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The generation gap: Relative earnings  
of young and old workers in Italy

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# THE GENERATION GAP: RELATIVE EARNINGS OF YOUNG AND OLD WORKERS IN ITALY.

by Alfonso Rosolia\* and Roberto Torrini\*\*

## Abstract

We describe the evolution of the relative earnings of young male workers and the evolution of the age-earnings profiles across cohorts over the last three decades. We draw on administrative records to document a significant deterioration of entry wages over the 90s in the presence of substantially stable experience profiles. We complement the analysis with the Bank of Italy's Survey on Household Income and Wealth and show that the opening wage gap between younger and older workers over the 90s is shared by all education groups. These developments are not accounted for by changes in relative skill-age labor supplies nor by changes in other potential socio-demographic determinants of wages. We argue that the observed developments are likely to be the result of partial labor market reforms that generated a dual labor market along the age dimension, opening a gap between the earnings of old incumbent workers and those of new entrants into the labor market.

**JEL Classification:** J31.

**Keywords:** earnings distribution, cohort effects, labor market reforms.

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## 1. Introduction<sup>1</sup>

This paper describes the evolution of entry wages and career profiles of the cohorts entered in the Italian labor market over the last three decades, with a specific focus on the developments of intergenerational earnings inequality. Much effort has been devoted to understanding the developments in earnings inequality in the US and of unemployment in Europe. The interplay between market forces and institutions has been suggested as the reason for the persistence of unemployment in Europe and for the rise in earnings inequality in the US<sup>2</sup>. One strand of the literature considers the rise of inequality in the US mostly due to technological change and has suggested that institutional arrangements prevented wage dispersion from increasing in Europe and caused unemployment to rise in continental Europe. Labour market rigidities and trade unions are seen as the ultimate cause of such a resistance to market forces. The debate on institutional arrangements has triggered reforms in a number of European countries, and improvements in terms of employment growth have been achieved even in countries traditionally characterized by poor performances of their labour markets, like Italy and France (Brandolini et al., 2005; Bassanetti et al. 2006). However, partial reforms of labour market regulation could give rise to a dual labour market, where the burden of the adjustment is borne by only part of the labour force. In particular, when they affect mostly the new entrants, reforms are likely to have an impact on earnings dispersion along the age dimension, opening a gap between generations both in terms of expected lifetime labor earnings and pension wealth. The Italian case is particularly interesting in this respect since, moving from high unemployment rates and low participation up to first half of the 1990s, employment growth accelerated dramatically when compared to GDP dynamics, thanks to overall real wage moderation and piecemeal reforms of the labour market (Brandolini et al., 2005). Regulatory reforms have prompted greater flexibility in working arrangements in terms both of hiring conditions (intensive use of temporary contracts) and entry level wages<sup>3</sup>.

Wages evolve along the life cycle as a result of two different forces: economy wide productivity growth and the accumulation of working experience. Standard Mincerian equations estimated on cross-section data quantify the effect of experience comparing wages of workers at different points in their life cycle in a given year, assuming implicitly that less experienced workers will face in the

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<sup>2</sup> See Card and Di Nardo (2002); Di Nardo, Fortin and Lemieux (1996); Autor, Katz and Kearney (2005) for the inequality debate in the US, and Layard, Nickell, and Jackman (1991); OECD (1994); Blanchard (2005) for unemployment in Europe.

<sup>3</sup> See Contini and Trivellato (2005), for an assessment of the evolution of the Italian labour market and the relevance of institutional changes in determining a divide between young and older workers.

future the same pattern as more experienced ones. This would be the case if the cross sectional distribution of wages according to work experience remained unchanged over time but for its mean, which in the long run should evolve roughly at the same rate as labour productivity. However, different cohorts of workers may experience different entry wages and age-earnings profile because of technological change<sup>4</sup>, institutional factors, or the interplay of supply and demand of imperfectly substitutable workers. These factors show up in a cohort effect, whereby the entry wage and/or the career pattern of workers vary across people entering the labour market at different points in time: a generation gap.

We document the evolution of the entry wages and subsequent career profiles of male workers drawing on a 30-year longitudinal panel of administrative records that allows us to track the working history of all cohorts entered in the labor market from the late 70s. We find a significant deterioration of entry wages starting from the early 1990s which was not compensated by relevant changes in the subsequent experience profile. We then examine potential explanations and find that such deterioration is not associated with an increase in wage dispersion, suggesting that it is not driven by the entry of less able individuals favoured by labor market reforms. The finding is confirmed when we complement the analysis with a richer dataset, the Survey of Household Income and Wealth of the Bank of Italy (SHIW), that allows to explicitly account for the evolution of socio-demographic factors not available in the administrative records. Finally, we show that also a simple supply-demand explanation is unable to account for the observed deterioration. We conclude that these developments are plausibly accounted for by the fact that institutional reforms aimed at lowering labor costs eventually affected mostly the new cohorts entering the labor market.

There is a long tradition of studies on the impact on life-cycle earnings profiles of cohort-specific factors. Freeman (1975) focuses on the negative impact on the relative wage of young college graduated workers of the entry in the labour market of a large cohort of college graduates in the early 1970s. Freeman (1979) and Welch (1979) analyse the effect of the entry into the labour market of the baby-boom generation, finding a sizeable negative impact on the relative wage of young workers. More recently, Card and Lemieux (2001) explain part of the rise in the overall US college premium by the slowdown in the supply of new college graduates, which mainly benefited younger cohorts. Gosling, Machin and Meghir (2000) find evidence for the UK of an increasing wage differential between young and older workers. This is attributed to a negative cohort effect on young cohorts' entry wages but not their growth over the life cycle. This implies that new cohorts

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<sup>4</sup> The positive relation between experience and wages can be justified on the basis of both human capital accumulation and of incentive mechanisms, where a growing patterns for salaries respond to the need of spurring work effort. Here for short we will label these different factors as technological.

experience a permanent loss in their working life earning due to a lower entry wage which is not offset by a faster career. They do not identify the source of such a cohort effect but point at institutions, educational quality or labour market condition rather than cohort size as possible explanations. Similarly, Beaudry and Green (2000) and Beach and Finnie (2004) for Canada find a declining entry wage for cohort entered in the labour market during the 1990. On the contrary, Fitzenberg et al. (2001) compare different cohorts of German workers and find a quite stable wage structure.

In addition to quantifying the evolution of inequality along the cohort dimension, the evidence discussed in the paper is also relevant for a correct assessment of the actual cost for firms of expanding the labour input, as the wage rate of new entrants is likely to be the relevant price for firms when deciding whether to expand productive capacity via labour or capital input. In this respect, the analysis adds to the interpretation of the relative dynamics of output and labor input observed in Italy over the past decade and offers elements to predict the medium-run evolution of labor costs.

## **2. Earnings dynamics over the working life.**

We start our analysis with a description of the evolution of entry wages and career profiles over the life cycle. We draw on a longitudinal sample of administrative records that allows us to track each worker since he enters the labor market<sup>5</sup>. We have information on weeks worked each year, yearly compensation, the identity of the firm along with basic information on age and sex. The data cover a sample of around 70,000 private non-agricultural Italian employees over the period 1975-2004. A major limitation of this data is the lack of information on educational attainment<sup>6</sup>. Over the period spanned by the data Italy recorded a significant increase in education achievements: between 1977 and 2004 the share of high school graduates in the labor forces went from less than 13 percent to about 44 percent; that of college graduates from 4 to 14 percent. We deal with this shortcoming proxying the educational achievement by the (observed) entry age: we assume that workers who entered the labour market at age 21-22 have plausibly completed secondary education but not college and workers entered at age 25-26 plausibly hold a college degree<sup>7</sup>. Furthermore, we follow Beaudry and Green (2000) and define a cohort as workers born in two contiguous years so as to increase sample size in each cohort.

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<sup>5</sup> More precisely, our administrative records allow to track only employees in the private non agricultural sector. We thus miss the true entry date for those individuals who start out their working life as self-employed or as employees in the agricultural or in the public sectors.

<sup>6</sup> Another issue with this data is that we observe gross earnings in private sector as reported for social security purposes, so that only regular workers enter the analysis.

<sup>7</sup> We deal explicitly with secular changes in educational achievements in the next section.

