The generation gap: a cohort-level analysis of earnings levels, dispersion and the role of initial labor market conditions in Italy, 1974-2010

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Abstract

We build on Rosolia and Torrini (2007) and discuss entry wages, career patterns and inequality developments of subsequent cohorts of youths who entered the Italian labour market since the early ’70s and offer a focus on more recent developments observed during the Great recession. The decline in entry wages started around mid 90s has continued in the last decade although no significant acceleration is observed during the crisis. Falling entry wages have not been accompanied by faster subsequent careers; rather, subsequent careers have been growingly characterised by rising earnings dispersion. We relate such developments to the evolution of labour market institutions, insofar as they affected labor market flows.

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1 Introduction

Over the decade leading to the crisis the employment opportunities of Italian youths have improved considerably. Figure (1) displays the employment rate of youths no longer in education with a completed high-school or college degree 2-3 years after completion. Since 1995, along with the introduction of more flexible working arrangements and the recovery after the lira devaluation, their employment rate has increased sizeably. At the onset of the Great recession it was at 70 percent for male high-school graduates and at almost 80 percent among male college graduates, more than twice the ongoing levels in the mid 90s.

The steady improvement of youths’ occupational opportunities has shifted the attention on the quality of such opportunities in terms of earnings and job stability and of subsequent career development. Several studies, have concluded that the sequence of partial labor market reforms begun after the 1992-93 recession as an attempt to modernize the economic environment, while supporting the creation of new employment opportunities, also contributed to generate a dual labor market along the age dimension, opening a gap between the earnings of old incumbent workers and those of new labor market entrants, more exposed to the new working arrangements.

This paper compares the evolution of a number of labor market outcomes of subsequent cohorts of entrants exploiting a long panel of administrative records for a sample of private sector non agricultural employees covering almost 40 years (1974-2010).

In a previous paper (Rosolia and Torrini 2007) we documented the evolution of entry wages of subsequent cohorts of entrants over the 3 decades between 1974 and 2004. This is the starting point of the present paper: we expand the analysis to 2010, confirm our previous findings and
document how the declining pattern we unveiled in the previous paper has steadily continued. We then complement this evidence in two new respects: first, we offer a more systematic study of the evolution and nature of earnings dispersion over the lifecycle of subsequent cohorts. Specifically, we ask whether this dispersion has increased, and what is the role played by unobserved heterogeneity and (permanent and transitory) earnings instability. Second, we document the role of initial labor market conditions in shaping lifecycle wage profiles and explore whether this role has changed over time. We then conclude.

2 Data

We exploit two longitudinal random samples drawn from administrative records maintained by the Italian Social security administration (Inps) and covering the universe of Italian private non agricultural employees. The samples collect all information available on records concerning individuals born in specific dates of the year. Both samples have an individual identifier although we cannot ensure it is consistent across versions so that they cannot be linked. Along with basic demographics, the data provide information on yearly earnings and weeks worked at the employer level and some information on the employer. Earnings measures are deflated with the consumer price index (2010=1).

The first sample spans the 30 years between 1974 and 2004 and is based on 2 birthdates (March and October 1st) for a total of about 80,000 observations per year (2.5 million observations overall). The second sample spans the period 1985-2010 and is based on 4 birthdates (March and October 1st and June and December 9th) for a total of about 4.7 million observations.

For our purposes, the data has two major limitations. First, we do not observe the actual
entry age. We thus infer it from the observed employment history and define a new entrant in the labor market as someone who has no observed prior employment relationships. Because both datasets are left-truncated and no information prior to the first year is available, we start our analysis of entrants from the third year of each sample so that a new entrant in 1976 is someone who has not been employed in the two previous years, in 1977 in the 3 previous years and so on (similarly, for the newer dataset we start from 1987).

Second, the data lack information on educational attainment. Since this is a major determinant of earnings levels and wage profiles the major changes in educational achievement recorded over the past 40 years, if unaccounted for, would seriously bias the picture. We thus proxy the individual educational achievement by the (observed) entry age: we assumed that workers who entered the labour market at age 20-21 have plausibly completed secondary education but not college and workers entered at age 25-26 plausibly hold a college degree.

