ITALY'S DEMOGRAPHIC DECLINE AND PROSPECTS FOR ECONOMIC GROWTH

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Abstract

The relationship between demographic and economic dynamics is complex. The projected ageing and shrinking of the Italian population in the coming years is not favourable to economic growth, but it does not have to translate into economic regress. The recovery of the large untapped labour potential (especially of women and older workers) and immigration flows may partly compensate for the shrinking population. However, it is productivity improvements that will ensure sustained increases in per capita income, as has been the case in Italy's post-war history. This will require reaping the benefits of technological progress while developing people's skills.

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Contents

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1. Introduction

"To what extent does a high rate of population growth impede the growth of per capita product?" asked Kuznets at the 1966 Symposium on Population Problems, a few years before he received the Nobel Prize in Economics (Kuznets 1967, p. 171). At that time, the dominant concern was that strong population growth could harm economic progress, especially in developing countries characterised by a shortage of capital and a surplus of labour (Birdsall 1989, p. 24). Today, the dominant concern is the opposite, at least in advanced countries facing falling birth rates and rapid ageing. A clear illustration of this change in perspective is provided by a recent Communication of the European Commission, which states at the outset: "In the coming years, the shrinking and continued ageing of the EU population risks negatively impacting the EU's long-term competitiveness" (2023, p. 2).

Demographers have long warned of the challenges posed by population decline. As Livi Bacci wrote a quarter of a century ago, "today's 1.5 children per woman cannot guarantee replacement, and so the road to decline is open; European societies accustomed to abundant human resources are finding themselves at the end of the millennium in a much changed situation" (2000, p. 169). However, in Italy at least, there has been no consequent political action.

The first reaction of policymakers has typically been to focus on the factors holding back the fertility rate and to consider policies that could remove the economic, social or physical constraints to higher birth rates. The recent call by the French President for a "demographic rearmament" based on a strengthened childbirth leave and a plan to cope with infertility (Macron 2024) is a case in point, which is particularly significant given that France has one of the highest fertility rates in Europe and very generous family policies. The current downward trend in birth rates reflects many factors, not just economic ones: changes in individual preferences, the evolution of social and cultural models, and growing uncertainty about the future, both individual and collective – what Livi Bacci calls "… the *Zeitgeist*, the spirit of the times" (2024, p. 150). However, even if effective policies were adopted, a sharp increase in the birth rate would not resolve the generational imbalance in the medium term. Mobilising underutilised labour and immigration are the only options for alleviating labour shortages over the next two decades. The issue is highly politicised, and characterised by diverse and strongly held normative views, which make a positive analysis difficult.

In this paper, I take demographic decline – by which I mean a shrinking and ageing population – as a fact and ask what could prevent it from turning into a parallel economic regress. I define economic regress as a fall in average real per capita income, which is taken as a proxy for living standards. Note that different conclusions would be reached from the perspectives of public debt sustainability and geopolitical importance, since the absolute size of the economy matters here (aggregate income can fall even as per capita income rises if the population shrinks significantly). Furthermore, focusing on "average income" means ignoring the many valuable aspects of human well-being that this monetary indicator fails to capture (Sen 1993a, b) as well as the inequalities in income distribution that affect a community's standard of living (Brandolini and Vecchi 2013).

I consider the case of Italy, which is interesting for two reasons. First, the fall in birth rates and the increase in longevity have been particularly pronounced in Italy: the resident population has been falling since 2014 and is projected to fall by a further 7 per cent to 54.7 million inhabitants by 2050; the working-age population (15-64 years) would shrink much more, by more than 20 per cent or 7.7 million people, falling below the level of 1950 (Istat 2024, "median scenario"; Figure 1). If the employment rate remained at its 2024 level, there would be 5.4 million fewer people in work in 2050 than today. Italy's demographic decline is significant. The second reason for interest is that Italy stands out among the major advanced countries for having the worst economic performance in the last quarter of a century. According to OECD data, in 2024 real gross domestic product (GDP) per capita was, at constant purchasing power parities, only 6 per cent higher than in 2000, compared with 18 per cent in Japan, 19 in France, 23 in Germany, 21 in the United Kingdom and 37 in the United States. This persistent growth problem may make it more difficult to counteract the negative effects of the demographic decline.

The paper is organised as follows. In Section 2, I present a simple growth accounting framework for Italy from 1950 to 2024, which helps us relate economic development to key demographic and labour market variables. In Section 3, I apply this accounting framework to evaluate the implications of Italy's projected demographic changes for its economic outlook around the middle of the century. In particular, I consider four variables at the intersection of demography and labour: the boundaries of the working age; the employment rate; the working time; and net migration flows. In Section 4, I deal with labour productivity, and its relationship with workers' individual characteristics and technological progress from the specific demographic perspective adopted in this paper. In Section 5, I conclude.

2. Demographic and economic growth accounting in 1950-2024

In order to assess the impact of demographic decline on economic development, it is necessary to go beyond the mere shrinkage of the population and to take into account other factors such as the attitude to participate in market activities and the time spent at work over the course of a year. An exercise in "growth accounting" helps to understand the relationships between some of the variables at stake.

I use gross national disposable income (GNDI) per capita at constant prices, or real GNDI per capita, as a summary measure of living standards. GNDI is a better measure of the income accruing to a country's residents, and hence of their standard of living, than the more commonly used GDP, because it includes all net income from abroad: compensation of employees, property income and other transfers, including remittances (more precisely, both the primary and secondary incomes recorded in the current account of the balance of payments). The inclusion of remittances is important not only in developing countries (Capelli and Vaggi 2016), but also in advanced countries, where they can represent a significant international income outflow. On the other hand, the proliferation of cross-border transactions and tax-planning practices by multinational enterprises has exposed the limitations of GDP as an indicator of a country's income (e.g. Tedeschi 2018). In the absence of a specific deflator, GNDI at constant prices is obtained by using the GDP deflator.

As a measure of output, I use the gross value added at factor cost less imputed rents of owner-occupied dwellings (VAFC). Gross value added at factor cost corresponds to the remuneration of the factors of production and differs from value added at market prices, or GDP, in that it excluded taxes on production and imports net of subsidies; imputed rents are deducted because they represent the valuation of the housing services consumed by homeowners and are therefore not part of production (and would misleadingly inflate profits).

The relationship between GNDI and VAFC is therefore as follows:

$$\begin{aligned} \text{GNDI} \quad = \quad & \text{VAFC} + \text{imputed rents of owner-occupied dwellings} \\ & + \text{taxes on production and imports less subsidies} \\ & + \text{net receipts from abroad} \end{aligned} \quad . \tag{1}$$

Identity (1) shows that part of GNDI is represented by the income flows attributable to net taxes and international transactions, another part is the valuation of non-produced dwelling services, and the third part is the result of economic activity. This last component is by far the most important, with VAFC accounting for 80 to 90 per cent of GNDI over the period considered. In turn, VAFC is the product of the amount of work done in a country and of its productivity, where the amount of work depends on the average hours worked by those in employment, the proportion of people of working age who are in employment (the employment rate) and the size of the working-age population.[1]

In summary, GNDI per capita can be broken down as follows:

$$\text{(2)} \qquad \frac{\text{GNDI}}{\text{POP}} = \left(\frac{\text{GNDI}}{\text{VAFC}}\right)\left(\frac{\text{VAFC}}{\text{HW}}\right)\left(\frac{\text{HW}}{\text{EMP}}\right)\left(\frac{\text{EMP}}{\text{WAP}}\right)\left(\frac{\text{WAP}}{\text{POP}}\right),$$

where POP is the total population, HW is the total hours worked, EMP is the total employment, and WAP is the working-age population. The last factor is the inverse of the dependency ratio (plus 1), that is the ratio of the number of children and old people to the number of adults aged between 15 and 64 years, the limits conventionally used to identify the working-age population.

Expression (2) is the identity used here to examine the relationship between demographic change and economic development. By taking all variables in natural logarithms and denoting real GNDI per capita by y, the ratio of real GNDI to real VAFC by v, hourly labour productivity by p, hours worked per person employed by h, the employment rate by e, and the ratio of total population to working-age population by d, the growth in real GNDI per capita can be approximated by the logarithmic difference and decomposed as follows:

$$\text{(3)} \qquad \Delta y = \Delta v + \Delta p + \Delta h + \Delta e - \Delta d.$$

Note that the logarithmic changes of v reflect the different dynamics of the GNDI and VACF deflators as well as the variations in the nominal flows that make up the difference between the two aggregates. Leaving aside this term, expression (3) shows that the income available to each inhabitant *on average* grows either because people are more productive (Δp) or because more people are employed (Δe) or work longer (Δh), or a combination of these circumstances, but after deducting the part of the product that *on average* goes to those who do not work (Δd).

[1] This breakdown maintains the standard statistical definitions, according to which employed persons are those who, during the reference week, worked at least one hour in a market activity for remuneration in cash or in kind (including regular collaborators of a family business even if unpaid). The measure of the employment rate can be generalised to take into account both the hours actually worked (Brandolini and Viviano 2016a) and the work done in non-market activities (Brandolini and Viviano 2016b).

The breakdown in (3) is useful for describing some aspects of Italy's economic development after the Second World War (see the Statistical Annex for details of the underlying data). From 1949 to 2024, real GNDI per capita increased by a factor of 6.5, at an average annual rate of 2.5 per cent: the increase was entirely due to improvements in labour productivity, only slightly offset by a reduction in the hours worked per person employed. This result stems from different developments over the period (Figure 2). The pace of real GNDI per capita growth averaged around 5.6 per cent per year in the two decades of the "economic miracle", gradually decreasing to 1.4 per cent in the 1990s and 0.2 per cent in the first two decades of the 21st century, marked by the global financial crisis of 2008-09 and the sovereign debt crisis of 2011-13. In 2020-24, the functioning of the economy was severely altered by the COVID-19 pandemic: the collapse of activity during lockdowns was followed by a recovery so strong that real GNDI per capita grew by an average of 1.1 per cent per year over the whole five-year period.

The slowdown in GNDI per capita largely mirrored the slowdown in labour productivity. The GNDI/VAFC ratio had a negligible impact, except in the last period[2]. The contribution of hours worked per person employed was almost always negative, particularly in the 1970s, due to the reduction in contractual working time, and in the 2000-19 period, due to the spread of part-time and temporary jobs. The contribution of the employment rate was also negative in the 1950s and 1960s, but has become positive in the current century. In short, more people have been working since the early 2000s, but for less time on average. The evolution of the dependency ratio made a positive contribution to economic growth in the 1980s as the baby-boom cohorts entered the labour market, but has had a dampening effect since the beginning of the millennium due to the gradual ageing of the population.