Figure 1 describes the evolution of real<sup>8</sup> weekly wages of male worker who entered at age 21-22 (top panel) and 25-26 (bottom panel); the thick line represents the entry wages of subsequent cohorts, while the thinner ones are the wage profiles over the working life for selected cohorts<sup>9</sup>. In both groups entry conditions in the labour market deteriorated since the early 1990s, after substantial improvements between the mid-1970s and late 1980s. For the lower educated group (entry at 21-22) initial wages grew between 1976 and 1992 by 35 percent and declined thereafter by 12 percent, going back to the levels recorded more than two decades earlier; among the more educated (entry at age 25-26), after an increase up to 1992 of similar magnitude (37 percent), starting wages declined by 8 percent in the following decade, with a slight recovery in 2004 that put the overall fall with respect to the 1992 peak to about 4 percent. As a benchmark, over the period 1976-1992 aggregate average yearly real wages per standard labor unit in the private sector, as measured by the National Accounts, grew by 33 percent and remained largely stationary thereafter. Worse initial conditions than in the past, however, do not necessarily imply a net welfare loss for the individual. First, overall labor income depends not only on initial conditions but also on the age-earnings profile the individual will experience during his working life. Second, in the presence of credit markets individuals could borrow against higher future labour incomes to smooth their consumption profile, which ultimately is the relevant measure of welfare.

The data allow us to explore also the career profile of different cohorts and therefore to establish whether the drop in the entry wage entails a persistent loss with respect to previous cohorts. Visual inspection of figure 1 however, does not suggest a steeper age-earning profiles for the cohorts who suffered drops in entry wages. The time patterns appear to be roughly the same, although moving from different starting points. If anything, younger cohorts seem to be characterized by even flatter careers. Note also that the drop in the entry wage does not seem to be matched by an economy-wide fall in wages: the wages of incumbent older cohorts did not show particular signs of weakness. To have a rough idea of the overall loss suffered by younger cohorts we compare the wage growth experienced by the cohorts entered at age 21-22 in 1986 and 1992: after 7 years the weekly wage had increased by more than 60 percent for the former as opposed to 38 percent for the latter; among those entered in the same years at age 25-26, after 7 years the 1986 entrants' wages had grown by 85 percent as opposed to 54 percent for the 1992 entrants.

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<sup>8</sup> Throughout the paper wages are deflated using the consumer price index.

<sup>9</sup> Incidentally, note that the group of those entered in the market at 25-26 years old is smaller and likely to hide more variation in the educational attainments both across individuals (for example, it might include late high-school graduates, college dropouts, early and late college graduates) and over time (for example, an increasing share of college graduates).

This evidence is however only suggestive. Different cohorts experienced different macroeconomic conditions at corresponding points in life. Such considerations thus command a more formal analysis of the evolution of earnings over time and across cohorts that explicitly accounts for common macro developments and labor market conditions. Specifically, we model the log wage at time  $t$  of an agent  $i$  in cohort  $c$  at age  $a$  as the sum of a time effect common to all individuals  $\mu_t$ , an age effect assumed to be the same for all agents  $\mu_a$ , and a cohort effect  $\mu_c$ . Formally:

$$W_{i,tca} = \mu_t + \mu_a + \mu_c + \varepsilon_{it} \quad (1)$$

where  $\varepsilon_{it}$  captures residual individual heterogeneity. In addition, we model age-effects as third order polynomials in age and the time-effects as third order polynomials in calendar date augmented with a measure of the unemployment rate<sup>10</sup>. We thus allow for cohort effects that *shift* the common wage profile over time. Such cohort effects represent estimates of the entry wages<sup>11</sup>. Equation (1) is estimated separately for individuals who enter at age 21-22 and 25-26. The exercise largely confirms the intuitions obtained from the previous visual analysis. As expected, a formal test of the null that the entry wages are constant across cohorts is strongly rejected for both entry age groups. Figure 2 displays for both groups the evolution of the estimated cohort effects, expressed as log differences from the one estimated for the oldest cohort in the group. The econometric evidence shows that even accounting for common macroeconomic developments, after rising throughout the 80s entry wages of cohorts entering the labor market in the '90s decreased significantly, losing up to 12 percent in comparison to the oldest cohort in the group, who entered the market almost three decades earlier, and over 20 percent with respect to the peak cohorts that entered in the late 80s.

The previous evidence is obtained under the assumption that subsequent cohorts with a given educational level experience the same age-earnings profile. To assess how strong such a restriction is, we performed three exercises. First, we simply regressed the residuals of the previous regressions on a cubic in age and its interaction with a dummy for entries in the 1990s. Second, we defined a new dependent variable netted of the previously estimated cohort effects and regressed it on a polynomial in age and its interaction with a post-1990 entry, a cubic in time and the measure of cyclical unemployment. Third, we simply estimated the original model allowing for an additional quadratic in age specifically for cohorts entered in the 1990s. In all exercises, statistical significance

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<sup>10</sup>Specifically, we regressed the unemployment rate on a cubic in time and included the residuals of such preliminary regression in the empirical model above to capture higher frequency shocks the cubic in time might miss because of its implicit smoothness. Note also that because of the linear relationship between age, time and birth year identification relies on the assumption that a cohort is defined as two contiguous birth years. We experimented with slight variations of the empirical models and found the results qualitatively unaffected.

<sup>11</sup>Given our definition of cohort (two contiguous birth years), we only use data from every second year, starting in 1976.

of the age polynomial would be suggestive of differences in the age patterns of subsequent cohorts. Results show that cohorts who entered at age 21-22 experience the same age profile independently of entry year, while more educated groups exhibit some differences. While statistically significant, however, the estimated differences do not imply economically relevant effects. For example, after 10 years from entry the cumulated wage difference amounts at most to 1 percent in favour of educated workers entered in the 1990s.

Note that this result suggests that the observed developments in entry wages do not reflect the adjustment of a market imbalance due to the wage compression caused by the indexation mechanism in place until the early 1990s (Manacorda (2004), Ichino and Erickson (1994)). In fact, if this was the case, we should have also observed, together with falling initial wages, steeper wage profiles for younger cohorts reflecting the decompression of the tenure differentials.

To sum up, the analysis of this section supports the view that cohorts entered into the labour market since the early 1990s experienced a sizeable wage loss with respect to those entered in the previous decades. The loss due to a declining entry wage, only partly explained by a slightly negative general wage trend since the early 90s, was not off set by more rapid career paths. The above findings are even more worrisome if one considers that the underlying data do not include new working arrangements such as Collaborations and free-lance relations which have become increasingly important in the most recent years and are known to imply less favourable conditions than the standard dependent employment relationships covered by our data<sup>12</sup> (Berton, Pacelli and Segre, 2005).

What are the possible reasons for such a decline? Economic theory offers a variety of potential explanations. In the next section we contrast some of them with the available evidence.

### **3. Some potential explanations**

#### *3A. Changing selection in and out.*

The first possibility we examine is the potentially adverse selection caused by the labor market reforms of the early 1990s which increased the degree of flexibility in labor adjustment through new contractual arrangements or less stringent rules on existing ones. Such institutional changes contributed to increase the degree of wage moderation thereby making it possible to employ also individuals who would have otherwise stayed unemployed because of their insufficient skills. Thus, the average entry wage would have gone down simply due to a recomposition effects. Indeed, the

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<sup>12</sup> Collaborations, (“collaborazioni coordinate e continuative” recently changed in “project work”), are mixture of paid employment and free-lance relationships. They do not benefit from employment protection legislation and minimum contractual wages do not apply. Also, social security contributions and benefits are lower than for standard paid employment making the lifetime outlook even worse.

overall unemployment rate went down significantly between the mid 1990s and mid 2000s, from about 12 percent to around 8; similarly, the employment rate increased by more than 5 percentage points. The effect was large also for younger cohorts: the unemployment rate of 15-34 years old went from 20 to 13 percent and the employment rate from 45 to over 50 percent. However, in addition to the fall in the average we should have also observed an increase in the dispersion of entry wages. In fact, the wages of those who would have been employed anyway should have been largely unaffected while the bottom tail of the wage distribution should have become thicker, driving down the average. The top panel of figure 3 reports the coefficient of variation of entry wages for the cohorts entered between mid 1970s and early 2000s. Again, we focus on entrants of age 21-22 and 25-26. We do not find compelling evidence of increasing dispersion, although the figures suggest a slight increase in inequality among entrants over the 1990s. Such evidence, however, does not account for the overall developments in wage inequality. Therefore, in the bottom panel we have plotted the ratio of the coefficient of variation of entry wages displayed in the upper panel to the coefficient of variation of the overall wage distribution in the same year. Such a comparison suggests that throughout the 1990s initial inequality has been lower than overall dispersion and, more importantly, substantially stable relative to overall inequality. This evidence suggests that the developments of entry wages can hardly be reconciled with the entry of a larger proportion of less able individuals formerly priced out of the market.

Another way in which selection may affect the evidence of the previous section is through the retirement decision of older low earners. If for any reason the exit decision has changed over time, leading to more exits among the low earners, this would contribute to widening the actual gap between younger and older cohorts in the recent years because of the better (unobserved) quality of older employees. However, the oldest cohorts in our data (entered in 1976) are observed in employment for at most 28 years; the bulk of the data covers individuals with working lives not long enough to be significantly affected by retirement decisions<sup>13</sup>.

