pension expenditure to GDP; such a reduction is more marked for Italy (-3.2 p.p.), see previous Table 2.

**Employment rate.** The number of workers is smaller than population aged 15-64 years, because there is a share of population that does not participate to the labour force. Over the period 2007-2060, the employment rate – defined as the number of working people divided by the population aged 15-64 – is the lowest in Italy with respect to other considered countries, see following Table 4. The projected increase in the employment ratio contributes in limiting the increase in the pension expenditure level; we recall that in the pension expenditure decomposition the inverse of this ratio is considered. Therefore, reforms aiming to strengthen the potential of economic growth are particularly relevant, for example stimulating people to stay longer in the labour market.
Coverage ratio

<table>
<thead>
<tr>
<th>Country</th>
<th>2007</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
<th>2060</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU (27 countries)</td>
<td>1.401</td>
<td>1.374</td>
<td>1.258</td>
<td>1.193</td>
<td>1.147</td>
<td>1.114</td>
<td>1.100</td>
</tr>
<tr>
<td>Germany</td>
<td>1.216</td>
<td>1.198</td>
<td>1.158</td>
<td>1.078</td>
<td>1.031</td>
<td>1.027</td>
<td>1.021</td>
</tr>
<tr>
<td>Spain</td>
<td>1.090</td>
<td>1.083</td>
<td>1.052</td>
<td>1.036</td>
<td>1.019</td>
<td>0.995</td>
<td>1.001</td>
</tr>
<tr>
<td>France</td>
<td>1.389</td>
<td>1.421</td>
<td>1.289</td>
<td>1.229</td>
<td>1.180</td>
<td>1.186</td>
<td>1.180</td>
</tr>
<tr>
<td>Italy</td>
<td>1.343</td>
<td>1.293</td>
<td>1.207</td>
<td>1.193</td>
<td>1.117</td>
<td>1.066</td>
<td>1.071</td>
</tr>
<tr>
<td>Sweden</td>
<td>1.370</td>
<td>1.351</td>
<td>1.325</td>
<td>1.348</td>
<td>1.338</td>
<td>1.346</td>
<td>1.316</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.247</td>
<td>1.257</td>
<td>1.130</td>
<td>1.099</td>
<td>1.072</td>
<td>1.009</td>
<td>1.016</td>
</tr>
</tbody>
</table>

Table 3: Coverage ratio (Source: Commission service, EPC 2009).

Employment ratio (%)

<table>
<thead>
<tr>
<th>Country</th>
<th>2007</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
<th>2060</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU (27 countries)</td>
<td>65.5</td>
<td>66.6</td>
<td>69</td>
<td>69.2</td>
<td>69.5</td>
<td>69.7</td>
<td>69.9</td>
</tr>
<tr>
<td>Germany</td>
<td>69.6</td>
<td>71.2</td>
<td>74.2</td>
<td>74.4</td>
<td>75.2</td>
<td>74.8</td>
<td>74.9</td>
</tr>
<tr>
<td>Spain</td>
<td>65.6</td>
<td>66.9</td>
<td>71.0</td>
<td>71.6</td>
<td>72.4</td>
<td>72.8</td>
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</tr>
<tr>
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<td>64.7</td>
<td>64.5</td>
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<td>67.1</td>
<td>67.2</td>
</tr>
<tr>
<td>Italy</td>
<td>58.7</td>
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<td>62.6</td>
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<td>63.8</td>
<td>64.0</td>
<td>63.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>74.3</td>
<td>75.1</td>
<td>77.3</td>
<td>77</td>
<td>77.1</td>
<td>77.5</td>
<td>77.6</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>71.5</td>
<td>71.6</td>
<td>73</td>
<td>73.2</td>
<td>74.2</td>
<td>74.3</td>
<td>74.4</td>
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</table>

Table 4: Employment ratio (Source: Commission service, EPC 2009).