The decompositions just described depend on many approximations. The underlying data are far from homogenous over time: while data from 1995 onwards are fully consistent and in line with the current version of the System of National Accounts ESA 2010 (Eurostat 2013), those for earlier years are elaborations based on data drawn from different sources, as described in the Statistical Annex. More importantly, the variables identified are not independent but influence each other. For example, the number of hours worked may affect

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[2] Over the period 2020-24, real GNDI per capita grew by 0.4 percentage points less than VAFC due to the dynamics of the GNDI/VAFC ratio; without this effect, real GNDI per capita would have grown at a rate comparable to that of the 1990s.

hourly productivity and vice versa; higher immigration may limit the rise in the dependency ratio but may also reduce the GNDI/VAFC ratio, as remittances increase.

Once these limitations are taken into account, the decomposition clearly shows that productivity growth is the key variable in improving living standards. The same decomposition helps us to assess how demography may affect economic development in the near future.

3. Demographic scenarios and economic outlook around mid-century

As seen, according to the median scenario of the latest Istat projections (2024), the population living in Italy in 2050 will be 7 per cent lower than in 2024. However, the most critical aspect for the economy will be the significant change in the demographic composition, with the number of people of working age falling by a fifth to 29.7 million and the dependency ratio rising from 58 to 84 per cent. If nothing else changes, the increase in the number of children and elderly people from the current 6 to almost 9 for every 10 people of working age would result in a fall in real GNDI per capita of 0.59 per cent per year over the next quarter of a century. If these projections come true, demographic trends would take a heavy toll on the country's standard of living.

This result depends on the assumption that all other variables remain unchanged and that the hypotheses underlying the population projections are accepted. With regard to the latter, Istat explains that "the probabilistic method adopted is based on the opinions of experts (expert-based model) to define the future evolution of the most important demographic indicators. ... This model … is based on the elicitation of a series of parameters from which the future stochastic evolution of each demographic component is derived" (2024, p. 13). Thus, the total fertility rate in 2050 is 1.38 in the median scenario, but the 3,000 simulations of the model produce values ranging from 1.1 to 1.75 (see Istat 2024, Figure A1, p. 14). These projections are undoubtedly surrounded by considerable uncertainty, but the uncertainty is not sufficient to change the overall pattern, as shown by the 90 per cent confidence intervals in Figure 1. In particular, it does not overturn the prediction of demographic decline even in the most favourable scenario.

The birth and mortality profiles used in the projections are important parameters in the estimates, but my focus here is not on these variables. Rather, I look at four factors that lie at the intersection of demography and labour to assess whether changes in their current patterns could alter the economic outlook: the boundaries of the working age; the employment rate; the working time; and net migration flows.

3.1. The boundaries of the working age

The decomposition discussed earlier takes 15 and 64 years as the age limits between which people are expected to participate in the labour force. These limits are a long-established convention but are likely to be outdated. On the one hand, young people tend to spend much longer in education than in the past, making the lower age limit of 15 years too low. On the other hand, improved quality of life and health conditions make the upper age limit of 64 too strict. Since 2000, life expectancy at 65 has increased by about 3 years to 20 years for men and by 2 years to 23 years for women, despite the temporary decline caused by the COVID-19 pandemic. If life expectancy is adjusted to take account of health problems that may limit individuals' ability to carry out their usual activities, both men and women aged 65 can expect to live an average of 10 more years without limitations. Compared with 2008, the first year for which data are available, this indicator has increased by an average of 1.6 years, which is the same increase than that that observed for (unadjusted) life expectancy (the improvement is more pronounced for women than men). Years lived in good health therefore account for the entire gain in life expectancy since 2008.

These observations provide some grounds for reconsidering the traditional age boundaries. The issue was debated in the preparatory work for the Europe 2020 strategy, which eventually included the target of 75 per cent of the EU population aged 20-64 in employment by 2020 (European Commission 2010). While the lower limit was raised from 15 to 20 years, the upper limit was left unchanged at 64 years: the proposal to raise it by one or two years "… did not gain the support of Member States in the Employment Committee, who felt it was not the right moment to increase the upper boundary in the definition of working age, and consequently this issue was not explored further" (Medeiros and Minty 2012, p. 15). This is a good example of the political sensitivity of the issue.

In the end, these age limits are no more than a statistical convention, which only take on political salience when embedded in a policy target. In reality, the boundaries are blurred and evolving. The statutory retirement age for old-age pensions is already 67 years in Italy and is bound to rise in line with life expectancy: according to OECD (2023, Figure 3.8, p. 145), the normal retirement age for labour market entrants in 2022 would be 71 years, based on the established links with life expectancy. Since 2000, the share of persons employed in the 65-69 age group has almost tripled to 16.1 per cent and that in the 70-74 age group has increased by a fourth to 4.1 per cent (Figure 3). These proportions are in line with the EU average for the former group and are only slightly below it for the latter. However, the number of people in employment would be around 370,000 higher if the employment rates in these age groups were to rise to the current German level, or around 720,000 higher if the Swedish level were taken as a reference.

In the decomposition of real GNDI per capita discussed in the previous section, employed persons aged 65 and over are counted in total employment. (As people in this age group are included in the numerator but not in the denominator, the employment rate in Figure 2 is slightly overstated on that account.) If the employment rates in the 65-74 age group in 2050 were assumed to be the same as in Germany in 2024, we would have 390,000 more people in employment: other things being equal, this would translate into a higher annual growth in real GNDI per capita of 0.07 percentage points between 2024 and 2050. With the higher Swedish rates, the additional employment would be 750,000 persons and income growth would be 0.13 percentage points higher per year. These estimates are simple ceteris paribus extrapolations of current patterns in other European countries and do not take into account the progress that could result from improved physical and mental health conditions.

3.2. The employment rate

The employment rate in decomposition (3) is calculated as the ratio of total employment from national accounts to the resident working-age population. This employment rate is a spurious measure that differs from the standard labour force statistic for at least four reasons, apart from discrepancies in statistical methods and definitions. First, as mentioned above, it includes in the numerator employed persons aged 65 and over. Second, it includes all persons engaged in any productive activity in the economic territory: it therefore includes non-resident frontier and seasonal workers, but excludes their Italian resident counterparts.[3] Third, it includes all foreign workers with a residence permit who are not registered at the registry office and therefore cannot be selected for the Labour Force Survey (LFS), as well as all irregular immigrants working in the country. Fourth, it includes all resident workers living permanently in an institution and conscripts, who are part of the general government

[3] According to national accounts definitions (Eurostat 2013, 11.17 and 11.18, pp. 308-9), frontier workers are people who cross the border daily to work in a neighbouring country, while seasonal workers are people who leave their residence country for several months, but less than a year, to work in another country.

employees in the national accounts. These factors help to explain why the employment rate used in the decomposition is higher than that estimated in the LFS, as shown in Figure 4. The gap between the two series is 2 to 4 per cent until the end of the 1990s and then widens to over 8 per cent, possibly reflecting increased immigration.

Looking at the LFS series that are typically used to assess the situation of labour supply, the employment rate has increased by almost 9 percentage points since the late 1970s. This modest upward trend has been entirely driven by the steady increase in female participation in the labour market, with the female employment rate rising from 35 per cent in 1980 to 53.3 per cent in 2024. Conversely, the male rate fell to 64 per cent in 2013-14; it has then increased to 71.1 per cent in 2024, but has remained 3 percentage points below the level of 1980.

Despite these improvements, Italy's employment rate is among the lowest in Europe, particularly for women. In 2024, the overall rate was 62.2 per cent compared with 72.1 per cent in the average of the other 26 EU countries and 77.5 per cent in Germany; the rates for women were 53.3, 68.2 and 74.1 per cent, respectively. In 2024, total employment would have been 3.7 million higher if Italy's employment rates had reached the average of the other European countries, and 5.7 million higher if they had reached the high level in Germany. According to decomposition (3), all else being equal, annual growth in real GNDI per capita would be 0.50 percentage points higher if Italy's employment rate converged to the European average by 2050, and 0.74 percentage points higher if it converged to the German level.

These comparisons show that there is apparently ample scope for increasing employment rates in Italy, but they are silent on the actual possibility of achieving this outcome in practice. A quick look at the employment rates in 2024 shows that they vary considerably by gender, age, educational level and main geographical area (Figure 5). Taking German rates as a reference, employment rates in South Islands are much lower, especially for women, while in the Centre North they are more similar, except for young people. For women aged 45-54 in the Mezzogiorno with at most lower secondary education, the employment rate is little more than a third of that of their counterparts living in the Centre North or in Germany. Low-educated women make up 17 per cent of the Italian working-age population but 31 per cent of the non-employed population; some of these women have never worked in the market. Finding work can be difficult for people with low levels of education and work experience, particularly in disadvantaged areas in the Mezzogiorno. At the other extreme, there is an anomalously large number of young people with a university degree, and therefore potentially better chances of finding a job, who are not in employment: 620,000 people, almost two thirds of them women, are in this situation in the 25-39 age group.

While these observations implicitly point to difficulties on the demand side of the labour market, problems on the supply side are no less important, as most of jobless people do not appear to want to work. According to the LFS data, 27.8 per cent of the working-age population, or 10.4 million persons, declared that they were neither looking for nor wanting a job in 2024; as a result, only 3.7 million non-employed persons were searching for a job or, if not searching, were available to work. The proportion of jobless people who did not want to work was lower among men and middle-aged persons; for all sexes and age groups, it was noticeably higher in Italy than in Germany (Figure 6; the data used in this graph follow slightly different definitions from those used above). There are several reasons for not wanting to work, many of which may be reversible as personal and external circumstances change. However, the observed large share of inactive people who do not want a job suggests that there may also be limits to raising employment rates on the supply side of the labour market.

3.3. The working time

The average number of hours worked by an employed person in a year has fallen considerably from over 2,100 in the 1950s to 1,700 in 2024 (Figure 7). This secular decline is due to two rather different factors. In the 1960s and especially in the 1970s it was driven by the actions of workers and trade unions to reduce working time. This was achieved at the beginning of the 1970s when national sectoral agreements provided for a reduction in the working week to 40 hours (see the series on contractual hours for the industrial sector). This reduction was fully, albeit gradually, transferred to actual hours worked (Bodo and Giannini 1985).

