

AGING AND PRODUCTIVITY

POLICY BRIEF 09

Employment Skills and Productivity in Italy
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NEW SKILLS AT WORK
JPMORGAN CHASE & CO.

Aging and Productivity

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Policy Brief

Introduction

In the last two decades, yearly productivity in Italy has grown by a mere 0.21%. Italy is also one of the fastest aging countries in the world. In the last two decades, the share of individuals aged 65+ has increased from 13.3% in 1980 to 23% in 2017. Should population aging and the resulting aging of the workforce be a concern for productivity growth in Italy?

To assess the impact of aging on economic growth, a growth decomposition analysis can be used. This considers the effect of aging on labor force participation – both at the intensive margin (number of hours worked) and extensive margin (employment rate) – on total factor productivity (TFP) and on capital accumulation. Recent studies (Cooley and Henriksen, 2018, Maestas et al, 2016) suggest that the reduction in the rate of labor productivity growth induced by the aging process may indeed be large. In fact, besides a likely drop in the overall employment rate, lower productivity growth may emerge in aging societies due to individual productivity declining with age (Skirbekk, 2008). Moreover, aging may also lead to a reduction in innovation (Aksoy et al., 2019) and in entrepreneurship, both because older workers are less innovative and because they may tend to block younger workers from acquiring business skills (Liang et al., 2014). Finally, even in the presence of

technological improvements, an elderly labor force may be less able and willing to adopt these innovations due to skill obsolescence and lower adaptability (Hujer and Radic, 2005, Aubert et al. 2006).

In the brief, we focus on the age pattern of individual productivity and labor cost. We provide a snapshot of the current behavior of employers and employees in Italy with respect to two common strategies for elderly workers: development measures and retirement policies. Based on a comparison between the current Italian situation and the best international experiences, we offer some policy suggestions to sustain productivity in an aging society.

Do workers become less productive as they grow older?

Computing the shape of the age-productivity curve is a challenging exercise. Individual productivity is difficult to measure, as most jobs involve team tasks in which individual performance is either unobservable or hard to quantify. Moreover, even when individual productivity is measurable, as for instance in individual sports (van Ours, 2009), positive selection problems emerge, since mostly (or only) top performers continue to work (or play) until a late age. Finally, individual productivity, defined as a worker's ability to perform a given set of tasks, may not represent a useful economic concept. In fact, technological progress tends to modify the set of tasks required to produce efficiently – thereby reducing the market value of the worker's initial set of skills (OECD, 2006).

A more modest – but still useful – exercise is to measure the evolution of the individual skills that are likely to affect working productivity as

¹ This policy brief greatly benefited from the discussion that took place during the Round Table "Managing the ageing of the labor force: which business best practices?" I would like to thank the participants for their valuable contributions: Tito Boeri (Bocconi University), Laura Bruno (Sanofi), Chiara

Bisconti (consultant), Giuseppe Costa (Università di Torino), Pietro De Biase (Fiat Chrysler Automobiles), Alfio Filosomesi (Intesa San Paolo), Marco Leonardi (Università degli studi di Milano), Marco Manacorda (Queen Mary University) and Patrizia Ordasso (Intesa San Paolo).

individuals become older. It is widely recognized that physical skills decline with age (Skirbekk, 2008). However, technological progress and sectoral shifts from manufacturing to services have largely reduced the relevance of physical strength and increased the importance of cognitive skills. Studies on cognitive skills classify intelligence into fluid and crystallized (Cattell, 1971). Fluid intelligence indicates the ability to learn things independent of prior knowledge, while crystallized intelligence refers to acquired or learned abilities, such as knowledge and wisdom. Empirical evidence shows that crystallized intelligence increases steadily with age and peaks only in the mid-50s, whereas fluid intelligence peaks much earlier – in the mid-20s – and then steeply declines (see references in Skirbekk, 2008).