Benefit ratio. The ratio of the average individual pension to the average wage (approximated by the change in the GDP per hours worked) measures the level of the public pension benefit. According to the AWG projections (2009), the benefit ratio will decline by around 10 p.p. in EU-27. In Italy, this decline is projected to be more incisive, around 21 p.p., see Table 5. One has to notice that it takes up maximum values in the comparison with the other countries in 2007-2040 and that it consistently decreases in 2010-2040. Reducing future generosity of pension benefits has been one of the most important measures adopted to contain pension expenditure. The effect of this reduction contributes in a marked decreasing in the level of the pension expenditure (-5.5% in 2007-2060, see Table 2).

<table>
<thead>
<tr>
<th>Country</th>
<th>2007</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
<th>2060</th>
</tr>
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<tbody>
<tr>
<td>EU (27 countries)</td>
<td>49.7</td>
<td>50.9</td>
<td>49.7</td>
<td>46.8</td>
<td>43.8</td>
<td>41.4</td>
<td>40.1</td>
</tr>
<tr>
<td>Germany</td>
<td>51.4</td>
<td>50.4</td>
<td>49.7</td>
<td>45.9</td>
<td>42.9</td>
<td>42.5</td>
<td>42.5</td>
</tr>
<tr>
<td>Spain</td>
<td>57.8</td>
<td>62.6</td>
<td>65.2</td>
<td>61</td>
<td>57.2</td>
<td>54.5</td>
<td>52.2</td>
</tr>
<tr>
<td>France</td>
<td>63.3</td>
<td>63.3</td>
<td>57.7</td>
<td>52.9</td>
<td>50.3</td>
<td>48.3</td>
<td>47.5</td>
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<tr>
<td>Italy</td>
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<td>71.3</td>
<td>70.5</td>
<td>64.1</td>
<td>57.3</td>
<td>51.7</td>
<td>47.3</td>
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<tr>
<td>Sweden</td>
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<td>48.1</td>
<td>41.0</td>
<td>36.6</td>
<td>33.5</td>
<td>31.4</td>
<td>30.1</td>
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<tr>
<td>United Kingdom</td>
<td>34.6</td>
<td>34.6</td>
<td>34.9</td>
<td>34.5</td>
<td>34.2</td>
<td>35.8</td>
<td>37.1</td>
</tr>
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</table>

Table 5: Benefit ratio (Source: Commission service, EPC 2009).

5. How to assess the financial sustainability

The AWG projections (2009) show that last reforms of the Italian pension system have contributed to limit the future increase of the pension expenditure in an ageing context. Evaluations, which under used assumptions prospect pension expenditure stable or declining, suggest that the pension system is financially sustainable, namely that it is able to face its commitments towards its current and future.
participants under substantial equity among generations. Actually, when the pension system is PAYGO financed, the fulfilment over time of the pension promises would have to be supported by projections of stabilization of contributions levels so that the intergenerational equity is ensured.

Therefore, we consider more accurate indicators of the demographic burden, the Pensioners/Workers ratio and the degree of PAYGO covering of the pension expenditure by contributions (whose definition is recalled below).

**Pensioners/Workers ratio.** This indicator is directly linked to the old-age dependency ratio and the coverage ratio, while it is inversely linked to the employment rate, as one can see by the following

\[
Pensioners/Workers\ ratio = \frac{\text{Number of pensioners}}{\text{Number of workers}} = \frac{\text{Pop 65+}}{\text{Pop 15-64}}
\]

One can easily verify that Pensioners/Workers ratios are larger than the conventional old-age dependency ratio in all the considered countries, see Figure 2. In particular, Italy presents the highest value both in 2010 (0.6536, about twice the old-age dependency ratio value) and in the 2060 projection (0.9524, more than one half times the old-age dependency ratio). This is explained by considering that Italy has:

(a) very high values of old-age dependency ratio (the second highest old-age dependency ratio, very closed to the highest value of Germany);

(b) high values of the coverage ratio, although the recently adopted reforms have raised the standard age for the retirement and have provided with rules to automatically adjust the retirement age to life expectancy lengthening, and

(c) the lowest employment rate value, about 7 p.p. below to the average value for the EU-27 (the objective, fixed by the strategy “Europe 2020”, of an employment rate equal to 75% for age group 20-64 is well-far to be reached and this has obviously negative impact also on the pension expenditure).