3 Preliminary evidence on entry wage developments and subsequent careers

Figures (2) and (3) summarize the main evidence of the paper. They display the wage progression since entry of subsequent cohorts of men and women with different (proxied) education levels. Two main features clearly stand out. First, weekly entry wages began to drop in the first half of the 90s and the downward trend has steadily continued until 2010, being larger for the presumably less educated entrants at age 20-21. Specifically, the entry weekly wage of

1 In Italy high school education is expected to terminate at age 18-19; college graduation is normally expected at age 23-24.
males has dropped by a cumulated 25-30 percent since 1990 in both age groups; among female
entrants, the fall has been deeper for the less educated (40 vs. 20 percent). Second, subsequent
wage careers do not appear to have compensated the decline in entry wages thus leading to a
long-lasting, if not permanent, loss in life-earnings. Interestingly, (Oreopoulos, Heisz and von
Wachter 2012) unveil a similar timing and pattern of entry annual earnings among male college
graduates in Canada: annual earnings appear to have increased until the late 80s and then
have fallen by roughly 30 percent in the first half of the 90s and remained stable thereafter.
(Beaudry and Green 2000) in a different empirical setting also find similar evidence.

Figure (4) plots only average weekly wages at entry along with average weekly wage for all
employees. While real weekly wages have broadly declined for the population of employees as
a whole, entry wages have deteriorated at a faster pace thus opening up a generation gap in
earnings. This gap in wage rates is further amplified by the progressively more fragmented
careers of youths. Figure (5) plots the median number of weeks worked in the year after
entry. Except for women entering the labor market at 25-26, the median number of weeks has
gradually fallen among younger entrants of both sexes and among older men.

The decline of entry wages has been accompanied by an increase in wage dispersion, as
measured by the standard deviation of (log) real weekly earnings (figure (6)). Such increase is
basically driven by the fall in the lower tail of the distribution, as shown in figure (7) which
displays the 2nd and 8th deciles of the distribution of entry wages.

The deterioration of average entry real weekly wages has been stronger for less educated en-
trants (age 20-21). As a consequence, the education wage premia - measured by the percentage
difference between entry wages of college vs. high school graduates entering the labour market
at the same time - has widened (figure 8)). Education premia, substantially stable until the
first half of the '90s, have started to rise thereafter, and more markedly among women, in conjunction with the commonly experienced deterioration of entry wages documented above.

A decline in entry wages is not in itself a source of concern if subsequent careers allow to recover (part of) the initial loss with respect to previous generations. Yet, a preliminary look at the evidence suggests this has not been the case. Figure (9) focuses on the average wage growth experienced 5 years from entry. The pattern of subsequent wage growth rates turns out to be quite cyclical, with stronger subsequent growth for those entering at times of expansion, but confirms the first impression and even suggests a decline in wage growth over time.

4 A cohort-level econometric investigation

The comparison of outcomes of subsequent cohorts at the same point of the lifecycle necessarily implies comparing outcomes at different points in time and thus in different cyclical conditions. A more appropriate analysis of developments in entry wages and their consequences on lifetime earnings should account for these potentially confounding factors.

In this section, we look at the evidence discussed above through the lenses of an empirical model. Specifically, we postulate that (log) real real weekly earnings of employee \( i \) at time \( t \) born in \( b \) and of age \( a \) can be written as:

\[
    w_{b,a,t}^i = \mu_b + \mu_a + \mu_t + \epsilon_{b,a,t}^i
\]

where \( \epsilon_{b,a,t}^i \) is an i.i.d. error. Earnings are assumed to reflect a cohort effect (\( \mu_b \)), an age profile (\( \mu_a \)) common to all cohorts and a time effect (\( \mu_t \)) also common to all cohorts. The model can be estimated projecting individual weekly earnings of subsequent cohorts of entrants on a set of cohort, year and age dummies. Since age, time and cohort dummies are perfectly collinear
we follow what is customary in the literature (e.g. (Deaton and Paxson 1994), (Attanansio 1998)) and impose, as identification assumptions, that time effects (i) sum up to zero, and (ii) are orthogonal to a linear trend.

These assumptions amount to assigning all observed wage growth to the changing demographic structure, which over time modifies the relative weights of the common age profile, and to the change in the permanent component of each subsequent cohort’s average earnings, captured by the cohort dummies. Time effects capture only zero-mean cyclical effects, assumed to affect all groups equally.