A useful tool for analyzing the difference in cognitive skills by age is the OECD Survey of Adult Skills (PIAAC), which measures literacy and numeracy for individuals aged 18 to 65. These two abilities represent cognitive foundation skills that require an integration of fluid and crystallized intelligence (Desjardins and Warnke, 2012). Literacy is defined as the ability to understand, evaluate and use written texts. Numeracy is the ability to access, use, interpret and communicate mathematical information and ideas. The objectives against which these abilities are tested is to participate in society and to manage the mathematical demands of adult life. According to 2012 PIAAC data for OECD countries (Paccagnella, 2016), individual literacy and numeracy peak in the mid-30s and then slowly decline: the average literacy score was 11% lower among the elderly individuals aged 55-65 (with a score of 257.5) than among individuals in the 25-34 age group (score of 289.3). Italy displays a similar age pattern, but at a below EU average level of

literacy: 233.4 among the elderly against 264.8 for the 25-34 age bracket. Data for numeracy show a similar relation, but with a larger drop in Italy, where the average numeracy among elderly individuals (229.2) was almost 14% lower than among individuals in the 25-34 age bracket (265.9). Problem solving in technology-rich environments, another ability measured in the OECD Survey of Adult Skills, instead peaks earlier – in the mid-20s – and then slowly declines².

The existing evidence thus suggests that cognitive skills have an inverted-U shape, with a peak that occurs at a different age for different skills. However, the shape of the age-productivity curve needs not to coincide with the age pattern of any of these individual skills. In fact, the individual on-the-job productivity of a worker is a complex mixture of several elements: individual skills, from cognitive to physical and soft skills; job and task specific knowledge, which may increase with age; but also the complementarity across workers, possibly of different age groups, that each production task may require.

Empirical analyses using large matched employer-employee datasets confirm the existence of a hump-shaped relation between on-the-job individual productivity and age, with job performance generally declining after fifty years of age (Skirbekk, 2008, de Hek and van Vuuren, 2011)³. Furthermore, studies of large Belgian firms using detailed matched employer-employee data found that firms' productivity was positively associated with the share of young workers and negatively associated with the share of older workers (Lallemand and Rycx, 2009).

Self-assessments of "work ability" by employees of different ages and employer perceptions of

² The PIAAC is a cross-sectional survey. Hence, it does not allow to study the evolution of cognitive skills by age for single individuals, but rather to evaluate, at a given point in time, the difference in cognitive ability among individuals of different age. Distinguishing between age effects – the direct consequences of growing older – from cohort effects – the

consequences of being born at different times – is thus problematic.

³ Some studies however suggest that individual productivity in work teams may not be decreasing at least until workers reach at least age 60 (Börsch-Supan and Weiss, 2016).

worker productivity can also be used to measure individual productivity. Both employers and employees assess the productivity of elderly workers to be lower than that of younger workers. In particular, elderly workers are rated lower in hard qualities – including flexibility, physical and cognitive skills – and in willingness to learn new technologies, but higher in reliability and social skills (Van Dalen et al, 2010). Additional existing evidence supports a decline with age of workers productivity in Finland (Ilmakunnas et al, 2010) and Norway (Solem, 2008).

An additional, major negative shock to the (declining) labor productivity of the elderly is change in the production methods induced by technological improvements. In these cases, the working experience (or procedural knowledge) of the elderly workers becomes less relevant and their skill obsolescence is made more evident and costly to the firm (Lovasz and Rigo, 2013, for Hungary). However, heterogenous effects may emerge among the elderly, with some workers performing well even in the presence of technological changes (Gordo and Skirbekk 2013).

The Cost of elderly workers

Since workers tend to become less productive as they become older, employers may try to reduce the wages of elderly workers to keep their labor cost close to their productivity.⁴ We use data from the 2011-14 EU Statistics on Income and Living Conditions (EU-SILC) to construct the (gross) hourly wage profiles by age for full time employees working 30 or more hours per week. Estimates reported in Figure 1 show that hourly wages are always increasing with age in Italy and in the average for the EU15, whereas they flatten out when workers reach their mid-fifties in France. This aggregate pattern masks important differences according to individual characteristics such as gender and education.

⁴ Although there may be several reasons for wage and productivity profiles of individual workers not to coincide at

As shown in Figure 2, these wage profiles largely differ according to educational attainments. College graduates enjoy a steeply increasing profile. Wages are lower, but the profile is still increasing, albeit at a lower rate, for high school graduates. For high school dropouts, instead, wages are on average lower – they peak when workers are in their late forties and then decline. These patterns are consistent with the varying impact that age may have on individual on-the-job productivity for individuals with different educational attainments.