In the 1980s and 1990s, actual hours worked per year stabilised or even increased slightly. In the manufacturing sector the increase was largely due to a more intensive use of manpower: less reliance on the short-time work scheme (*Cassa Integrazione Guadagni*), which was widely used in the first half of the 1980s, and a reduction in the number of hours lost to industrial action and absenteeism (Casadio and D'Aurizio 2000).

Since the mid-1990s, the spread of various forms of "atypical work", often accepted in the absence of better jobs, has been the main factor behind the decline in hours worked. Between 1993 and 2024, the share of part-time jobs increased from 11.2 to 17.1 per cent, and for women from 21.0 to 30.0 per cent; on average, the number of hours actually worked per week in these jobs is almost half that of full-time jobs. Over the same period, the share of temporary employees rose from 10.2 to 14.7 per cent: for many workers, the alternation of short periods of employment and periods of non-employment means that the total number of hours worked over the year is much lower than in standard jobs.[4] While in the 1970s the decline in hours worked was fairly homogeneous across workers, as it was the result of nationally applied labour contracts, since 2000 the decline reflects a significant heterogeneity across workers (Bentivogli and Sestito 1997). The fragmentation of work experience is a major cause of the widening of the distribution of annual earnings among employees (Rosolia 2010; Depalo and Lattanzio 2023; Bovini et al. 2023).

The current average working week is still well above the 15 hours that Keynes (1931) predicted for his grandchildren, but it reflects a secular trend common to most advanced countries that is unlikely to come to an end. Indeed, one legacy of the COVID-19 pandemic has been the search for a better balance between work and private life. This has taken the form not only of a substantial increase in the amount of time spent working from home, but also of renewed calls for shortening the working week. In the United Kingdom 61 companies started a trial of a four-day working week in 2022, which is still in place for the vast majority of them (Autonomy 2024), while in Italy the reduction of working time has featured in many recent collective bargaining negotiations (Casadei 2024). These changes are unlikely to become the new norm any time soon, but they do suggest that an increase in working time is unlikely. However, the underutilisation of labour supply associated with many part-time and temporary jobs may be a more realistic way of increasing the labour input.

In 2024, 46.1 per cent of women and 61.8 per cent of men in part-time employment said that they took the job because they could not find a full-time job: this represents a potential labour supply of 3.9 per cent of total hours worked in the economy. If this underemployment were to be reabsorbed by 2050, that is if the share of part-time employment were to match its current voluntary component, the number of mean hours worked per employed would

[4] Using administrative data from the National Social Security Institute (INPS), Rosolia (2010, Table 1, p. 183) estimates that the average number of weeks worked per year by employees in the private non-farm sector fell from 42.5 in 1985-89 to 40.7 in 2000-04; the share of employees with at least two jobs in the year more than doubled from 7.4 to 18.6 per cent. Using a larger sample from the same source, Depalo and Lattanzio (2023, Figure 1, panel b, p. 12) calculate that the average number of full-time equivalent weeks worked fell from 42 in 1993 to 36.5 in 2021, while the number of contracts per employee rose from 1.1 to 1.34.

increase to almost 1,780 per year and the yearly increase in real GNDI per capita would be 0.15 percentage points higher over the next quarter of a century.

3.4. Net migration flows

Immigration is a recent phenomenon in Italian history. The proportion of the resident foreign population was just 0.6 per cent in the 1991 census, rose to 2.5 per cent in 2001, and reached 9.1 per cent in 2024, a figure that would exceed 12 per cent if immigrants who have acquired Italian citizenship in the last twenty years were included. Paraphrasing an official report on the situation in Germany in 1992, Billari observes that "Italy is *de facto* an immigration country, 'without an immigration policy and without a policy for integrating immigrants'" (2024, p. 83). The turning point came at the beginning of this century, when net migration became significantly positive (Figure 8).

In the median scenario of the Istat projections (2024), the growth of the resident population includes a significant net inflow from abroad which falls from a peak of 274,000 people in 2023 to 198,000 in 2030, and then stabilises at around 165,000 people per year from 2039 to 2050. These values, estimated on the basis of the flows observed in the five years 2017-19 and 2021-22 (excluding 2020 because of the anomalous pattern during the pandemic), may prove to be very imprecise in both directions, as suggested in Figure 8 both by the high variability of the historical time series and by the wide 90 per cent confidence interval. According to Istat projections, over the entire period 2025-50 immigration will increase the population by 4.7 million people in the median scenario, but estimates range from 3.1 to 6.4 million. In the extreme case, if net migration were zero and the composition of the foreign population remained exactly the same as in 2024, the total resident population would not reach 50 million in 2050 and the working-age population would be 3.7 million lower than projected in the median scenario. The dependency ratio would rise to 92 per cent and, other things being equal, the negative impact of demography on the annual growth rate of real GNDI per capita would rise to 0.75 percentage points. This case is clearly implausible, but it highlights the importance of migratory flows for the medium-term demographic balance.

Immigration has so far been crucial in offsetting the decline in the native population and filling the gaps that have gradually emerged in the Italian labour market. In 2024, the share of foreign nationals in total employment was 10.5 per cent, but reached 15.1 per cent in craft occupations and 30.1 per cent in unskilled occupations; it was 16.9 per cent in construction and 20.0 per cent in agriculture (these figures do not include foreign-born persons who have acquired Italian citizenship). The proportion of foreign workers in elementary occupations was 29.4 per cent, compared with 8.0 per cent of Italians; another 31.7 per cent were in craft and trade occupations, compared with 21.0 per cent of Italians (Figure 9). In a segmented labour market such as the Italian one, where large pockets of unemployment coexist with significant labour shortages, immigrant workers tend to be employed in lower quality jobs that are less acceptable to the native workforce. In short, native and immigrant workers are complements rather than substitutes, and the latter are overwhelmingly concentrated in low-paid occupations.[5] According to INPS data for the private non-farm sector in 2019, 35 per cent of workers in the bottom fifth of the distribution of weekly earnings were born abroad, compared with only 7 per cent in the top fifth (Figure 10). These estimates refer only to employees with a regular INPS contract: the contrast would be much sharper if irregular workers and agricultural labourers were included.

As a result of these labour market outcomes, as well as the eligibility conditions for many social transfers,[6] the living standards of immigrants are much lower than those of Italians, according to all available indicators. In 2023, controlling for differences in the household size and composition, the average disposable income of foreign adults was about two thirds of that of Italians; the incidence of absolute poverty, measured in terms of consumption expenditure, reached 35.1 per cent in households with only foreigners, 19.0 per cent in mixed households, and 6.3 per cent in households with only Italians; one child in 16 was poor in households with only Italians in the Center North, one in 8 in households with only Italians in the Mezzogiorno and one in 3 in households with foreigners. These figures are difficult to reconcile with the idea of integration.

The contribution of immigrants has become essential to the functioning of the Italian economy. The question of their integration should be equally central. As Billari writes, “the

[5] This is the finding of earlier studies by Gavosto, Venturini and Villosio (1999), Ambrosini (2001) and Brandolini, Cipollone and Rosolia (2005). Docquier, Ozden and Peri (2014) estimate that immigration had no impact on the earnings and employment of Italian workers in the period 1990-2000 and Fusaro and López-Bazo (2021) find that the employment effect was negligible in the period 2009-17. In a study of 15 Western European countries including Italy, D’Amuri and Peri (2014) conclude that in the period 1996-2010 immigrants were mainly employed in manual and low-skilled jobs, allowing natives to move into more complex and better paid jobs.

[6] For example, with regard to the guaranteed minimum income schemes, the 10-year residence requirement foreseen in the “Reddito di Cittadinanza”, which was in force in 2019-23, was reduced to 5 years in the “Assegno di Inclusione”, the new measure introduced in 2024. However, in the transition from one measure to the other, the number of foreign households potentially eligible for benefits decreased significantly, as the relaxation of the residence requirement was more than offset by the tightening of other access criteria (Bovini, Dicarlo and Tomasi 2023).

integration of those who are already here, both new migrants and second generations, must … become a priority, at school and university, but also in society in general, in particular through the teaching of the Italian language. Then, by facilitating and promoting access to Italian citizenship"; this is because "today there are no other demographic options" (2024, pp. 122-3). Italy's ability to attract immigrants will depend not only on the performance of its economy, but also on the immigration policies implemented.[7]

3.5. A summing up

The previous evaluations are summarised in Figure 11. The first bar indicates how much the growth in real GNDI per capita between 2024 and 2050 would be reduced by the population decline projected by Istat in the median scenario, while the second bar indicates the corresponding value in the extreme and implausible case of zero net migration over the entire period. The other bars, on the other hand, indicate the extent to which the negative demographic impact could be reabsorbed through the use of potentially available, but currently unused, labour. These estimates are not forecasts nor do they outline future scenarios, but are simply an accounting exercise aimed at illustrating the size of the underutilised labour is in the Italian economy. They show that this amount is probably sufficient to offset, if activated, a large part of the negative effects of the projected demographic trends and to prevent them from translating into a decline in real income per capita. However, the latter can only grow if labour productivity increases.

4. Labour productivity

The importance of labour productivity for the country's economic prospects suggests a closer look at its determinants from the specific demographic perspective adopted in this paper. The output of an hour's work depends on people's efforts and abilities as well as on the organisation and the machinery used in production. Under standard, and demanding, assumptions, growth in hourly labour productivity is equal to the sum of the changes in capital intensity, weighted by the capital share of value added, and growth in total factor productivity. Formally

[7] Basso et al. (2025) review the key features of Italy's migration policies, evaluating their effectiveness in attracting and integrating immigrants against international benchmarks.

(4) $\Delta p = (1 - \alpha)\Delta k + \Delta\theta,$

where k is the logarithm of the ratio of the net capital stock to total hours worked, α is the labour share of VACF, and θ is total factor productivity. In line with the exclusion of imputed rents of owner-occupied dwellings from value added, the net capital stock excludes dwellings. In addition to the compensation of employees, the labour share includes the remuneration of the labour contribution of the self-employed.