### *3B. Changing socio-demographics.*

The evidence of the previous section concerns developments occurred over three decades. In this sense, the data limitation implicit in the underlying administrative records are likely to be important since they do not enable us to explore the effects of changes in the distribution of education, working hours, family structure, and a variety of other factors that are likely to shape an individual decision to participate and her reservation wage. We thus try to complement the previous analysis drawing on the Survey of Household Income and Wealth of the Bank of Italy. Unfortunately, in

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<sup>13</sup> This also applies to the early retirement policies implemented in Italy up to the first half of the 1990s when the cohorts studied here were again mostly below the minimal required age.

doing so we lose the panel dimension and cannot follow a given individual from his entry in the labor market. From now on we will be focussing on comparisons of net monthly wages of employees of different age at a given point in time<sup>14</sup>. Specifically, we focus on males aged 19-60 employed in the non-agricultural sector<sup>15</sup>. In this sample, between 1977 and 1989 average real net monthly earnings in this group increased by about 21 percent; they declined by 3 percent from 1989 to 2004. Most of the decline observed since 1989 stems from the reduction in the average earnings of young workers which partly counterbalanced the effect of longer tenures implied by an aging workforce: the incidence of young workers declined from 27 per cent of total employment in 1989 to 22 per cent in 2004. Holding the share of young workers at its 1989 level, average earnings would have dropped by almost 5 percent instead of 3, 70 percent of the decline (3.3 percentage points) due to the fall in average young workers' wages and 30 percent (1.4 points) due to the fall in those of older workers.

The top panel of figure 4 displays the difference between the (logarithm of the) net monthly wage of older (31-60) and younger (age 19-30) workers between 1977 and 2004<sup>16</sup>. The wage differential remained fairly stable between the mid-1970's and mid 1980s, declined in the late 1980s and increased again during the 1990s, reaching a peak at the beginning of this decade. In 2004 older workers earned 35 per cent more than younger ones as opposed to a 25 per cent differential in the late 1970s and less than a 20 per cent gap in 1989. Holding the age-education composition of the two groups constant at the 1977-78 level does not change substantially the picture, except for some reversal in most recent years<sup>17</sup>. Also, it is largely unaffected by a finer definition of earnings based on hourly wages, available only since 1987, although a partial narrowing of the gap seems to have taken place since the mid 1990s plausibly because of the spreading of part-time among younger workers (fig. 4, bottom panel). All in all, the evidence is largely consistent with the initial findings based on administrative records. These developments took place in spite of the fact that average education of young workers has kept increasing in the period we analyse, likely improving the relative efficiency of younger workers. In fact, we detect similar trends in the wage gaps for each education group. The four panels in figure 5 report the wage differential for the whole sample, for

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<sup>14</sup> Differently from the administrative records used so far, that record gross earnings in private sector as reported for social security purposes, the Survey collects information on self-reported after-taxes yearly labour incomes and months worked along with a variety of socio-demographic information. From 1987 on it also collects information on hours worked.

<sup>15</sup> The classification adopted in the old waves of the survey does not allow us to distinguish between public and private sector employment for the entire period of analysis.

<sup>16</sup> The survey was run annually until 1984 and every second year from then onward; the only exception is the 3 year gap between the waves of 1995 and 1998.

<sup>17</sup> We split the sample in 15 cells, defined by 5 age classes 19-30, 31-40, 41-50, 51-60 and 3 education classes, compulsory school of less, high school, college or more. As a check, we have replicated the exercise holding also industry composition constant and basically found the same results.

workers with compulsory education or less, with secondary school and with college or more, respectively. For highly educated workers and less educated ones, apart from fluctuations due to the small size of the sample, the old-young differential follows the average pattern. Indeed it seems even more pronounced. For workers with secondary education, in the first half of this decade the old-young differential was still lower than at the beginning of the period, although relative earnings of younger workers followed the general path.

This evidence unveils an increasingly steeper cross-sectional age-earnings profile starting in the mid 1990s, especially because of the worsening of initial conditions of younger cohorts. To assess how much of this differential can be accounted for by changes in the distribution of underlying socio-demographic characteristics, we estimated a set of standard cross-sectional Mincerian wage equations that control for other observed individual characteristics beyond age and education:

$$W_{it} = \alpha_t + \beta_{0t}E_{it} + \beta_{1t}E_{it}^2 + \gamma S_i + \delta X_{it} + \varepsilon_{it} \quad (2)$$

where  $W_{it}$  is monthly wage of person  $i$  at time  $t$ ,  $E_{it}$  is his potential labor market experience as of  $t$ ,  $S_i$  are a set of education dummies and  $X_{it}$  are controls for marital status, family size, number of income earners, relative contribution of  $i$  to household income, his relationship to the head of household, residential location and town size<sup>18</sup>. Note that by assuming a year-specific cross-sectional experience profile  $\{\alpha_t, \beta_{0t}, \beta_{1t}\}$ , we can interpret  $\alpha_t$  as the initial wage of individuals entering the labor market at time  $t$  (that is, with no experience,  $E_{it} = 0$ ).

In figure 6 we plot the average wages and estimated entry wages obtained from such regressions relative to 1977 average wages<sup>19</sup>. As a general pattern, the average entry wage grew throughout the 80s, then declined returning in the mid-1990s to the average level recorded in the late 1970s and remained fairly stable thereafter, at a level which is 30 per cent lower than in late 1980s. The decline in the intercept went together with a rise in the slope due to the growing cross-sectional gap between young and older workers. In fact, the picture shows that the average wage increase by 20 percent between the late 1970s and the early 1990s, and dropped only slightly afterwards. The gap between entry and average wage went from about 30 percent in the late 1970s to around 50 percent in 2004. The broad pattern just described holds true for both workers with compulsory and high-school education, although with some differences. For low educated individuals the rise of the entry

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<sup>18</sup> We choose not to include in the empirical model the sector of activity and the type of occupation because these are endogenous and might explain part of the differential. However, as a check we replicated the analysis allowing for sector and occupation dummies and results are unaffected.

<sup>19</sup> The entry wage is the constant in the estimated equations; the residual class is individuals who are the main contributor to household income living in large towns in the north-west of Italy; when estimated on all educational categories, the reference class is compulsory education.

wage in the 1980s seems more sudden and the subsequent drop in the 1990s larger and more marked. New entrants with high-school degrees experienced a somewhat more prolonged growth of their entry wages during the 1980s and a more moderate and delayed subsequent decline. The entry wages of college workers followed a more erratic pattern – possibly because of the limited sample size on which estimations are obtained. Overall, after a positive trend until late 1980s the entry wages went on a markedly negative trend; differently from other educational categories, however, the average wages of college educated individuals kept increasing, gaining roughly an additional 10 percent between the late 1980s and 2004, on top of the 20 percent growth recorded between 1977 and 1989.

All in all, the observed decline in entry wages turns out to be broadly robust to changes in a wide array of underlying socio-demographic attributes over the period of interest. Note also that, insofar as such characteristics proxy for some unobserved determinant of earning (say, ability), the above results also provide further support to the conclusion that changes in the composition of the workforce along unobserved dimensions favoured by labor market reforms may not account in a significant measure for the pattern of entry wages.

### 3C. Changing relative supplies.

Finally, we want to address the relevance of supply-demand based explanations. The discussion in the previous sections does not take explicitly into account secular changes in relative supplies. In particular, if workers with the same education but of different ages are imperfect substitutes then changes in relative supplies would reflect into cohort effects (Freeman (1979), Welch (1979), Card and Lemieux (2001)). More formally, assume output is produced by means of a CES production function that uses educated-uneducated and young-old workers:

$$y_t = (\theta_{st} S_t^\rho + \theta_{ut} U_t^\rho)^{\frac{1}{\rho}} \text{ with } S_t = (\alpha_Y S_{Yt}^\eta + \alpha_O S_{Ot}^\eta)^{\frac{1}{\eta}} \text{ and } U_t = (\beta_Y U_{Yt}^\eta + \beta_O U_{Ot}^\eta)^{\frac{1}{\eta}}$$

where  $S$  and  $U$  are skilled and unskilled workers,  $Y$  and  $O$  stand for young and old workers,  $\rho = (1 - 1/\sigma_E)$ ,  $\eta = (1 - 1/\sigma_A)$  are function of the elasticities of substitutions between education groups and age groups. In this framework the relative wage of young and old workers of the same education group is equal to:

$$\log\left(\frac{w_{SO}}{w_{SY}}\right) = \log\left(\frac{\alpha_O}{\alpha_Y}\right) + (1 - \eta)\log\left(\frac{S_Y}{S_O}\right) \quad (3a)$$

$$\log\left(\frac{w_{UO}}{w_{UY}}\right) = \log\left(\frac{\beta_O}{\beta_Y}\right) + (1 - \eta)\log\left(\frac{U_Y}{U_O}\right) \quad (3b)$$

which depend on both the relative efficiency and on the relative employment of young with respect to old workers.