Figure 1: Labor Hourly Wage by Age

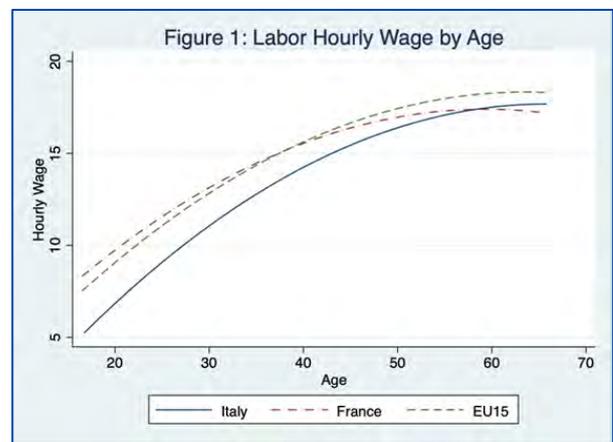
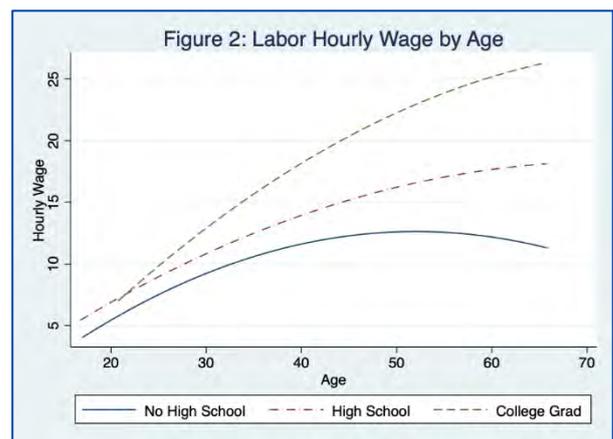


Figure 2: Labor Hourly Wage by Age



all ages (see De Hek and van Vuuren, 2011) employers will still have an incentive not to overpay elderly workers.

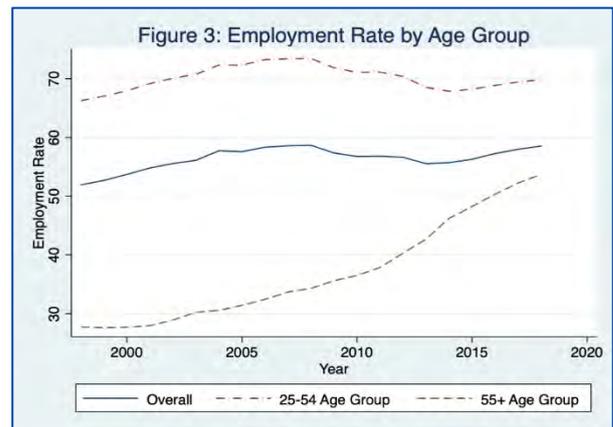
Comparing profiles of productivity by age and of wages by age is useful in addressing a crucial issue: whether older workers are overpaid. Empirical studies (De Hek and van Vuuren, 2011) provide (weak) evidence that the life-cycle wage profile is indeed steeper than the life-cycle productivity profile – thereby suggesting that elderly workers may be paid more than their labor productivity would command. This is in line with additional (strong) evidence that firms are less inclined to hire older workers and that, in case of unexpected takeover of the firm, the employment of older workers is reduced. Moreover, returns to tenure – and thus wages to elderly workers with a long working history – are larger in unionized sectors.

All this evidence seems suggestive of older workers being overpaid. In Italy, where unionization is strong in many sectors and employment protection legislation is high, employers have limited possibility of dismissing those elderly workers who turn out to be less productive and overpaid.

What do employers do?