4.1. Individual characteristics

In expression (4), total employment is treated as homogeneous, which is unrealistic given that people differ in many characteristics such as physical strength, psychological attitude, education, motivation, and so forth. Alternatively, employment can be measured in labour efficiency units by multiplying an index of labour quality, based on observable individual characteristics, by the number of hours worked. The change in the labour input in efficiency units, l, is then equal to the change in the index of labour quality, q, plus the change in total hours worked, o, or

(5) $\Delta l = \Delta q + \Delta o,$

where all variables are in logarithms. In this case, expression (4) is modified as follows:

(6) $\Delta p = (1 - \alpha)\Delta k + \alpha\Delta q + \Delta\theta.$

With a slight abuse of notation, θ continues to denote total factor productivity in (6), albeit net of changes in labour quality. Any increase in the human capital of employed persons, due to better health or education, shows up as a positive Δq, and thereby reduces the estimated total factor productivity. Expression (6) makes it clear that it is not only the input of raw labour that contributes to income growth, but also its qualitative characteristics.

In growth accounting exercises, the standard method of measuring labour quality is to use a Törnqvist index (e.g. U.S. Bureau of Labor Statistics 1993, p. 13; Zoghi 2010), which defines the annual growth rate Δq as follows:

(7) $\Delta q = \sum_{i=1}^{n} \frac{1}{2}\left(\frac{w_i C_i}{\sum_j^n w_j C_j} + \frac{w_{i,-1} C_{i,-1}}{\sum_j^n w_{j,-1} C_{j,-1}}\right)(\Delta c_i \text{-} \Delta c),$

where C_i is the number of persons employed with characteristic i and Δc_i is its logarithmic growth rate; Δc is the logarithmic growth rate of the total number of employed persons $C = \sum_{i=1}^{n} C_i$; w_i is the quality valuation of characteristic i; and the subscript -1 indicates values in the previous period. Variations in employment composition do not matter if each characteristic is equally valued, that is w_i=1 for any *i*. Otherwise, these variations may lead to a different growth path for labour productivity than that implied by considering only the dynamics of capital intensity and total factor productivity.

Unlike Section 3, which focuses on population decline in terms of the actual or projected fall in the number of hours worked, this framework allows us attention to account for observable individual characteristics that are likely to correlate with people's productivity. A well-established research tradition has considered the effects of employment composition: it has generally taken into account characteristics such as age, education, gender and employment status, and has relied on relative earnings to weight each characteristic.[8] This weighting choice assumes that earnings reflect productivity, as they would in a competitive labour market. Although this assumption is widely adopted, it may often be inappropriate. This is the case when a gender pay gap exists due to social and cultural norms or outright sex discrimination (Bertrand 2020). Likewise, the close link between wages and productivity is difficult to reconcile with the evidence first identified by Rosolia and Torrini (2016) that, after controlling for observable characteristics, real earnings at first employment have been declining for cohorts entering the labour market after the early 1990s, and that this initial disadvantage has not been offset by steeper career progression. It is equally debatable to assume a close relationship between earnings and productivity if, as suggested by Lazear (1979), workers agreed to be paid less than their marginal product early in their careers in return for correspondingly higher pay later on: in this case, the age profile would be steeper for earnings than for productivity, and the latter could not be inferred from the former.

On the other hand, it may be important to account for the relationship between individual productivity and age. If people's abilities diminish with age, at least after a certain age, ageing could hinder income growth, independently of the shrinking population. This is what Barbiellini Amidei et al. (2024) find for Italy. By examining the relationship between labour productivity and the age composition of the working-age population using aggregate data for the Italian regions over the period 1981-2011, they estimate a fairly pronounced hump-shaped

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[8] The U.S. Bureau of Labor Statistics (2024) classifies workers into 70 different categories based on age, education and gender. Each group is weighted according to its share of the total wage bill. The number of categories considered generally reflects data availability. For example, Jorgenson and Griliches (1995) and Dougherty and Jorgenson (1996) divided employment into twenty groups according to gender, employment status and educational attainment, while Bassanini, Scarpetta and Visco (2000) and Scarpetta et al. (2000) distinguished six categories based on gender and educational attainment.

age-productivity profile. Based on these estimates, they calculate that the change in the age composition is associated with a reduction in the annual growth rate of labour productivity of around 0.7 percentage points between 2000 and 2019 and 1.5 percentage points between 2019 and 2030. These effects are large, possibly implausibly so, when compared with the actual changes discussed earlier.

Rather than relying on indirect estimates based on aggregate data, the rate of physical or cognitive deterioration over a lifetime can be accurately measured by examining performance in specific individual sports at different ages. Fair (2007) used econometric techniques to analyse the best recorded times of US male athletes in the 100 metres and marathon at each age, as well as the best ratings of male chess players worldwide. He calculated that the performance of 100-metre sprinters declined by 17 per cent between the ages of 35 and 60, while that of marathon runners declined by 23 per cent; by contrast, the decline for chess players was only 5 per cent.

Clearly, Fair's estimates bear little relation to performance in ordinary workplaces. However, suppose for the sake of argument that they do capture how individual abilities change with age. What would future population ageing imply for aggregate labour productivity? Figure 12 illustrates the decline in the performance of persons between the ages of 35 and 65 in 100-, 200-, and 400-metre track events (sprint), all other running track events (run), and chess. No change in performance is assumed between the ages of 15 and 35, as no estimates are available for this age group. These age factors can be used to "price" the contribution of individuals at different ages in equation (7), so that the projected change in labour quality due to ageing can be calculated. Note that these age factors are applied to the total working-age population rather than to employment, for which no projections are available. Somewhat surprisingly, using these factors, the projected population decline between 2024 and 2050 is found to be smaller when measured in efficiency units than in numbers of people, regardless of the "sport" chosen to approximate age decline. While the working-age population falls by 20.5 per cent, the age-corrected decline is 20.2 per cent when using records in sprint races as a proxy for change in labour quality, 20.1 per cent when using records in other running races, and 20.4 when using performance in chess. This result simply follows from the fact that, over the next quarter of a century, the composition of the working-age population will shift in favour of the central age groups relative to the older age groups that are assumed to be less productive (Figure 13). Therefore, the ageing of the working-age population would slightly improve labour quality.

Note that in decomposition (6) these estimated age-induced changes in labour quality (discounted by the labour share α) would not result in a corresponding change in labour productivity, but rather an opposite change in total factor productivity. In any case, both the estimates derived from regional historical data and the, admittedly unrealistic, sport-based conjectures highlight that the measured impact of ageing on the adjustment for quality of the labour input is highly sensitive to the shape of the assumed age-productivity profile as well as to its interaction with the population age composition.

In fact, it is very difficult, if not impossible, to detect a clear pattern in the way productivity changes with age. As Ilmakunnas and his co-authors observe: “The productivity effects of ageing depend on the extent to which age-induced changes in cognitive and non-cognitive abilities are relevant for work performance” (2010, p. 135). Furthermore, the deterioration in working ability can be compensated by accumulated experience. Finally, it is difficult to isolate the individual contribution to production when it is carried out by a team using tools and machines.

On the other hand, chronological age is an unreliable indicator of physiological functioning due to significant differences in the way people grow older, as Kotschy, Bloom and Scott (2025) have recently emphasised. Thanks to advancements in quality of life and health care, cognitive and physical abilities have been found to improve among more recent demographic cohorts compared to previous ones, once they reach old age. For example, Beard et al. (2025) estimated that the cognitive, motor and vitality capacities of a 68-year-old participant of the English Longitudinal Study of Ageing born in 1950 were superior, on average, to those of a 62-year-old born in 1940. Thus, chronological age can lead to inaccurate conclusions regarding the economic effects of ageing, including its impact on individual productivity.

4.2. Technological progress

The decomposition of labour productivity according to (4), hence ignoring changes in labour quality,[9] shows that almost two thirds of its deceleration was due to total factor productivity (Figure 14). Total factor productivity grew by around 5 per cent per year during the 1950s and 1960s, by 2 per cent in the 1970s, and by less than 1 per cent in the subsequent

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[9] Brandolini and Cipollone (2001) show that adjusting for labour quality and capital utilisation affects the estimates of total factor productivity for the Italian economy over the period 1981-2000, yet not in a manner that overturns the evidence of a productivity slowdown.

two decades; after a decline in the 2000s, it then recovered but remained subdued. The contribution of the increase in capital intensity also fell from 2.7 per cent per year in the 1960s to around 0.6 per cent between 1980 and 2009, after which it became slightly negative. To the extent that total factor productivity can be seen as a rough measure of technical progress, much of Italy's income stagnation since the early 2000s can be attributed to the low capacity of its economy to keep up with rapid technological progress. However, the lack of investment after the sovereign debt crisis, particularly in the public sector, also played a role (see also De Philippis et al. 2022).

The slowdown in productivity growth has long been debated in Italy (e.g. Toniolo 2013; Crafts and Magnani 2013). Its discussion is beyond the scope of this paper, but two considerations are worth mentioning from the specific demographic perspective adopted here.

First, the capital investments needed to increase productivity go hand in hand with the adoption of new technologies, which can often lead to the replacement of human labour with machines. According to an OECD study (Nedelkoska and Quintini 2018), Italy is one of the most vulnerable developed countries, with 15 per cent of jobs at high risk of automation and a further 36 per cent with a high probability of being significantly transformed by technological progress. However, the feared massive job destruction does not seem to have materialised yet.[10] In fact, in a context of a declining working-age population automation could offer the possibility of achieving higher levels of productivity, compensating for the reduction in the labour supply. Technological progress responds to the conditions in which firms operate, and some analyses confirm that industrial automation in advanced economies has accelerated due to the relative scarcity of workers in prime-age groups, who are typically employed in manual tasks (Acemoglu and Restrepo 2022). Nevertheless, the central problem remains how to ensure that new ways of organising production serve the interests of the general population,

[10] This is clearly illustrated by the installation of industrial robots, which are automatically controlled, reprogrammable, and multi-purpose machines. Acemoglu and Restrepo (2020) calculated that for every industrial robot installed in the United States between 1993 and 2007, six jobs were lost, falling to three after accounting for the positive effects on labour demand in other sectors. Applying these estimates to Italy's current stock of industrial robots, almost 380,000 jobs should have been lost in the sectors that installed them. However, when Dottori (2021) replicated Acemoglu and Restrepo's analysis for the longer period 1993-2016, he found no significant effects on overall employment in Italy, although he did find that the proportion of new hires was lower in the manufacturing sector. Graetz and Michaels' (2018) estimates, which cover 17 countries including Italy, also show that installing robots did not reduce total employment, but it did reduce employment in low-skilled jobs. As to artificial intelligence (AI), its use in Italy is still too limited to have had a significant impact. Dalla Zuanna et al. (2024) estimate that around 30 per cent of Italian workers perform tasks that could potentially be replaced by AI in the future, while almost 40 per cent perform tasks that could be complementary to AI, particularly in health care and professional services. Consequently, the latter occupations could experience an increase in both productivity and labour demand.

rather than of a small elite, and provide the basis for widespread prosperity (Acemoglu and Johnson 2023).