![Fig. 2: Old-age dependency ratio and pensioner per contributor ratio in 2010 and in 2060.](image)

**Degree of PAYGO covering of the pension expenditure by contributions.** Following Angrisani (2008), it is defined as the ratio of contributions to the pension expenditure, namely

\[
D_{PAYGO}^{c} = \frac{\text{Contributions}}{\text{Pexp}}
\]

This indicator is inversely linked both to the Pensioners/Workers ratio and to the benefit ratio; hence, reduction of both ratios produces an increasing of the degree of PAYGO covering. Figure 4 shows the
expected trend of the degree of PAYGO covering, together with trends of the Pensioners/Workers ratio and the benefit ratio.

Fig. 3: Trends of Pensioners/contributors ratio, degree of PAYGO and Benefit ratio.

Over the projection period the demographic dynamics of the Italian pension system is characterized by the consistent increasing of the ratio between pensioners and contributors, which from 0.654 in 2010, after a short decreasing until to 0.645 in 2015, increases to about 0.95 in the last two decades. This means a support ratio of about 1.5 contributors for each pensioner in 2010, which in 2060 will be of only one contributor for each retiree. Although the adoption of the NDC reform will consistently contribute in reducing the benefit ratio (from 0.713 in 2010 to 0.473 in 2060), the consistent increase due to the demographic factor will have prevalent effects on the degree of PAYGO covering; this is projected in a significant decrease from 0.757 in 2010 to 0.675 in 2040. It has especially to be highlighted the “wave effect” on pensions which begins in 2020 and is marked in next two decades, namely starting from the time at which young workers, currently aged between 35-55 years, will be in retirement and now represent the more consistent age group of the whole working population.

Considering the above figures it is clear that the Italian pension system is, and will be, imbalanced. The disequilibrium size questions on the future sustainability under current rules for contributions and benefits. One has to remark that the Italian pension system, although exclusively based on PAYGO financing with a heavy additional contribution of the State which covers about the third part of the pension expenditure, is missing both of adequate control indicators of sustainability (based on the accrued pension liability) and of mechanisms to correct unbalancing due to adverse demographic or economic situations. This leads to the constitution of a very high and not controlled pension liability. Consequently, when the “demographic wave” will produce the increase of the retiree population, the high pension liability will fall on the younger generations of workers, which will suffer the iniquity of receiving lower pension benefits even if paid higher contributions and, hence, they will found resources to finance complementary pension benefits.

Hence, sustainability evaluations have to take into account the current (not projected) quantification of the pension liability, namely the commitments already taken up by unbalancing the pension system towards its participants, as the future pension expenditure is depending on the current liability. It is necessary to analyse the current pension system state by means of appropriate indicators of state and control, defined in a logical and mathematical framework so that the sustainability is not subject to the “goodness” of the adopted assumptions in the projections. We refer to the context of “logically sustainable” pension systems, introduced in Angrisani (2008). In this framework, variables of state and control are defined and specific logical-mathematical rules and conditions are provided to sustainability. On the contrary, sustainability evaluations based exclusively over pension expenditure projections can be misleading both because they are strongly depending on the underlying assumptions and they do not provide objective indications in order to eventual re-balancing of the system.
6. Conclusions

According to the population projections published by Eurostat in 2010, meaningful demographic changes in the age structure of population in Europe are forthcoming. In Italy old-age dependency ratios are expected in a strong increase, phenomenon especially emphasised because of the high increasing in life expectancy and the very low fertility rate.

The process of population ageing affects the Italian public pension system, which is exclusively PAYGO financed. Pension reforms over last decades have managed to control the future increase in the level of the pension expenditure, as the AWG projections (2009) show. However, the sustainability issue arises as future and foreseen imbalances, in particular due to the “wave effect” of the retirement of baby-boom generations, will put the pension system under pressure. There is the real necessity to define sustainability indicators promptly controlling the pension system state and to found sustainability on logical rules instead on projections.

7. References