Italian firms have long been concerned about elderly workers being paid more than their labor productivity commands. This concern has increased with the 2012 pension reform that eliminated several early pathways out of the labor market – thereby increasing the employment rate of the elderly workers, as shown in Figure 3. To address the possible mismatch between wages and productivity, two strategies are possible. Firms may try to implement workplace accommodation and development measures, which typically include some form of training, to improve individual productivity. Or they may try to dismiss the elderly workers – perhaps inducing them to retire early.

Figure 3: Employment Rate by Age Group



Data from the 2015 European Working Condition Survey (EWCS) allows us to assess the extent to which Italian firms invest in development measures in comparison with other European countries. Empirical evidence suggests that training in Italy is low, for all workers and also for the elderly. According to the 2015 EWCS data, in Italy only 15.2% of the interviewed workers had received on-the-job training in the previous 12 months by co-workers or supervisors to improve their skills, as opposed to 30% in the EU. Moreover, only 11.7% of the elderly workers, aged from 55 to 64 years old, had received this training, as opposed to 26.1% in the EU. A more detailed analysis using the EWCS data, presented in Figure 4, shows important differences in training decisions in Italy and in the EU. Among European countries, age represents an important factor in training allocation choice of firms. Compared to prime age workers (aged 36 to 54), young workers (18-35) were 5.5% more likely to receive training, whereas elderly (55-64) and very old (65+) workers were respectively 3% and 13% less likely to be trained. This strong age gradient did not appear in Italy – where the average level of training is however much lower than in EU countries. Workers who did not complete high school were less likely to receive training (by almost 5% in Italy and 8.8% in Europe). Instead, workers employed in jobs that involve learning new things were more likely to get trained (by

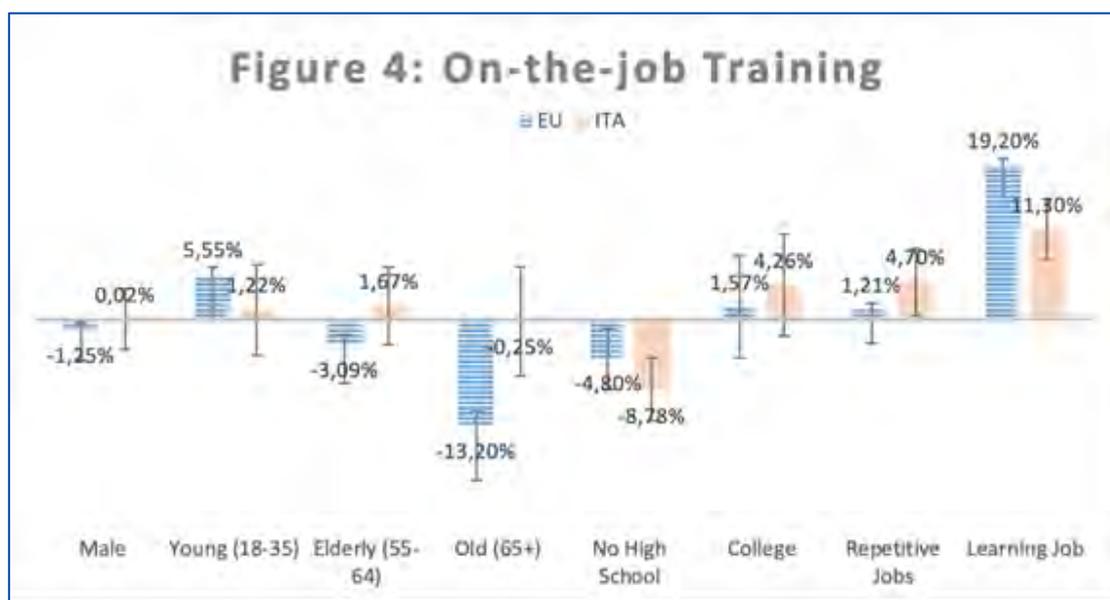
11% in Italy and 19% in Europe). Hence, offering training opportunities – particularly to elderly and less educated workers – does not seem to be a priority for Italian (and European) employers.

Rather than investing in development measures, firms may decide to reduce their demand for elderly workers. These negative labor demand shocks for elderly workers often occur in conjunction with the introduction of technological improvements or of a trade liberalization that modifies the opportunities for domestic firms in foreign markets. In these cases, firms seek more skilled workers and dismiss (or push toward retirement) elderly

workers, who show skill obsolescence and lower adaptability (Aubert et al., 2006, Bello and Galasso, 2018).