Second, rapid technological progress reinforces the need to consider the accumulation of human capital as a lifelong investment. Throughout an increasingly long working life, new techniques will emerge and existing ones will swiftly become obsolete. Continuous training of adult workers is as important as formal education, in order to counteract the deterioration of acquired skills and provide the new skills needed to cope with complex technological transitions. Italy's educational attainment and competencies, as measured in international surveys of students and adults, are lower than in other advanced countries. This could hinder technological advancement and exacerbate inequalities between skilled and unskilled workers.

5. Conclusions

Demographers have long been warning about Italy's demographic evolution and the risks it poses to the economy and society. The most worrying trend in the coming years is the sharp decline in the working-age population. Without significant changes, this decline is likely to result in a decrease in the country's output, making it harder to maintain the current standard of living.

However, while many demographic trends cannot be altered significantly, this does not imply that economic regress is inevitable. The reduction in labour availability implied by demographic trends can be countered in various ways: by increasing labour market participation, especially among women and young people, which is still very low by international standards; ensuring regular migration flows while guaranteeing that foreigners who are already in the country and those who will arrive in the future can integrate fully; facilitating participation in the labour market even at older ages, thanks to improved health conditions and quality of life. Meanwhile, exploiting the opportunities for productivity growth offered by rapid technological progress in the general interest should be a priority.

Bloom et al. (2010) observed that: "In the long run, below-replacement fertility is likely to lead to age structures that are sub-optimal with respect to their economic growth implications. The exact magnitude of these effects depends on a host of demographic, social, and political factors. These factors critically shape the long-term development of age structure as well as the interactions between age structure and the economy" (p. 144). The key to preventing demographic decline from leading to economic decline is to address these factors, bearing in mind that individuals and firms tend to adjust their behaviour. There is ample scope for public policy action.

What really matters, however, is recognising that we have been moving towards a permanently different population structure. Rather than devising policies to revert to the old demographic "equilibrium", the true issue is to conceive and enact policies that can reconcile economic and social progress with an ageing and likely smaller population.

Statistical Annex

National accounts data for 1995-2024 are drawn from the Istat online database and refer to the September 2024 release (which includes the benchmark revisions with reference year 2021). For earlier years, all series are reconstructed backwards by applying the growth rates of the corresponding series in previous releases, taking 1995 as the link year. The sources of earlier series are as follows.

- Gross domestic product at market prices (GDP) and gross value added at factor cost, at current and constant prices, are drawn from Baffigi (2015). Gross value added at factor cost is adjusted by subtracting imputed rents of owner-occupied dwellings using sectoral estimates from Baffigi (2015) for 1949-69 and Golinelli (1996) for 1970-94; these estimates are not fully comparable but the impact of the differences is negligible.
- Gross national disposable income (GNDI) at current prices is the sum of GDP and net income from abroad, the latter being equal to the balance of primary and secondary incomes in the balance of payments as reconstructed by Tosti (1999, 2022); GNDI at constant prices is obtained by using the GDP deflator.
- The number of employed persons is taken from Giordano and Zollino (2021), while total hours worked is obtained by multiplying this series by the average annual hours worked by employed persons from the Penn World Table, version 10.01 (Feenstra, Inklaar and Timmer 2015); the missing value for 1949 is set equal to that for 1950.
- Net capital stock (excluding dwellings) is taken from Giordano and Zollino (2021).
- The labour share is the ratio of the sum of compensation of employees and the imputed labour remuneration of the self-employed to gross value added at factor cost (net of imputed rents of owner-occupied dwellings); the labour remuneration of the self-

employed is calculated by attributing to each self-employed the average compensation of an employee in the same sector. For 1951-69, the share is calculated using the sectoral estimates of Golinelli (1996); missing values for 1949-50 are set equal to that for 1951.

Data for the international comparison of GDP trends are from the OECD online database.

The total population and the share of working-age population from 1952 onwards are calculated as the average of the beginning- and end-of-year values of the Istat inter-censuses reconstructions, in line with standard practice in national accounts. For 1949-51, the total population is drawn from Istat historical time series, while the share of the working-age population is set at the 1952 value. Net migration is taken from Istat historical time series for 1950-2001 and from the Istat online database for 2002-23. Population projections with base 1/1/2023 are from Istat (2024).

Life expectancy at 65 is drawn from the Istat online database for 2002-23 and from the Eurostat online database for 1985-2001. Life expectancy without activity limitations at 65 is one of the BES indicators available on the dedicated page of the Istat website (update November 2024), where BES is the Italian acronym for Equitable and Sustainable Well-being (the BES project was launched by Istat in 2010). This indicator measures the average number of years that a person aged 65 can expect to live without suffering limitations in usual activities due to health problems, where the presence of limitations for at least the last six months is a self-assessment of the people interviewed in the Survey on Aspects of Daily Life. Healthy life years at 65 is the corresponding indicator estimated by Eurostat from similar information collected in the EU-SILC survey (EU Statistics on Income and Living Conditions). Although available since 1995, several statistical breaks affect the time series for this indicator.

All labour force statistics (employment rates for the total and broken down by age, sex, educational level and geographical area) are estimates from the Labour Force Survey. They are drawn from the Istat online database for Italy and from the Eurostat online database for Germany, Sweden and the EU as a whole, with two exceptions: the values for the Italian geographical areas in Figure 6 are calculated from the LFS microdata, as the Istat online database does not provide the desired disaggregation; the values for Italy in Figure 7 are drawn from the Eurostat online database to ensure comparability with the German values, as the definitions differ slightly between Eurostat and Istat. Some statistical discontinuities are adjusted by linking series in the first overlapping year.

The distribution of weekly earnings in Italy is estimated using a sample of microdata from the archives of the National Social Security Institute (INPS). The statistics on household income come from the EU-SILC survey and are drawn from the Eurostat online database, while the statistics on absolute poverty come from the Istat's Household Expenditure Survey and are drawn from the Istat online database.

The online databases of Istat (http://dati.istat.it/), OECD (https://data-explorer.oecd.org/) and Eurostat (https://ec.europa.eu/eurostat/web/main/data/database) were accessed on June 2025.

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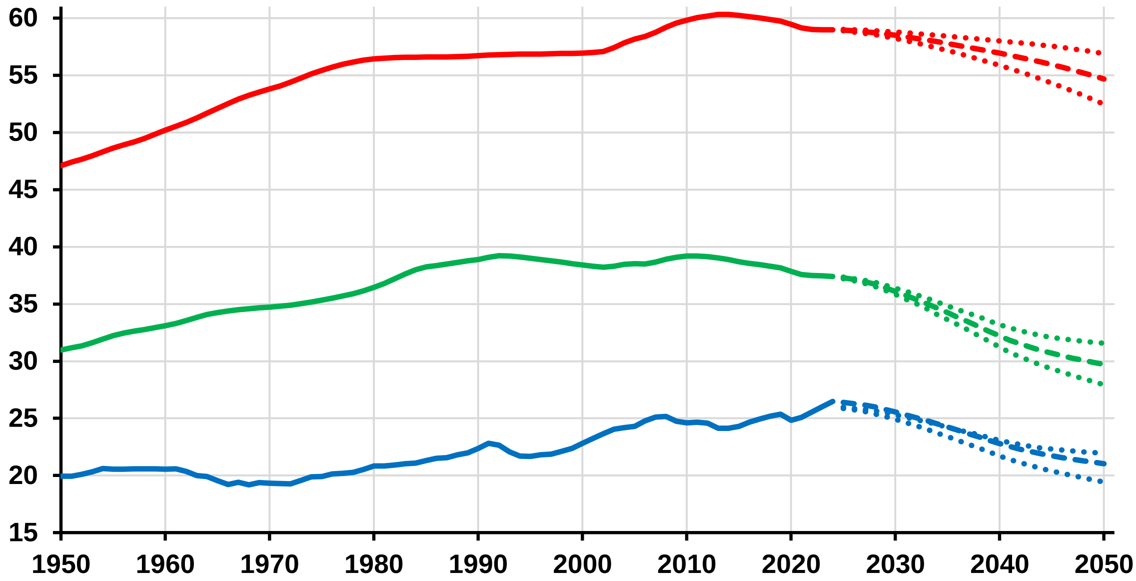
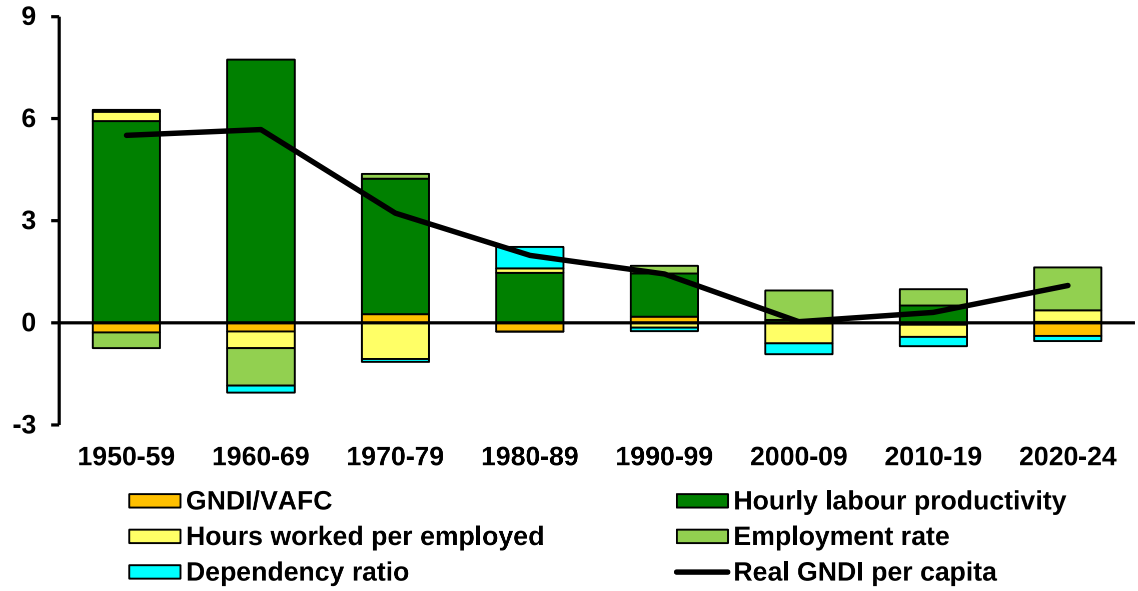
Figure 1: Population dynamics in Italy, 1950-2050 (million persons)