In Italy, these effects are likely to play an important role. On the one hand, the increase in education attainments in younger cohorts could have depressed the wages of young educated workers relative to those of older individuals with similar educational achievements. Between 1977 and 2004 the share of employed men with at least high school in the age group 19-30 went from 35.8 to 66 per cent; that of college graduates from 4.8 to 8.3 per cent. On the other hand, the progressive decline in cohort size could have played in the opposite direction. The share of men aged 19-30 over the population 19-60 decreased by nearly one third between the late 70s and 2004, going from 30 percent to about 20 percent. To verify whether these changes may account for the developments of the young-old wage differential in the 1990s we build on equations (3a) and (3b) and estimate the following model for the (log ) average relative wages of workers of age  $c$  to that of workers aged  $k$ :

$$\log\left(\frac{w_{ct}^S}{w_{kt}^S}\right) = \alpha_c + D_t\theta_c + \beta \log\left(\frac{E_{ct}^S}{E_{kt}^S}\right) + \varepsilon_{ct}^S \quad (4)$$

where  $E_{ct}^S$  is the number of employed males with education  $S$  in age group  $c$  in year  $t$  and age is measured in 5-year intervals (21-25 to 56-60);  $\alpha_c$  is a dummy for the age class and  $D_t$  is a dummy equal to 1 if  $t < 1993$  and zero otherwise. We will interpret estimates of  $\alpha_c + \theta_c$  and  $\alpha_c$  as the wage gap between age class  $c$  and  $k$  prior and after 1993, respectively, once changes in relative employment levels have been factored out. Notice that in a competitive wage setting framework these estimates have a clear economic interpretation: they represent the (pre- and post-1993) efficiency of workers of age  $c$  relative to those of (reference) age  $k$ . Also notice that we are holding the elasticity of substitution across age groups constant in the two sub-periods. Results are reported in table 1, where the reference age class is 51-60 which is therefore excluded from the sample. In column 1 we pool relative wages for all education categories allowing only for pre- and post-93 age-class dummies and the relative employment levels. Results show that the wage gap with the reference cohort (51-60) has widened in the 90s only for the younger 21-25 and 26-30 cohorts by around 13 percentage points, from around 42% to more than 55% for the 21-25 and from 27% to almost 40% for the 26-30 year old. In columns 2 and 3 we control for education achievements accounting for education dummies (col. 2; compulsory and high-school, the residual class being “at least college”) and allowing different elasticities of substitution across education categories (col. 3): the profile of the cohort wage gaps does not change, displaying an increase for the younger cohorts of comparable magnitude with the previous specification. Note that relative employment levels turn out to be significant only for high-school graduates suggesting that workers of different ages with

compulsory schooling or with college education are close to perfect substitutes. In columns 4 to 6 we estimate equation (2) separately for each education group. Results show that in the 90s college educated young employed aged 21-30 have lost more relative to older workers with similar education as compared to individuals of the same age and lower educational achievement, the gap being almost 27 percent for 21-25 year old and 20 for 26-30 year old employees). The gap turns out to be smaller for low educated young workers, between 7.5 and 10 percent, while for high-school graduates it is above 10 percent. Similar results are obtained narrowing the reference cell to employees age 56-60 and using alternative definitions of relative supplies<sup>20</sup>.

As a whole, these results suggest that changes in the relative supplies are not able to account for the widening age gap initially described. Another possibility to reconcile this evidence with economic fundamentals, is that the relative efficiency of younger cohorts, captured by the estimated coefficients (see equations 3a and 3b), has dramatically declined in the last decade at all education levels. However, we cannot think of any major event in the recent past which could plausibly account for such a decay in the efficiency content of labor along the age dimension within education specific groups.

#### **4. Conclusions**

In this paper we have drawn on two data sources to document the earnings loss suffered by young workers who entered the labour market in the 1990s. We find that the wage gap between old and young workers went from 20 percent in the late 1980s to 35 percent in the early 2000s. We find that this decline is not accounted for by developments in relative supplies of skill-age groups overtime and reflects almost falling entry real wages. Younger cohorts do not experience any catch up: their earnings appear to grow at the same rate as older cohorts at comparable ages, so that new cohorts of workers seem to have suffered a permanent loss in their relative income.

But what did prompt such a pronounced shift in the relative wages of younger cohorts?

We argue that market forces, such as relative supply developments, technological change, and the selection of less productive young workers into the labour market, are not plausible explanations for the observed pattern in the young-old wage gap. We believe that institutional arrangements should be scrutinized as possible alternatives. Although a deep investigation of this hypothesis is beyond the scope of this paper, it may be useful so sketch here how institutional factors may give account of the observed wage patterns.

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<sup>20</sup> In particular, we have included women in the measures of relative supply. The implicit assumption is that men and women are perfect substitutes within age-education cells. While our prior was that the secular increase in participation and employment of women would account at least for some of the young-old gap, the results were basically unaffected by such extension.

In a system where older workers' jobs are protected and their wage is downward rigid due to institutional arrangements (namely regulation and trade unions objective function), an adverse shock to the labour market can have an asymmetric impact on old incumbent cohorts and young cohorts of workers (Freeman (1975), Brunello and Lauter (2004)). In this context, which does not seem to be too far from the Italian case, if the productivity-adjusted wage of young workers is set at the same level as the elders' wage, an adverse shock would prompt a rise in young workers' unemployment rate; instead, if the wage of new entrants is downward flexible, an adverse shock would give rise to a two tier wage system, with the real wage of younger workers set at the lower level.

The young-old unemployment rate differential in Italy grew until the end of the 1980s, reversing the trend in the early 1990s, when also the entry wage and the permanent labour income of younger cohorts started to decline<sup>21</sup> (figure 7). These patterns are consistent with institutional factors. In a context where both real wages and jobs of incumbents are sheltered from labour market developments and new entrants are paid the same wage as the incumbents, a negative shock would prompt a rise in young workers unemployment. The persistent rise in youth unemployment would call for action to increase their employability. Indeed, since the late 1980s growing youth unemployment prompted the reaction of the policy maker with the introduction, for instance, of the so called "training and work contract". In addition to substantial cuts in social security contributions, it allowed firms to pay young workers an entry wage lower than the standard one, as a compensation for loosely defined firms' training obligations. In the same vein, during the 1990s several other arrangements made possible a reduction of the cost of hiring young workers. Against this backdrop, in the 1990s we observe an increasing share of new entrants that work less than 6 and 3 months in a year, a growing incidence of apprenticeships and a decaying share of white-collar jobs (figures 8 and 9).

We thus conjecture that difficult labour market conditions in the early 1990s prompted overall wage moderation and drove the adoption of a two tier wage mechanism, protecting - up to a certain extent - the real wage of incumbents while allowing the employment growth of younger ones.