Which of these strategies – training or retirement – firms employ the most depends on the sector, on the country and also on the individual elderly worker under consideration. However, studies (Van Dalen, Henkens and Wang, 2014) using a survey of almost 3700 companies and organizations in 7 European countries shows that firms use predominantly early retirement.

Figure 4: On-the-job Training



What do elderly workers do?

Empirical evidence thus suggests that firms are not likely to offer training to elderly workers. But do elderly workers require – and demand – training to continue performing their tasks productively? Data from the 2015 European Working Condition Survey (EWCS) also allows us to gather information on individuals' perceptions regarding the skills needed on the job. In particular, the interviewed workers were asked whether they needed further training to

cope well with their duties. Not many interviewed workers believed they needed more training – 11.4% in Italy and 12.2% in the EU.

An analysis on EWCS data, presented in Figure 5, suggests that in EU countries the demand for training comes more from young workers (18-35) and less from elderly (55-64) and very old (65+) workers. This request was 10.7% more likely to come from workers involved in learning jobs

and 0.7% less likely from workers in repetitive jobs. Interestingly, these different perceptions on the need for training between young and old workers did not emerge in Italy. While young Italian workers are as concerned as their European colleagues, elderly workers in Italy are not as confident as their elderly European colleagues about possessing the right set of skills and thus not needing further training. In Italy, instead, high school dropouts believe they have enough skills, while college graduates, workers in repetitive jobs and workers in learning jobs demand more training.

These results are somewhat surprising, as they suggest that elderly workers (in Europe) and less educated workers (in Italy) are more confident about their working skills than younger and more educated ones. This evidence is however consistent with the idea that *tacit knowledge*, i.e., the knowledge used to solve everyday problems on the job, does not decrease with age (Skirbekk, 2008). Senior workers employed in repetitive jobs may feel confident about having the knowledge and the experience to continue to perform well in their task. However, if these working procedures change, perhaps due to technological progress, these elderly workers may find themselves at a disadvantage.

Since over a longer time horizon these technological changes are more likely to occur, it is useful to assess whether workers have the ability needed to work until a late age. Data from the 2015 EWCS allows us to obtain information on an individual's perception of their ability to perform their current job (or a similar one) until age 60 or, for respondents older than 55, for five additional years. In Italy, only 12.4% of the interviewed workers expected to be able to work in their current job until 60, against 15.4% of the workers in the EU.

A detailed analysis of the EWCS data, displayed in Figure 6, establishes the individual characteristics of the workers, who expect to be

able to continue to work until 60 years old or more. Among European workers, men, elderly workers (aged 55+), individuals in (self-assessed) good health, workers in learning jobs and individuals who agree that conflicts in the firm are resolved in a fair way were more optimistic about their possibility of being able to continue to work. Whereas a more negative assessment came from European workers who are young (18 to 35), did not graduate from high school and perform repetitive jobs.

The picture that emerges from the 2015 EWCS data for the Italian workers (see Figure 6) is slightly different. In particular, unlike their European colleagues, Italian elderly workers (55+) did not consider themselves more likely than prime age workers (35-54) to be able to perform their current job for long. Instead, workers who do not feel they possess adequate skills to perform their task and who thus require more training, were much less optimistic on their ability to work until late years.

Empirical analysis using EWCS data thus suggests that Italian elderly workers display a different behavior from their European colleagues. They are less confident about possessing adequate skills and thus require further training to cope well with their duties. Perhaps as a result, they are also less convinced than other European elderly workers about their ability to perform their current job (or a similar one) until 60 years of age.

Even if offered training – an unlikely event, as previously discussed – elderly workers do not seem motivated enough to learn new technologies and try to avoid the risk of being fired and thus incur high income losses (Hijzen et al., 2010). They seem to prefer early retirement. Empirical results presented in Box 1 using retirement data from a large Italian company in the service sector confirms these findings.