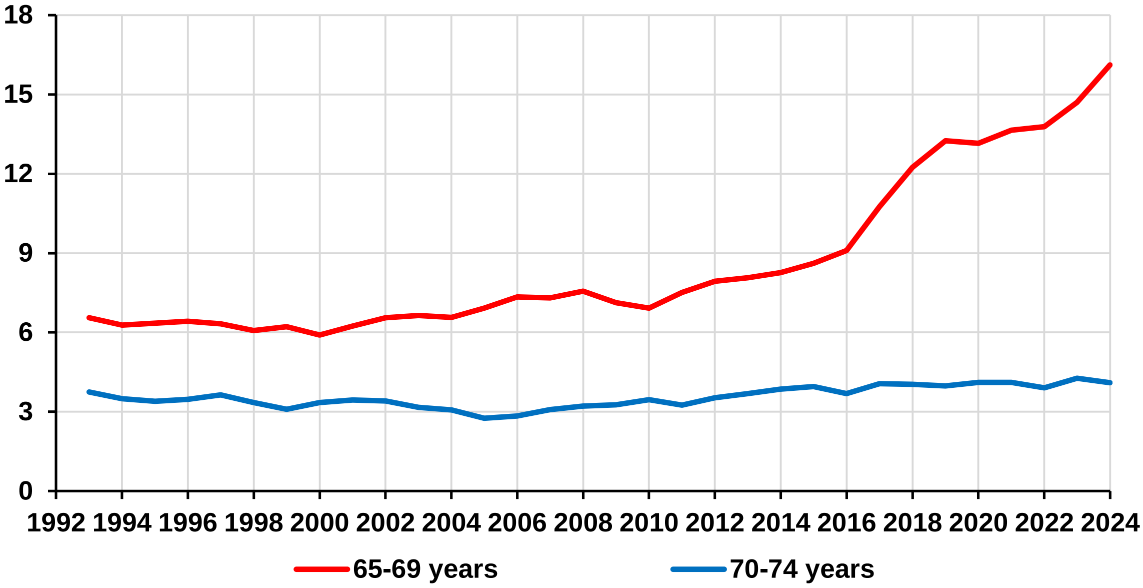
Source: see Statistical Annex. Dashed and dotted lines indicate median projections and 90 per cent confidence intervals, respectively; total and working-age population are Istat projections, while employment is calculated by simply multiplying projected working-age population in each year by the employment rate in 2024.

Figure 2: Growth accounting of real GNDI per capita in Italy, 1950-2024 (percentage points)



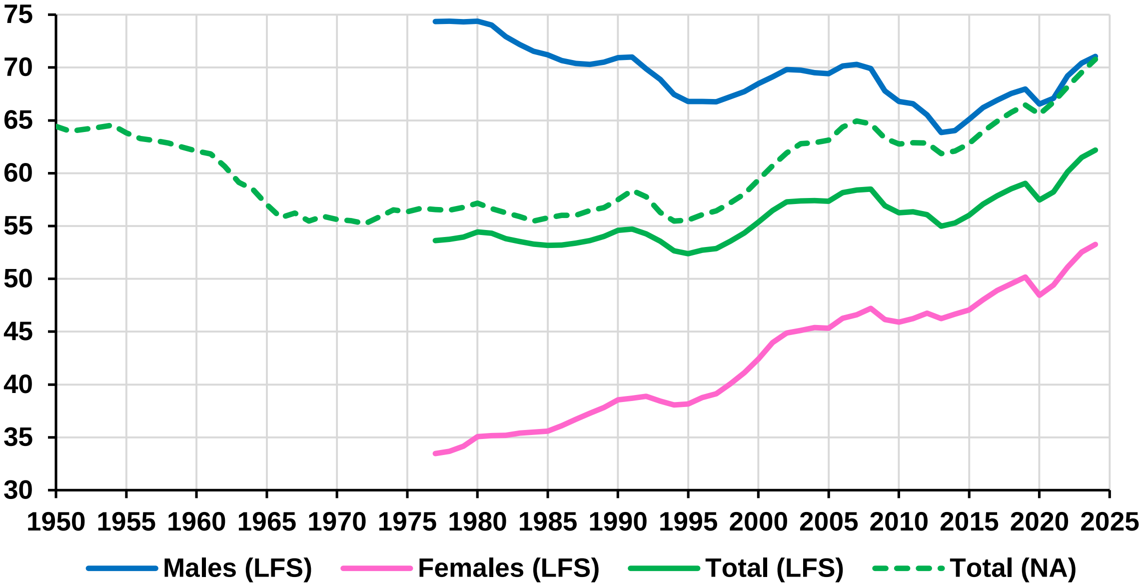
Source: see Statistical Annex. The graph shows for each period the mean annual change (approximated by the logarithmic difference) in real GNDI per capita and the breakdown into its components; the sum of the bars is equal to the value indicated by the solid line.

Figure 3: Employment rate of older age groups, 1993-2024 (per cent)



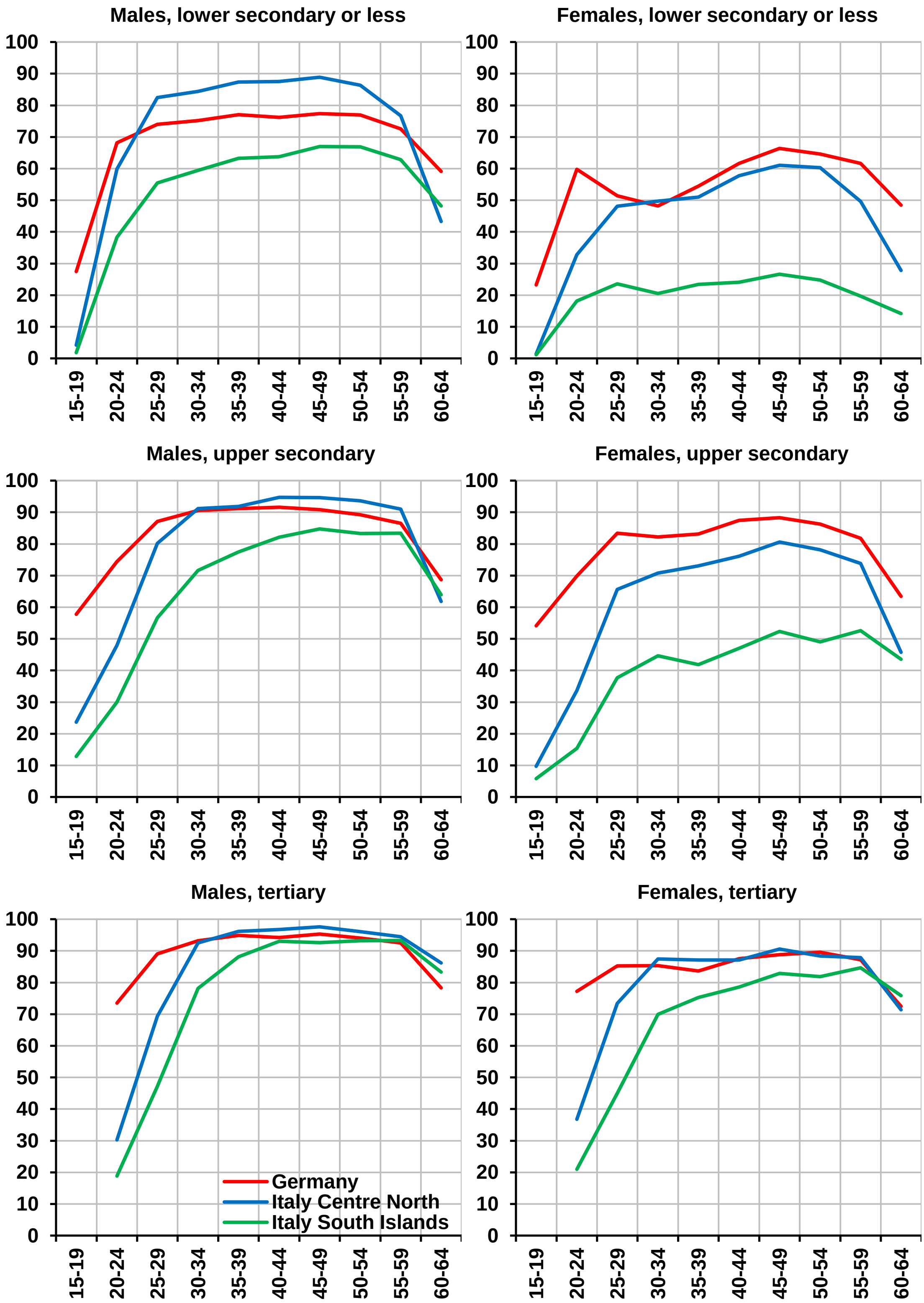
Source: see Statistical Annex.

Figure 4: Employment rate of working-age population in Italy, 1950-2024 (per cent)



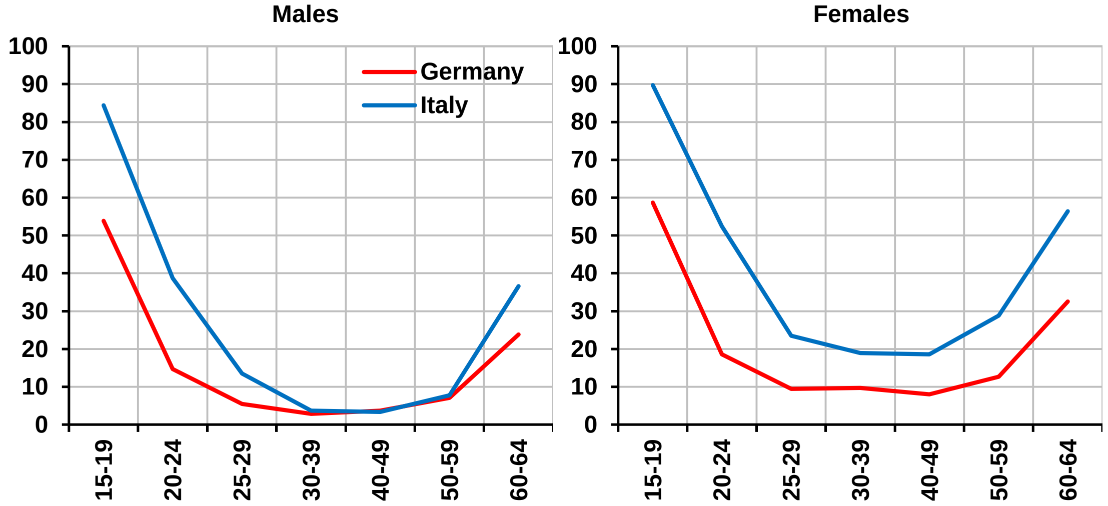
Source: see Statistical Annex. NA indicates the series based on national accounts used in the decomposition, while LFS indicates the standard statistics for working-age population estimated in the Labour Force Survey.