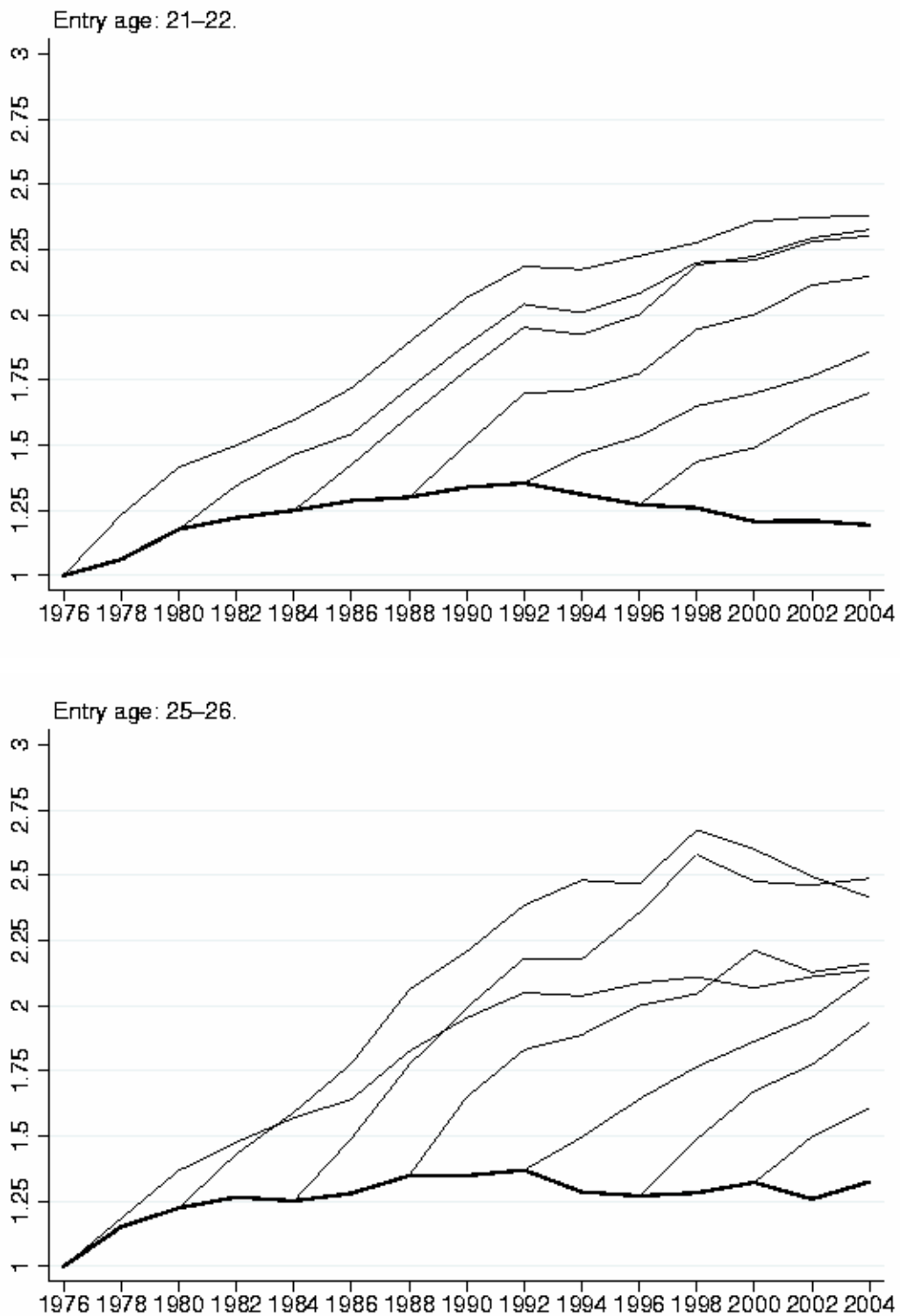
In itself, falling entry wages and constant returns to tenure across cohorts would be less of a concern in the presence of aggregate real wage growth. However, this was not the case: in the last 15 years the productivity slowdown and the decline in the aggregate wage share have determined a stagnation of average real wages (Bassanetti et al. (2005), Torrini (2005)). This made the decline in

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<sup>21</sup> We refer to self-reported information on unemployed status as available in the Survey of Household Income and Wealth of the Bank of Italy to investigate the differential over a longer horizon than that available in the Labor Force Survey.

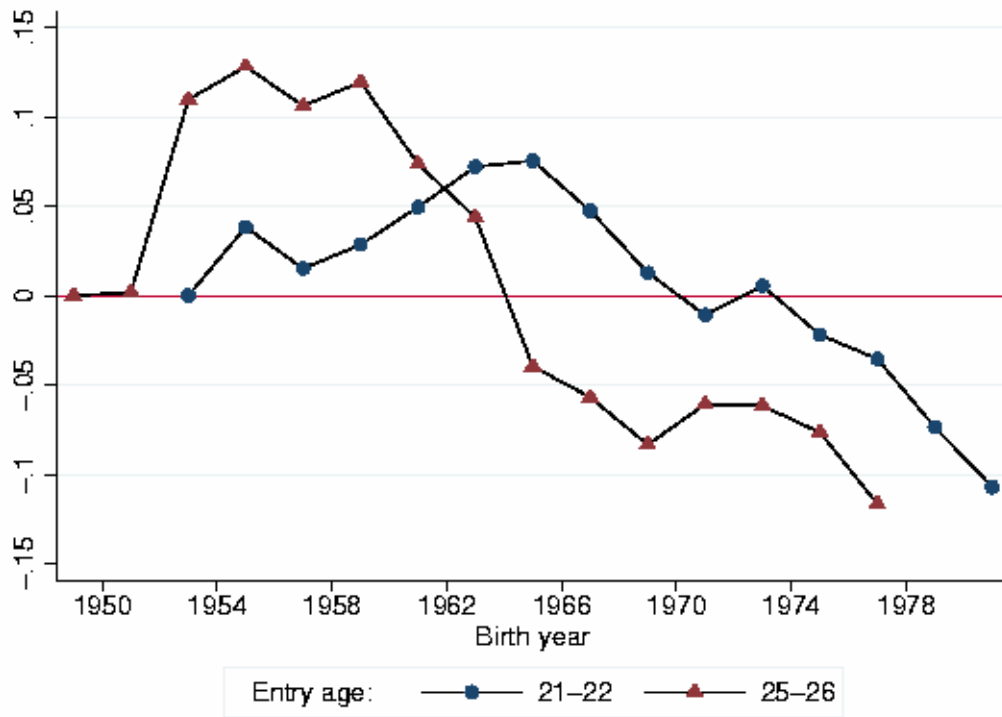
relative earnings a loss in absolute terms with respect to previous generations. Moreover, recent reforms of the pension system have created a gap between generations also in terms of pension wealth, exacerbating the generational divide: the small cohorts of young workers seem to bear the burden of high social security contributions and tax rates, slow growth of real wages and meagre pension benefits, together with more unstable careers. There is enough to justify growing concerns, even in the presence of better employment growth with respect to the past.

Figure 1: Entry wages and career profiles (index: 1976=1).



Source: authors' calculations on Inps data.  
Note: Wages are deflated with the consumer price index.

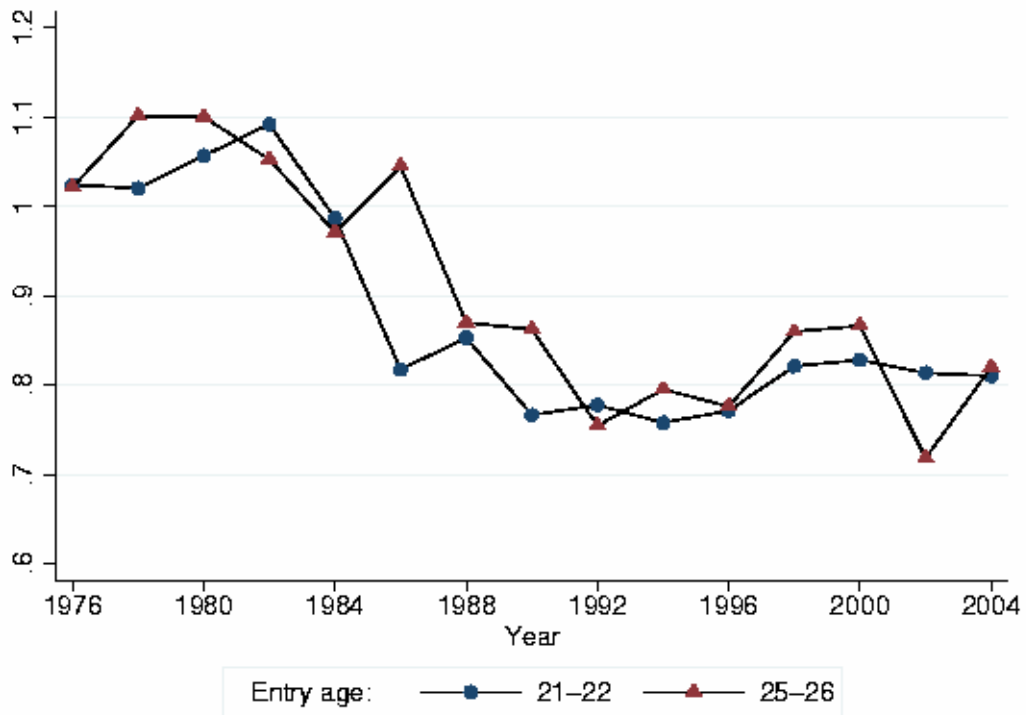
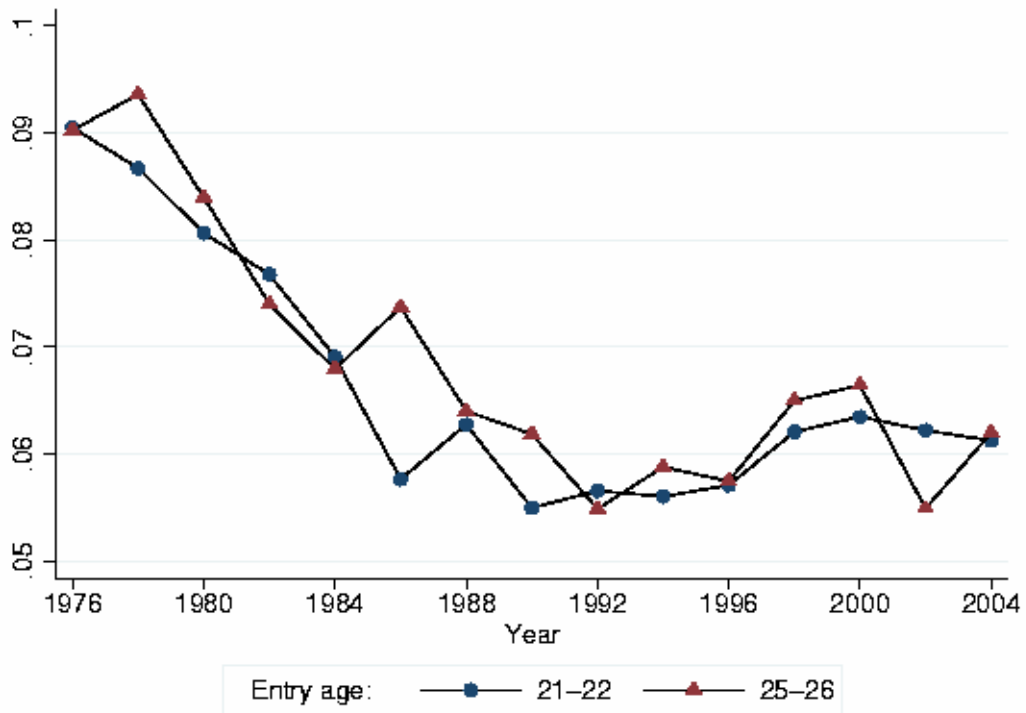
Figure 2: Entry wage differentials.