Cohort effects thus measure the permanent difference across cohorts once a common age profile is accounted for. Under the identification assumption, any difference in the age profile would appear into the estimated cohort effect. Therefore, if the decline in entry wages observed in the previous section was actually accompanied by a faster wage growth the resulting cohort effect would signal a weaker deterioration (or none at all). By the same token, if the slow down of entry wages described above was the result of a deterioration in economic activity that also affected older workers or previous cohorts of entrants, the estimated cohort effect would not signal any relative deterioration.

We estimate the model both for weekly and for yearly earnings, the difference lying in the developments of career fragmentation across cohorts. The ratio of the the cohort effect estimated on yearly earnings (expressed in weekly terms) to the one estimated on weekly wage yields a measure of employment gap, that is differences across cohorts due to changes in the patterns of attachment to the labor market.

Figure (10) shows both the estimated cohort effects for weekly earnings and such employment
gap by year of birth\textsuperscript{2}. Younger entrants, with presumably a lower level of schooling, have experienced a marked deterioration of the wage rate: the permanent weekly earnings component of males entering just prior to the great recession is estimated to be over one fourth lower than that of comparable entrants in the mid 80s; among women the decline is of about one third. At the same time, the employment gap has widened signalling a growing fragmentation of careers and thus a further source of earnings instability. Among more educated male entrants, the decline in the permanent component of the wage rate is less marked but it is still accompanied by a deterioration of the employment gap. Only among more educated female entrants there appear to have been no significant deterioration along either margin.

Figure (11) plots the estimated (log) cohort effects against the employment rate prevailing in the education/sex group at time of entry. Although different in size, more marked among high-school graduates, the fall in our estimated measure of permanent earnings potential has coincided with the increase in employment rates of youths at exit from school.

The decline may reflect a number of factors, of which the changing composition of available jobs is one. It is often claimed that labor market reforms have relaxed constraints on more labour intensive and less productive sectors thus leading to their development, a classical example being the personal and household services sector. To quantify the role of such developments we replicate the above analysis including controls for firm characteristics in the empirical model. While the above exercise was performed on year-cohort cell averages because, beyond birth year and age, there were no individual specific characteristics to be accounted for, now we estimate cohort effects on worker-level data and control for job-specific characteristics, namely sector, firm size and average wages paid at the firm.

\textsuperscript{2}The model is estimated separately for the 4 groups given by sex and entry age. The dependent variable is the average weekly wage or yearly earnings in the year-year of birth cell.
5 A look into the nature of earnings dispersion

As shown above, the decline in entry wages has roughly coincided with a pick up in earnings dispersion at entry, mostly driven by a fall of the lower tail of the distribution. This pattern may reflect various developments. First, the progressive deregulation of the labour market may have increased (transitory or permanent) earnings instability; second, by bringing into the labour market a larger fraction of youths the higher dispersion may reflect the higher heterogeneity of entrants; third, new labor market rules may have helped create jobs in less productive sectors so that increased earnings dispersion may indeed reflect job quality dispersion. While it is not straightforward to disentangle the different components, below we attempt to look at this issue through the lenses of standard variance decomposition techniques based on a postulated empirical model for earnings developments. Specifically, we assume that for each cohort/sex/entry-age \((b, s, e)\) individual weekly earnings at age \(a\) result from:

\[
\begin{align*}
  w_{ia} &= \mu_a + \nu_{ia} \\
  \nu_{ia} &= \alpha_i + \eta_{ia} + \epsilon_{ia}
\end{align*}
\]

where \(\mu_a\) are cohort/sex/entry-age age-specific effects, accounted for by a set of group specific age-dummies and \(\nu_{ia}\) the unexplained component resulting from \(\alpha_i\), which reflects unobserved heterogeneity (e.g. ability, education), and \(\eta_{ia} = \eta_{ia-1} + \nu_{ia}\) and \(\epsilon_{ia}\), respectively, permanent and transitory innovations to earnings. All variances are assumed to be cohort/sex/entry-age specific and unobserved components iid. Since the focus is on higher moments of the distribution, we restrict our attention to the larger sample 1985-2010.
The variance of the overall unexplained component \( \nu_{ia} \) is:

\[
V(\nu_{ia}) = V(\alpha_i) + V(\eta_{ia}) + V(\epsilon_{ia}) = V(\alpha_i) + V(\sum_{s=e}^{a} v_{is}) + V(\epsilon_{ia})
\]

which lays out the factors underlying the evolution of earnings dispersion across cohorts and over time. To net out the variance of the transitory shock, we focus on:

\[
cov(\nu_{ia}, \nu_{ia-1}) = V(\alpha_i) + \sum_{s=e}^{a-1} V(v_{is})
\]

which, under the assumption that over the lifecycle of a given cohort \( V(v_{ia}) \) is constant, allows to back out an estimate of the variance of the unobserved heterogeneity \( \alpha \) and of that of the permanent innovation \( v \) by a regression of \( cov(\nu_{ia}, \nu_{ia-1}) \) on a constant and a linear term which return, respectively, the first and the second variance. The variance of the transitory component, again assuming it is constant over the lifecycle, can then be obtained as:

\[
V(\epsilon_i) = V(\nu_{ia}) - cov(\nu_{ia}, \nu_{ia-1}) - V(v_i)
\]

Results, depicted in figure (12), suggest that the increase in wage dispersion across cohorts, over and above a group-specific age profile, has been driven by increased individual unobserved heterogeneity and by a higher variance of the transitory earnings innovations while the variance of permanent ones has remained broadly stable.

In the above representation the consequences of a more heterogeneous pool of employment opportunities determined by the (partial) deregulation of the labor market is embedded in the variance of permanent innovations \( v_{ia} \) which, capture events with long lasting consequences for one’s earnings, also reflect, say, the larger dispersion of employment opportunities following unemployment. Yet, to control for the role potentially played by the distribution of firm
characteristics in shaping the overall observed earnings dispersion we replicate the previous analysis on residuals obtained from a regression of weekly wages on a set of group specific age-dummies (as above) and selected firm characteristics (log size, average wages, sector).

[to be completed]

6 Initial labor market conditions and career profiles

Several studies have documented the persistent effects on initial labor market conditions, both within employment spells (e.g. (Beaudry and Nardo 1991), (Bertrand 2004)) and over the life cycle (e.g. (Oreopoulos et al. 2012)). We ask whether such persistence is a feature of the Italian wage setting mechanism, studying how wage profiles of cohorts entered in the labor market over the period 1985-2010 reflect regional labor market conditions at time of entry.

Specifically, we estimate the following model for (log) real weekly wages:

\[ w_{itber} = \beta u_{r,t} + \gamma u_{g,b+e} + \delta_t + \phi_b + \nu_r + \epsilon_{it} \]

where the wage at time \( t \) in region \( r \) of individual \( i \) born at date \( b \) and entered in the labor market at age \( e \) in region \( g \) is a function of the ongoing unemployment rate in region \( r \) at time \( t \), the unemployment rate at time of entry \( u_{g,b+e} \), a set of regional, time and cohort dummies and an iid error term. We let the effect of unemployment rate at entry to be different in the year of entry and in subsequent years. In this specification, \( \beta \) captures the effect of current unemployment rate on the average wage once systematic differences across locations and over time as well as age and cohort effects are accounted for; \( \gamma \) yields the effect on wages of unemployment rate at entry.

Results for alternative specifications of the effects of unemployment rate at entry are presented
The models are estimated separately for men and women. The sample includes all employees aged 20-64 and new entrants are employee aged 20-39 the first time they appear in the data. We only focus on the 1985-2010 sample, although results are substantially unaltered by merging the two datasets. Columns (1) report results for a baseline regression of low weekly real wages on current unemployment rate, which yields a negative and statistically significant elasticity of about 0.17 among men and positive among women. In columns (2) we augment the model allowing for an additional effect of the current unemployment rate on new entrants. Among men, the average elasticity to current unemployment rate of experienced workers’ wages turns out to be much lower (0.04) with a p-value just below 10 percent. On the contrary the additional response of new entrants’ wages to the current labor market stance is strongly negative. The estimated coefficient implies that entering the labor market with a one standard deviation (0.057) higher unemployment rate reduces the entry wage by about 10 percentage points. A similar effect is found among women, for whom the average estimated elasticity remains positive and statistically significant. Results in column (2) thus suggest that the elasticity of average wages to current unemployment is driven primarily, at least among men, by the response of entry wages, while mature workers seem rather insulated. In columns (3) we ask whether new entrants suffer from bad initial labor market conditions also beyond their entry job. We thus augment the specification allowing for an effect of the initial unemployment rate on wages earned in subsequent years. Results imply that subsequent wages are on average lower, although with major differences among men and women. While the former suffer an economically small earnings loss (one third of a percentage point for a one standard deviation higher unemployment rate at entry), comparable women lose ten times as much. In column (3) the effect of initial labor market conditions on subsequent wages is constrained to be the same
regardless of whether they are earned in the same or in a different job. In column (4) we relax the assumption and allow for a differential effect of initial unemployment rate on subsequent wages when they derive from a different job than the entry one. This specification shows that, among men, the average negative elasticity of subsequent wages to initial unemployment is driven by lower wages earned in jobs different from the initial one; among women, also those that keep the initial job earn less with respect to comparable entrants in more favourable labor market conditions although the loss is larger for job changers.