Figure 5: Employment rates by sex, age class and educational attainment level in Italy Centre North, Italy South Islands and Germany, 2024 (per cent)



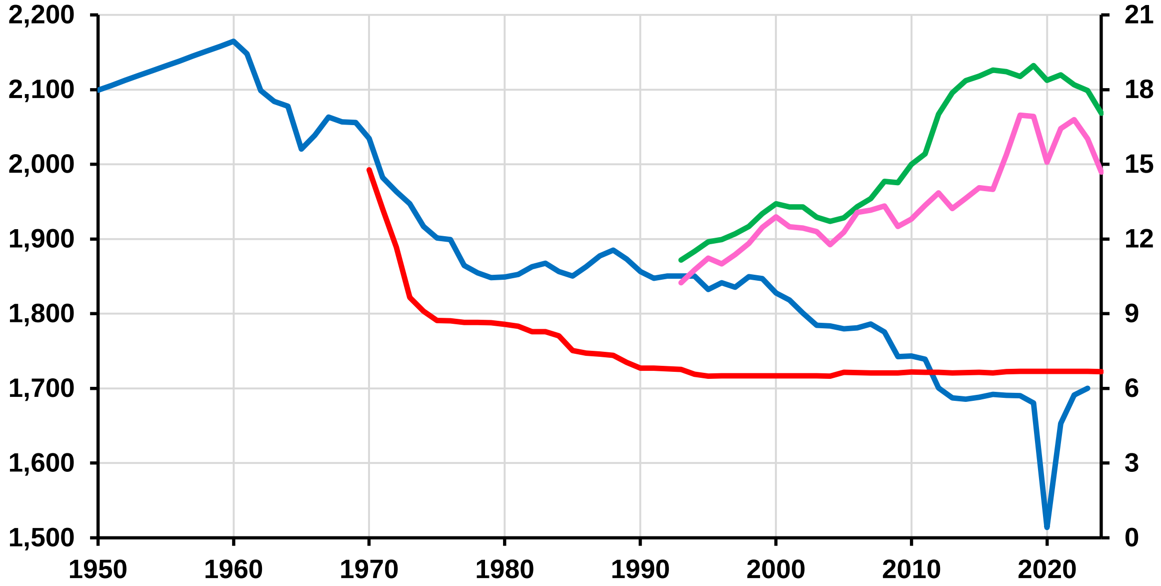
Source: see Statistical Annex.

Figure 6: Inactive people who do not want to work by sex and age class in Italy and Germany, 2024 (percentage share of the working-age population)



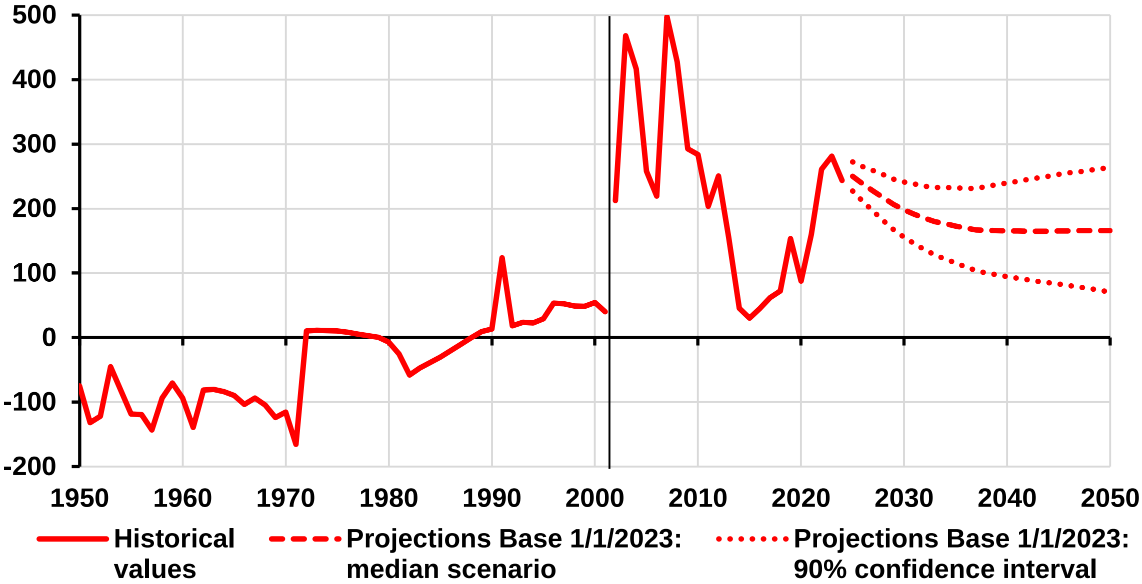
Source: see Statistical Annex.

Figure 7: Working time in Italy, 1950-2024 (number of hours and per cent)



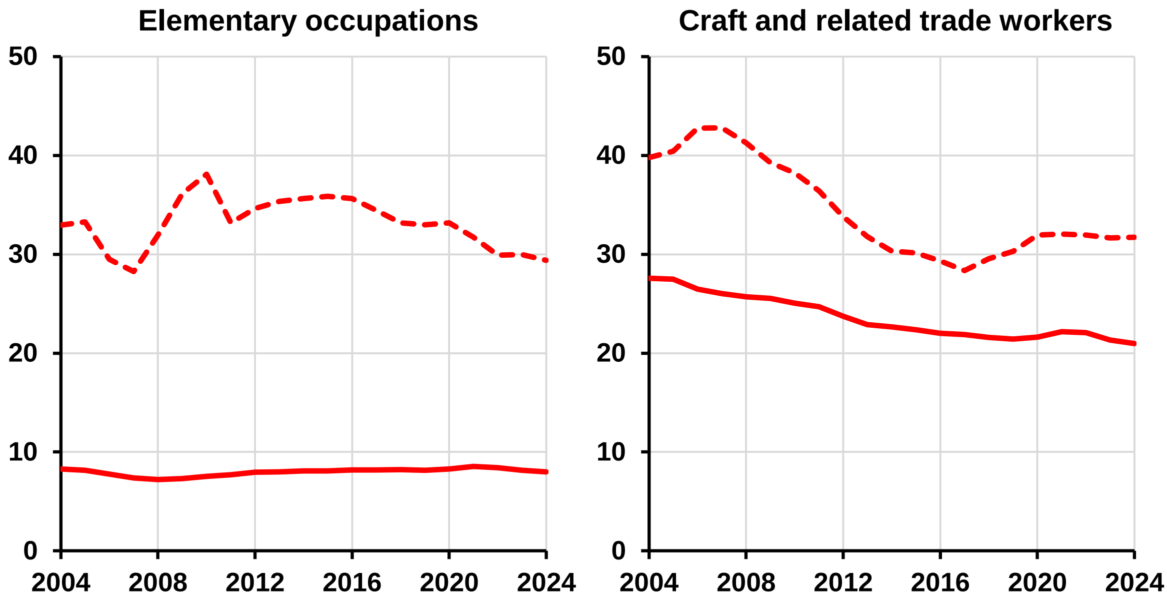
Source: see Statistical Annex. Hours worked: average annual hours of work per employed worker. Contractual hours: average number of hours of work agreed in national contracts in industrial sectors. Part time: share of part time employed workers (right-hand scale). Temporary work: share of temporary employees (right-hand scale)

Figure 8: Net migration in Italy, 1950-2050 (thousand people)



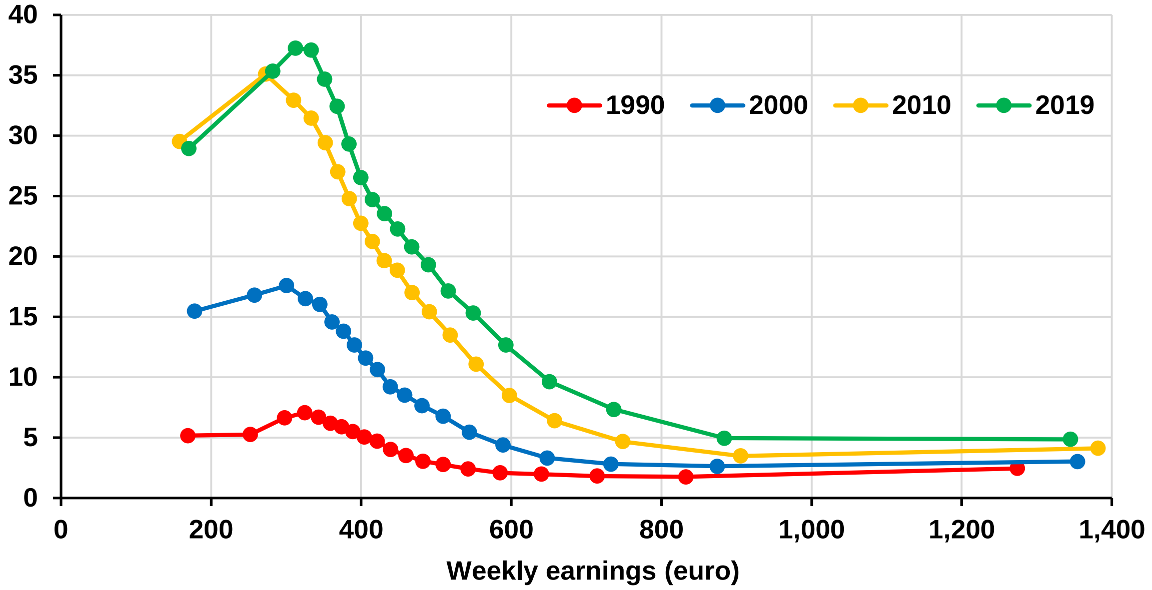
Source: see Statistical Annex. The vertical line indicates a statistical discontinuity.