Source: authors' elaborations on Inps data.

Note: Estimated log differences in entry wages with respect to oldest cohort in entry-age class.

Figure 3: Entry wages dispersion.

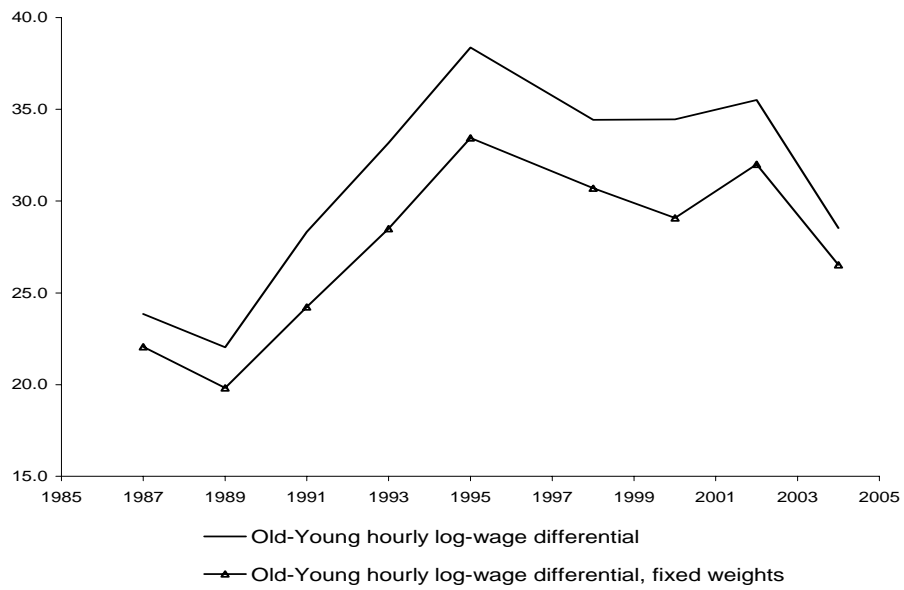
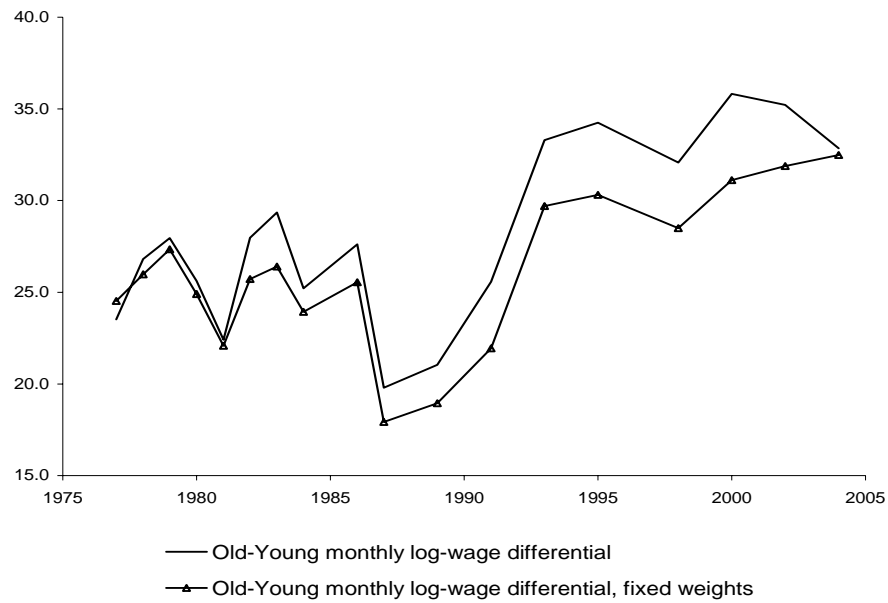


Source: authors' elaborations on Inps data.

Notes:

Top panel – coefficient of variation of log real weekly entry wages; Bottom panel – ratio of coefficient of variation of entry wages to coefficient of variation of wages in relevant year.

Figure 4: Old-young wage gap

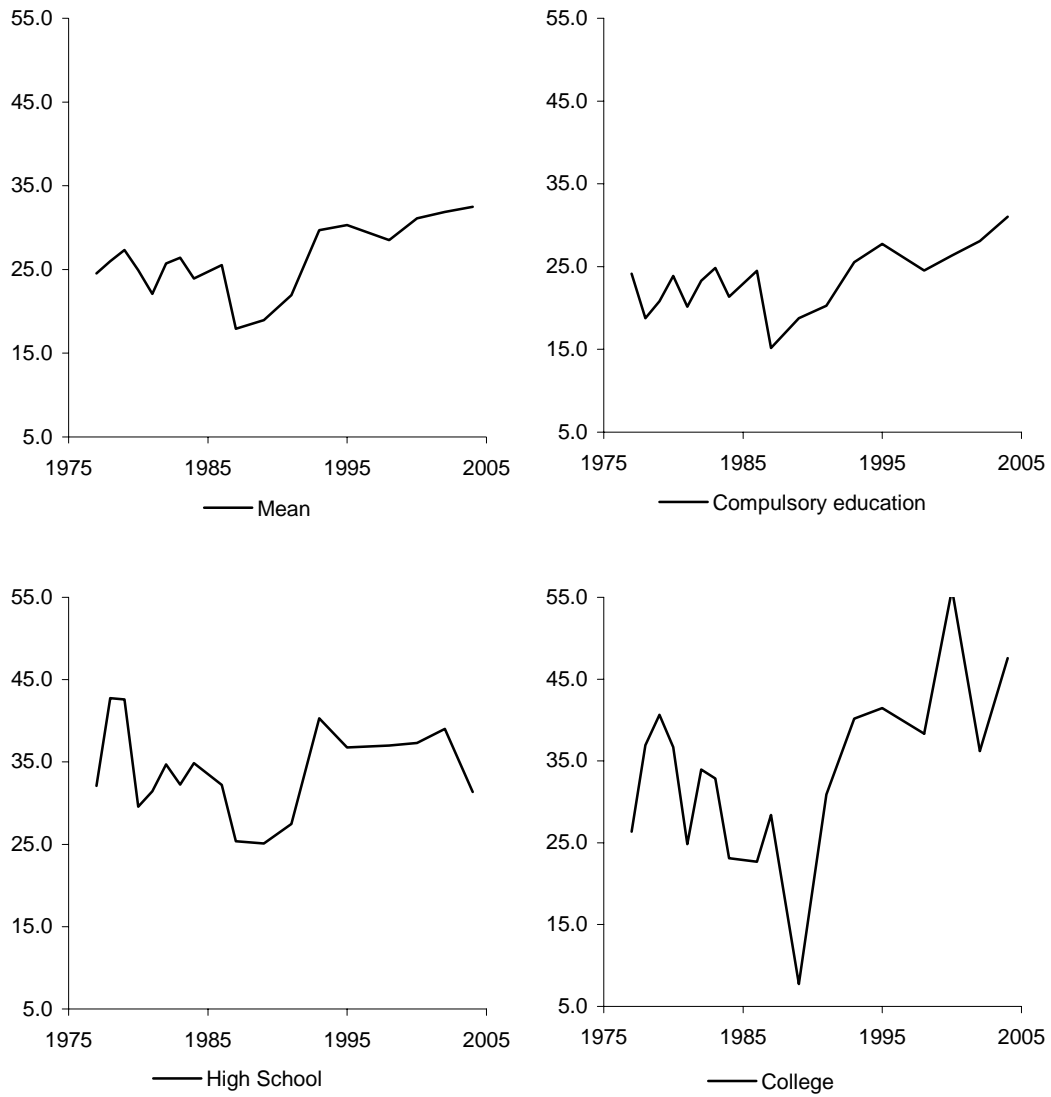


Source: authors' elaborations on Survey of Household Income and Wealth, Bank of Italy.