Figure 5: Lack of Appropriate Skills

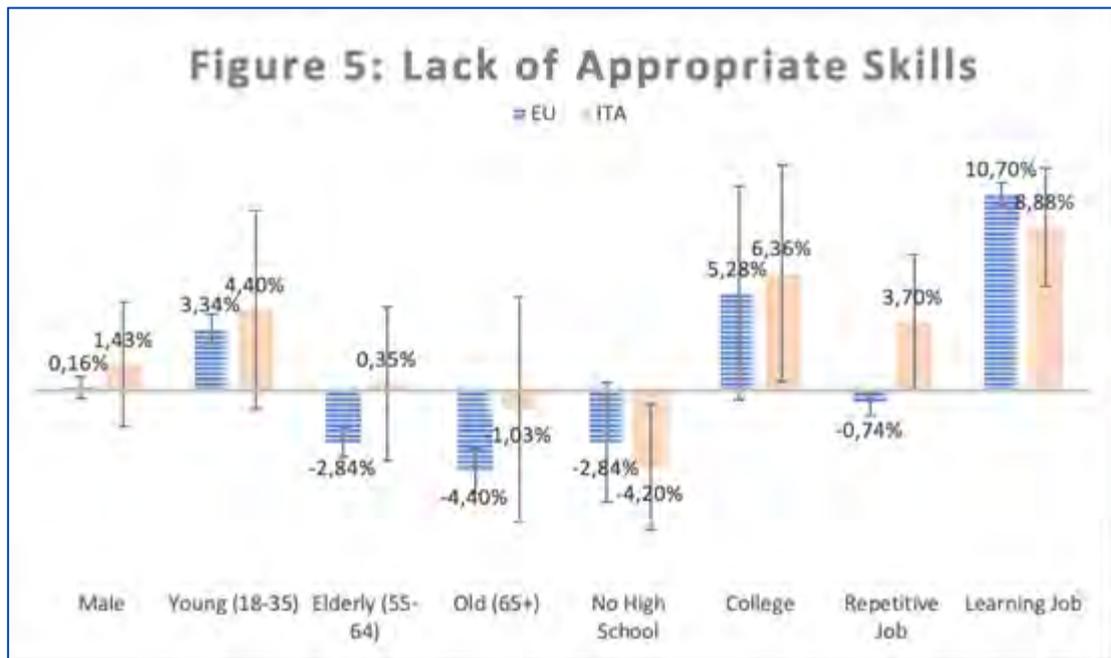
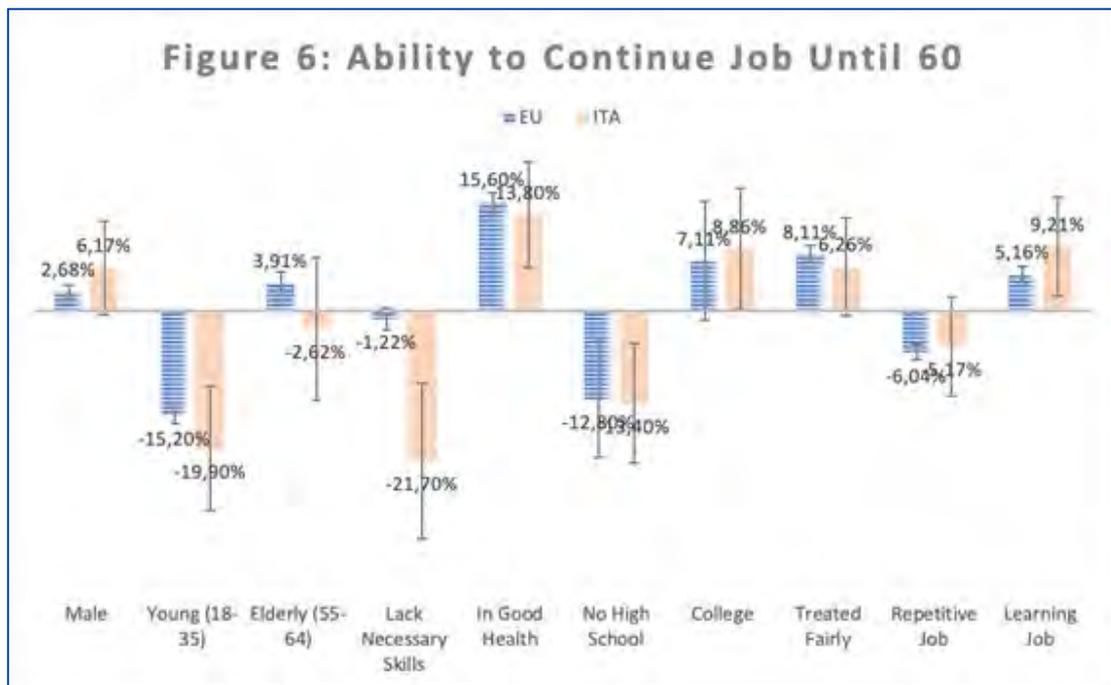