Figure 9: Share on total employment for Italian and foreign citizens in Italy, 2004-24 (per cent)



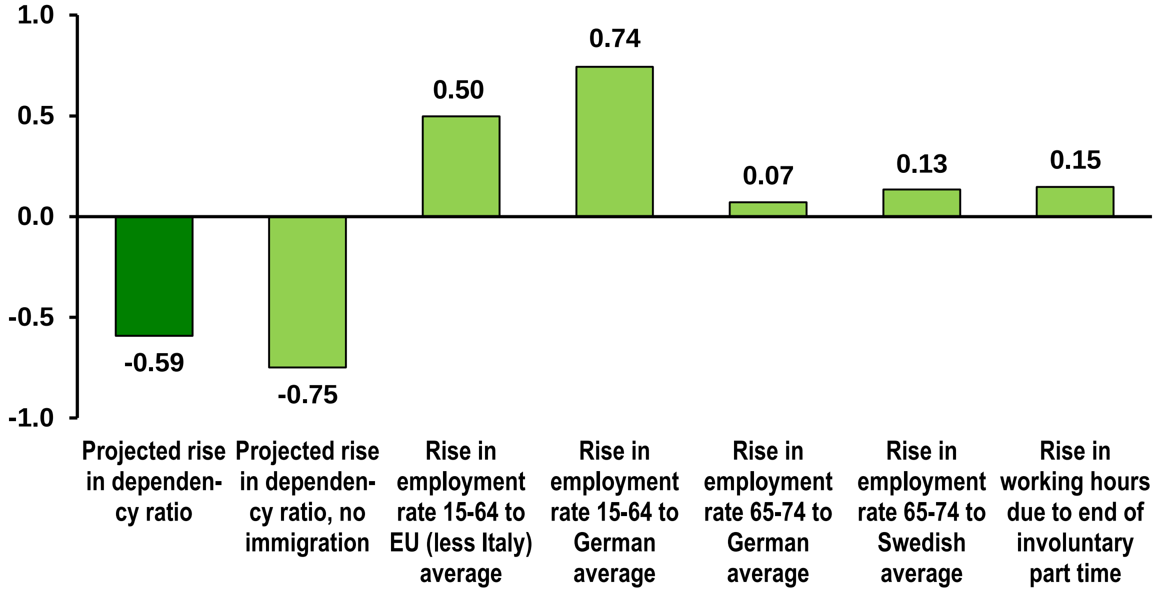
Source: see Statistical Annex.

Figure 10: Share of foreign-born employees in non-farm private sectors, by vingtile group of the distribution of weekly earnings in Italy, 1990, 2000, 2010 e 2019 (per cent)



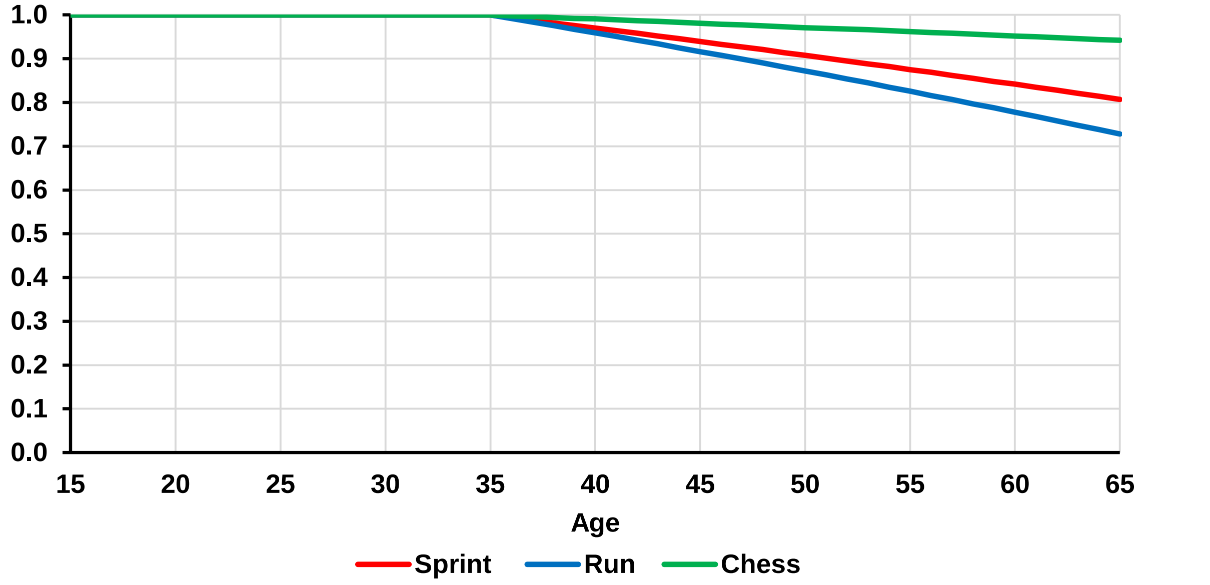
Source: see Statistical Annex. Workers aged 15-64 who have worked for at least five weeks; weekly earnings for full-time equivalent at 2015 prices (consumer price index). Each dot represents the mean value of the vingtile group.

Figure 11: Impact on the annual growth rate of real GNDI per capita of changes in the demography and labour evolution in Italy, 2025-50 (percentage points)



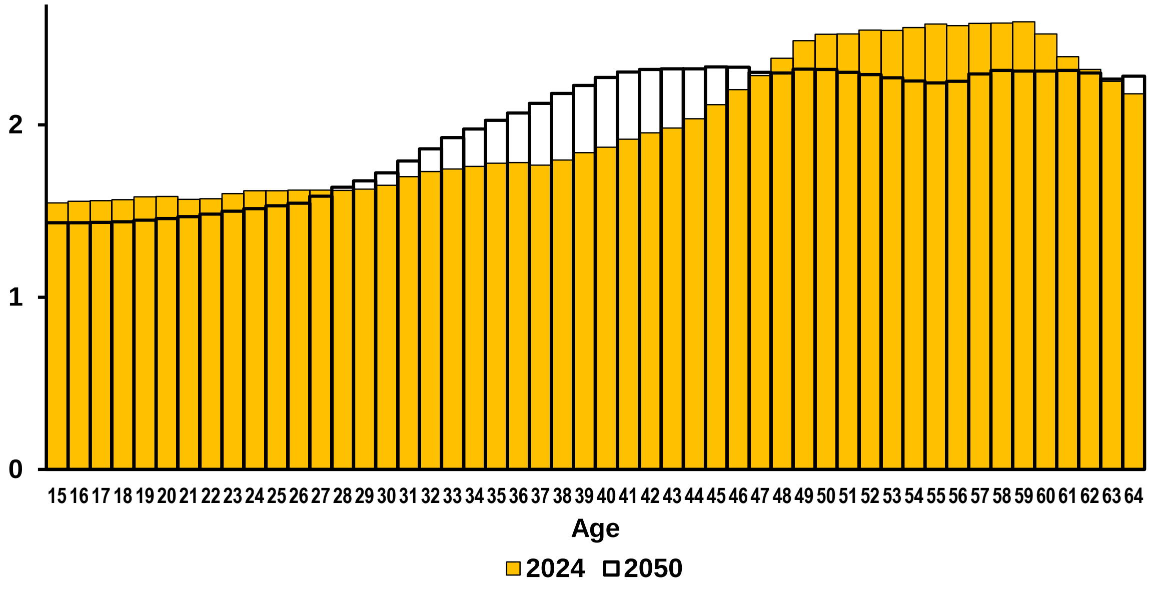
Source: author’s elaborations.

Figure 12: Age-decline in best performance of sportsmen (index: performance at age 35=1)



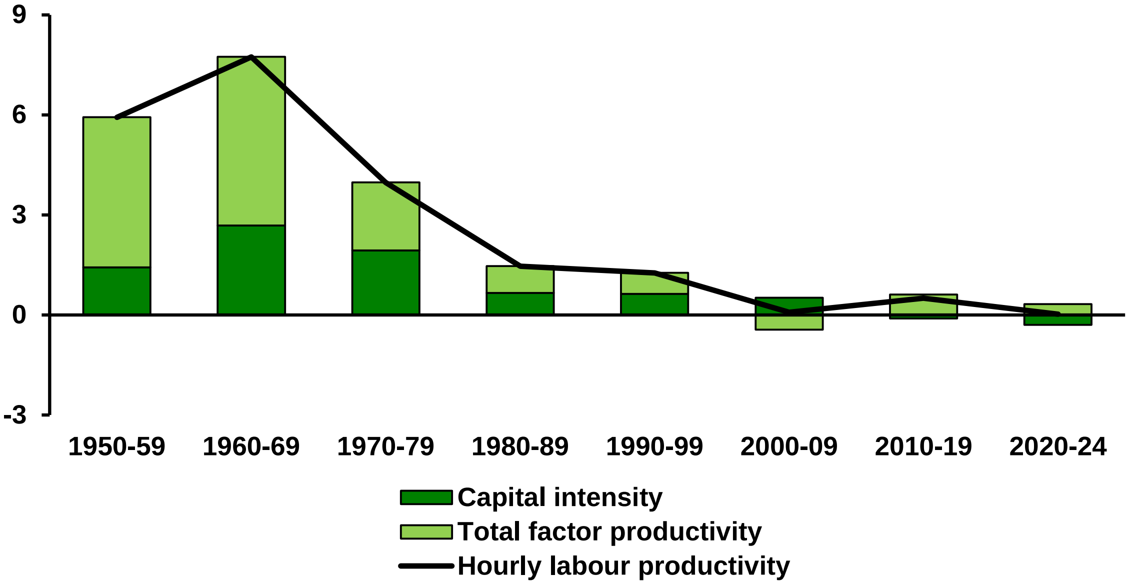
Source: author's elaborations on data from Fair (2007), Table 3, pp. 48-9. Sprint refers to 100-, 200-, and 400-metre track events, while Run refers to all other running track events. As Fair (2007) provides estimates of age decline for people aged 35 years or over, it is assumed that there is no age decline between the ages of 15 and 35.

Figure 13: Composition by age of working-age population (percentage points)



Source: author's elaborations. For each year, the bars add up to 100.

Figure 14: Growth accounting of hourly labour productivity in Italy, 1950-2024 (percentage points)



Source: see Statistical Annex. The graph shows for each period the mean annual change (approximated by the logarithmic difference) in hourly labour productivity and the breakdown into its components; the sum of the bars is equal to the value indicated by the solid line.