Notes:

(1) Old = 31-60 years old, young = 19-30 years old; (2) The survey was extensively revised in 1987; (3) Top panel – monthly after-tax wage, bottom panel – hourly after-tax wage.

Figure 5: Old-young wage gaps by education

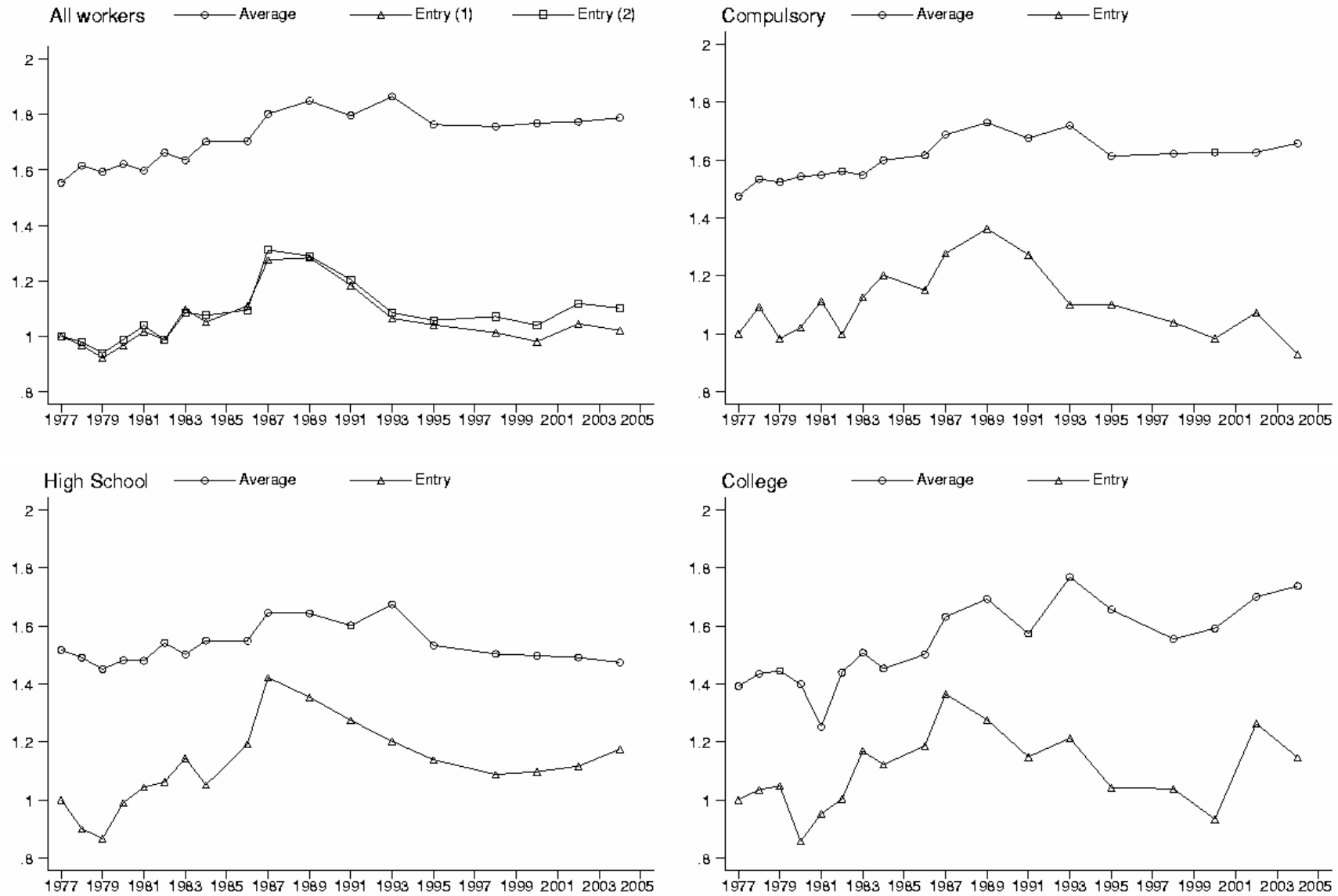


Source: authors' elaborations on Survey of Household Income and Wealth (SHIW), Bank of Italy.

Notes:

(1) Old = 31-60 years old, young = 19-30 years old; (2) The survey was extensively revised in 1987.

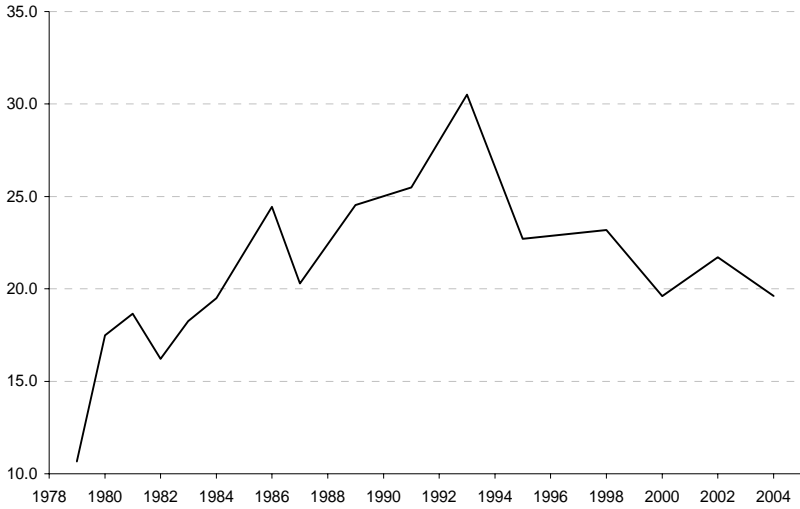
Figure 6: Estimated monthly entry wages and average monthly wages (index: entry wage in 1977=1).



Source: authors' elaborations on Survey of Household Income and Wealth (SHIW), Bank of Italy.

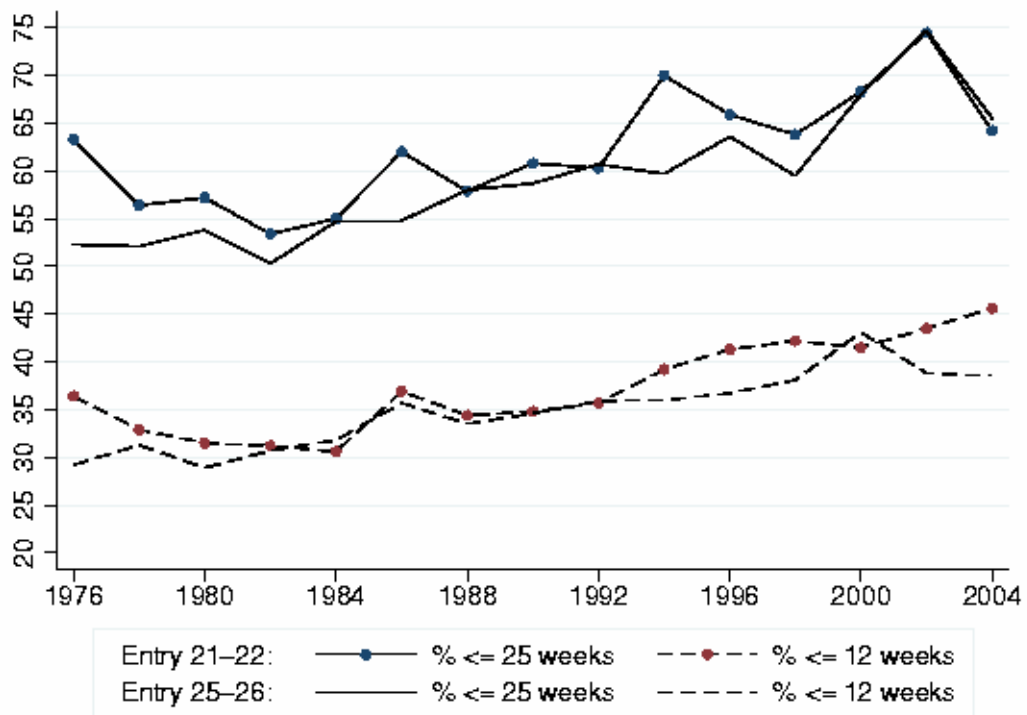
Notes: (1) Entry wages estimated from equation (2) in main text controlling also for individual education; (2) Estimated from equation (2) not controlling for education.