Figure 6: Ability to Continue Job Until 60



Policy Implications

In Italy, the solution to the issue of declining productivity by age in a fast aging society has been found in a “Conventio ad excludendum”. According to our evidence, both employees and employers prefer to exploit retirement policies

that allow for some form of early exit of the elderly workers from the labor market, rather than invest in workplace accommodation and development measures. Yet, the space for fiscal maneuvers needed to finance these expensive

early retirement policies has been shrinking. Despite the pension reform measure implemented in 2019 ("Quota 100"), which allows individuals with at least 62 years of age and 38 years of contributions to retire with (almost) full benefits, a growing concern for the sustainability of the Italian public debt will not allow these policies to be continued in the future. The 2019 reform measure is in fact only temporary and will last for three years.

Finding a solution to the several effects that an aging population may have on the overall productivity is not an easy task. Latins use to say "*Mala eetas nulla delenimenta invenit*"—that is, horrible old age has no flatteries to it. Luckily, many things have changed since then. In particular, in the last decades, disability-free life expectancy has increased, physical strain on the job has largely been reduced – thanks also to technological improvements – and the number of hours worked weekly has dropped. Moreover, albeit less than in other European countries, also in Italy recent cohorts of workers have higher levels of education, which makes them less exposed to skill obsolescence and productivity slowdowns.

A first policy implication is thus to concentrate on public policies that foster the *education of young cohorts*. In fact, life-long learning is easier for individuals, who are initially more educated, and have thus already developed a learning habit and a willingness to update their skills regularly. This policy has become increasingly more relevant. In fact, as higher longevity increases the feasible span of the individual working life, it is hard to imagine that individuals will receive their entire education at the beginning of their life. Additional periods of human capital accumulation will be needed in midlife to learn, for example, how to cope with new technologies. These upgrades will be easier the more educated the workforce is.

But what can be done for the current elderly workers in order to sustain overall productivity? Specific measures for old employees (SMOE) include providing training opportunities, using

special equipment and assigning specific jobs to the elderly, organizing mixed-aged working teams and offering working time reductions.

As previously argued, training is problematic for both demand and supply reasons: elderly workers may be unwilling to undergo training and firms may be unwilling to offer it to elderly workers. Several studies confirm that general training has no impact on elderly workers productivity. *Training* may however be beneficial, as the policy experiences in Germany (Perspektive 50+ in 2005) and in Norway (Competence Reform in the late 1990s) suggest. But to be efficient, the teaching style has to be specifically targeted to match the experience profile of elderly workers and to build on their crystallized (rather than fluid) intelligence. Moreover, on-the-job elements have to be included. This combination is critical to convince (often unmotivated) elderly workers to participate – even more than financial incentives – and to take advantage effectively of the training. For employers to be willing to offer training to elderly workers, later retirement is needed, so that firms can expect a fifty year old workers to remain in a particular job for longer than an average 20 year old worker, who tends to have more job mobility.

Investments in specific equipment for the elderly, assignment of specific jobs to elderly individuals and the creation of mixed-age working teams have also been shown to increase the productivity of elderly workers. Improving physical working conditions for all workers has become easier with technological improvements, but specific programs for elderly workers have also been introduced (VETO in Finland, INQA in Germany among many others). Some improvement measures, such as the increased illumination of the workplace or the reduction of excessive environmental noise, can be applied to many working environments and have been shown to be effective. Instead, although often successful, the policies of assigning specific jobs to elderly individuals and of creating mixed-age working teams are more

difficult to generalize, since not all employers have to opportunity to tailor the jobs or the tasks to the characteristics of the elderly workers.