Finally, in columns (5) we explore whether the role of initial labor market conditions has changed across cohorts. Based on the evidence discussed so far, we split the subset of (observed) new entrants into two groups, those entered prior to 1997 and those entered afterwards and allow the initial unemployment rate to have different effects in the entry job and in subsequent ones for these younger cohorts. Results do not highlight major quantitatively relevant differences: younger entrants suffer upon entry slightly less from a higher unemployment rate but more in subsequent job changes.

7 Conclusions

The performance of youths in the labor market is at the center stage of the policy debate in almost all developed countries (7). In Italy, since the beginning of the recessionary phase the youth employment rate at entry has fallen considerably, even accounting for those remaining in school. This fall follows a huge improvement of employment opportunities for young entrants in the labor market recorded over the previous 10-15 years.

3The choice of 1997 as splitting point reflects the introduction of a number of important measures by the so-called Pacchetto Treu.
Such improvements are often linked to the partial deregulation of the labour market started in the mid 90s which has determined a significant segmentation of the labor market with youths mostly confined into flexible occupations and thus more exposed to cyclical downturns.

This paper shows that the improvement in occupational chances has gone along with a deterioration in earnings and with an increase in within cohort dispersion relative to older cohorts. As to the deterioration, this appear to have been partly compensated by the favourable developments in overall unemployment rate whose level upon entry we find to persistently shape entrants’ lifecycle earnings. As to the dispersion, we show that its increase reflects both a higher dispersion of individual unobserved heterogeneity and a higher incidence of transitory earnings shocks.
References


Figure 1: Youth employment rates at entry in the labor market
Figure 2: Entry wages and wage progressions of male employees
Figure 3: Entry wages and wage progressions of female employees
Figure 4: Entry wages and total average wages

Weekly real earnings (average)

F, Entry at 21–22
F, Entry at 25–26
M, Entry at 21–22
M, Entry at 25–26


Full lines: entry wages; Dashed lines: wage index for all employees of same sex
Figure 5: Weeks worked

Figure 6: Earnings dispersion at entry - standard deviation

Males, Entry at 20–21

Males, Entry at 25–26

Females, Entry at 20–21

Females, Entry at 25–26

Figure 7: Earnings dispersion at entry - 2nd and 8th deciles
Figure 8: Returns to education at entry

Figure 9: Average yearly wage growth 5 years from entry

Males, Entry at 21–22
Males, Entry at 25–26
Females, Entry at 21–22
Females, Entry at 25–26

Figure 10: Cohort permanent earnings and employment gap
Figure 11: Employment rates and cohort effects

![Chart showing employment rates and cohort effects for high school and college males and females.](chart.png)
Figure 12: Determinants of earnings dispersion
Table 1: Unemployment rate and wages of new entrants

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<td>$u_{ey}I(t = entryyear)$</td>
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<td>$u_{ey}I(t &gt; entryyear)$</td>
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<td>$u_{ey}I(t &gt; entryyear)J(f \neq entryfirm)$</td>
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Post-1997 entrants:

|                   | (1)   |       |       |       |       |       |       |       |       |       |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                   |       |       |       |       |       | 0.186 |       | -0.174|       |
|                   |       |       |       |       |       | (0.035)|       | (0.044)|       |
| $u_{ey}I(t = entryyear)$ |       |       |       |       |       |       |       |       |
|                   |       |       |       |       |       | (0.023)|       | (0.029)|       |
| $u_{ey}I(t > entryyear)$ |       |       |       |       |       |       |       |       |
|                   |       |       |       |       |       | (0.023)|       | (0.029)|       |
| $u_{ey}I(t > entryyear)J(f \neq entryfirm)$ |       |       |       | -0.233|       |       |       |
|                   |       |       |       | (0.026)|       |       |       |

All regressions include dummies for year, region of work and year of birth. Standard error in parenthesis. Estimates are sex-specific. Sample is 1985-2010.