Figure 7: Young-old unemployment rate differential



Source: Survey of Household Income and Wealth, Bank of Italy.

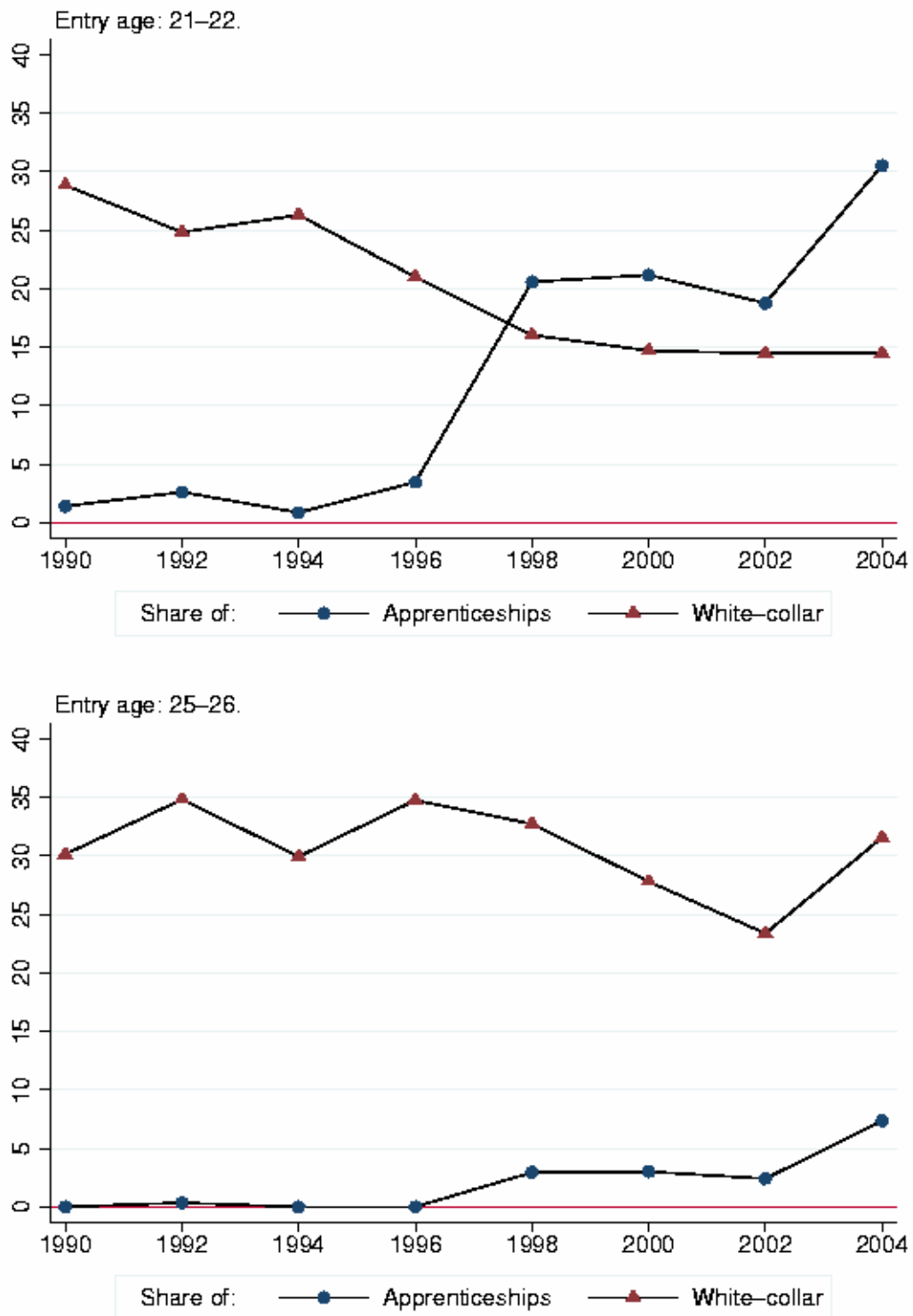
Figure 8: Short jobs for new entrants.



Source: authors' elaborations on Inps data.

Note: The figure plots the share of new entrants with less than, respectively, 25 and 12 weeks in an employment relationship in the entry year, by age at entry.

Figure 9: White-collar jobs and apprenticeships among new entrants.



Source: authors' elaborations on Inps data.  
 Note: the residual category is blue-collar jobs.

Table 1: Age-education relative wages

|  | All education       |                     |                     | Compulsory          | High-school         | Tertiary            |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|  | (1)                 | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 |
| Age-education specific relative supply (ERS) | -0.004<br>(0.016)   | 0.011<br>(0.013)    |                     | 0.035<br>(0.028)    | -0.140**<br>(0.048) | 0.021<br>(0.048)    |
| ERS X Compulsory                             |                     |                     | -0.092+<br>(0.048)  |                     |                     |                     |
| ERS X High-school                            |                     |                     | -0.148**<br>(0.047) |                     |                     |                     |
| ERS X Tertiary                               |                     |                     | 0.022<br>(0.013)    |                     |                     |                     |
| 21-25  | -0.551**<br>(0.040) | -0.614**<br>(0.034) | -0.629**<br>(0.033) | -0.310**<br>(0.030) | -0.560**<br>(0.036) | -0.685**<br>(0.150) |
| 26-30  | -0.397**<br>(0.035) | -0.476**<br>(0.028) | -0.475**<br>(0.027) | -0.191**<br>(0.022) | -0.399**<br>(0.036) | -0.552**<br>(0.061) |
| 31-35  | -0.228**<br>(0.035) | -0.309**<br>(0.027) | -0.294**<br>(0.026) | -0.066**<br>(0.017) | -0.249**<br>(0.037) | -0.324**<br>(0.059) |
| 36-40  | -0.112**<br>(0.035) | -0.193**<br>(0.027) | -0.175**<br>(0.027) | -0.011<br>(0.016)   | -0.145**<br>(0.037) | -0.140*<br>(0.060)  |
| 41-45  | -0.094**<br>(0.035) | -0.176**<br>(0.027) | -0.157**<br>(0.027) | 0.029+<br>(0.016)   | -0.078*<br>(0.038)  | -0.190**<br>(0.059) |
| 46-50  | -0.024<br>(0.035)   | -0.104**<br>(0.028) | -0.102**<br>(0.027) | 0.020<br>(0.017)    | -0.036<br>(0.036)   | -0.044<br>(0.060)   |
| 21-25 X pre-1993                             | 0.134**<br>(0.047)  | 0.130**<br>(0.034)  | 0.152**<br>(0.033)  | 0.074**<br>(0.023)  | 0.083<br>(0.051)    | 0.267**<br>(0.079)  |
| 26-30 X pre-1993                             | 0.126**<br>(0.047)  | 0.124**<br>(0.034)  | 0.133**<br>(0.033)  | 0.098**<br>(0.022)  | 0.112*<br>(0.050)   | 0.201*<br>(0.078)   |
| 31-35 X pre-1993                             | 0.017<br>(0.047)    | 0.015<br>(0.034)    | 0.009<br>(0.033)    | 0.033<br>(0.024)    | 0.048<br>(0.049)    | -0.007<br>(0.081)   |
| 36-40 X pre-1993                             | -0.002<br>(0.047)   | -0.005<br>(0.034)   | -0.014<br>(0.033)   | 0.023<br>(0.024)    | 0.002<br>(0.049)    | -0.026<br>(0.087)   |
| 41-45 X pre-1993                             | 0.042<br>(0.047)    | 0.041<br>(0.034)    | 0.031<br>(0.033)    | 0.027<br>(0.023)    | 0.018<br>(0.049)    | 0.080<br>(0.080)    |
| 46-50 X pre-1993                             | 0.012<br>(0.047)    | 0.011<br>(0.034)    | -0.000<br>(0.032)   | 0.032<br>(0.022)    | 0.005<br>(0.049)    | -0.017<br>(0.080)   |
| Compulsory                                   |                     | 0.211**<br>(0.017)  | 0.162**<br>(0.025)  |                     |                     |                     |
| High-school                                  |                     | 0.037+<br>(0.019)   | 0.059**<br>(0.020)  |                     |                     |                     |
| Observations                                 | 198                 | 198                 | 198                 | 66                  | 66                  | 66                  |
| R-squared                                    | 0.61                | 0.80                | 0.82                | 0.93                | 0.85                | 0.76                |

Standard errors in parentheses; + significant at 10%; \* significant at 5%; \*\* significant at 1%.

Source: authors' elaborations on Survey of Household Income and Wealth (SHIW), Bank of Italy.

Notes:

(1) Reference age-cell is 51-60; (2) Relative supply only includes men of age-education cell; (3) Cells are 5 years age groups except reference, age 51-60; (4) Sample years:1984-2004.

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