Reducing working time for the elderly – often combined with partial retirement, as recently done in Italy, does not seem to increase their productivity, neither it is in high demand, as few workers used the flexible retirement.

To conclude, assessing the impact of aging on economic productivity is not an easy task, since many mechanisms are potentially at play – from reduced employment rates and lower productivity of the elderly workers to lower adaptability to innovation. Moreover, to the extent that an aging workforce has some negative effects on productivity, no one-size-fits-all solution is available. Still, two general policies emerge. *Specialized training*, which matches elderly worker experience profiles and focuses on on-the-job characteristics, is crucial to reduce current (and future) worker skill obsolescence and to improve their adaptability to new technologies. *Investments in specific equipment for the elderly* – even as simple as increasing the illumination of the workplace – can contribute to increasing their current productivity. Other policies, such as the assignment of specific jobs to elderly individuals and the creation of mixed-age working teams may also work, but need to be tailored to the specific working environment.

For Italy, a more problematic scenario emerged from our round table discussion and from the analysis presented in Box 1. Firms rarely offer training opportunities to elderly workers, with the exception of on-the-job training when new technologies are adopted. On their side, elderly workers – even when involved in less physically demanding tasks, such as jobs in the service sector, seek opportunities to exit the labor market early. Moreover, the uncertainty on the retirement rules created by a long list of reform measures leads employers and employees to exploit any existing early exit pathway that could be eliminated in the near future. Faced with this gloomy scenario, economic policy in

Italy should switch its focus from designing creative – but costly – early retirement provisions to promoting specialized training for elderly workers. This is no easy task, since both Italian employers and employees seem skeptical about the use of late career training. In fact, this training policy will succeed only if workers are motivated to improve their skill obsolescence and (low) adaptability to new technologies and firms are convinced that the skill upgrading of their elderly workers is feasible and convenient. To reach these goals, no early retirement policies should be adopted – or even discussed, since shortening the working horizon of the elderly employees will defeat both purposes.

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BOX 1 Response to a Retirement Program

In this box, we study how elderly individuals, who are not yet qualified to retire, respond to a retirement plan offered by a large private firm operating in the service sector in Italy. Exploiting a program (isopensione) introduced with the 2011 pension reform, this firm offered to all its employees, who were expected to reach the criteria to retire in the following seven years, the possibility to quit their job and to receive from the firm a monthly transfer equivalent to their future pension until the official retirement criteria were reached. The firm would in fact continue to pay pension contributions until retirement. The program was open to all employees who were old enough and/or with enough contributions to retire within seven years. Hence, in our analysis of the acceptance, we focus on the labor supply decisions by the elderly workers. Using administrative firm data, we have detailed information on demographic and socio-economic characteristics (gender, age, education, marital status, gross income, work place) as well as information about satisfying the pension requirement (distance to retirement).

The overall acceptance rate into the retirement program was extremely high: 72.6% of the elderly workers decided to quit and to receive a monthly benefit by the firm. However, large differences emerged across workers, due to their individual characteristics. In particular, more educated workers, employed in higher ranked positions and with higher gross annual earnings were less likely to accept the firm's retirement offer. This result was partially driven by an income effect, as these workers would incur a larger economic loss, but it also suggests that – even in a service sector, in which technological improvements have recently been adopted – highly educated elderly workers are less likely to quit. Family conditions also matter: the take-up rate was lower among male workers and employees with children. Finally, these retirement decisions strongly depended on each individual's pension situation at the time of the offer. Workers, who were further away from their retirement, are more likely to accept the offer: 5% for every year of distance from retirement. Interestingly, our analysis shows that also psychological factors matter in retirement decisions. The 2011 Fornero reform postponed retirement age for several workers. Our analysis shows that – controlling for all other factors – workers, who were effectively blocked by the reform measure, were much more likely to access the retirement program offered by the firm.

Figure 7: Adhesion to Early Retirement Program

