FAR AWAY FROM A SKILL-BIASED CHANGE: FALLING EDUCATIONAL WAGE PREMIA IN ITALY

Paolo Naticchioni
University of Rome "La Sapienza", Univ. Catholique de Louvain

Andrea Ricci
University of Perugia

Emiliano Rustichelli
ISFOL

May 2007

Abstract

In this paper we apply quantile regressions to investigate the evolution of Educational Wage Premia (EWP) in Italy from 1993 to 2004. Using SHIW data (Bank of Italy) and different classifications for educational attainments, we show that EWP have generally decreased over time across the wage distribution. In particular, the falling of EWP in the private sector is striking, considering both continuous and categorical specifications for education, at all quantiles of the distribution. Different patterns are observed in the public sector, where EWP remain basically stable over time. A number of robustness checks and various econometric specifications are also applied in order to address sample selection issues. Our findings also provide additional evidence in favour of the thesis that the increasing patterns in inequality and EWP, and the related interpretations concerning skill-biased changes, are much less pronounced in continental Europe than in Anglo Saxon countries.

JEL codes: I20, J24, J31,

Keywords: Educational wage premia, Returns to education, Quantile regression, Italy.

Corresponding author: Paolo Naticchioni, Via Cesalpino, 12-14, 00161, Rome, email: paolo.naticchioni@uniroma1.it

1. Introduction

The analysis of educational wage premia (EWP) is a traditional topic in labour economics as it provides a statistical relationship between educational attainments and the structure of wage distribution. Empirical interest in EWP has actually increased over the last decades since the spread of new technologies is believed to favour the more skilled workers, entailing an increase of wage inequality between (and within) individuals characterized by different endowments of human capital.

Taking reference from this literature, our paper aims at investigating the evolution of EWP across wage distribution in Italy. The changes of EWP are estimated by applying quantile regressions and using the *Survey of the Household Income and Wealth* (SHIW) of the Bank of Italy, from 1993 to 2004. As for education, we make use of both a categorical specification in four dummies (primary, lower secondary, upper secondary and tertiary) and a continuous one (years of education). Applying quantile regressions offers some remarkable advantages with respect to standard procedure regarding the conditional mean. First, since the effect of education may vary across individuals situated at different points of the earnings distribution, using a quantile approach allows for the detection of heterogeneity among the educational premia. Second, with a quantile regression it is possible to model the distribution of unobserved heterogeneity in such a way that omitted variable biases (ability) do not affect temporal comparison of the estimates.

Within this framework, we show that EWP in the private sector decreased over the period and across the whole wage distribution. More specifically, using the Mincerian continuous specification for education, EWP decrease over time at all quantiles, from 39.4% at 10^{th} percentile to 12.3% at the 90^{th} percentile.

When education is measured in dummies, we point out that the decline in EWP of lower secondary degrees, with respect to the omitted category of primary education, is significant (about -50%) in the upper tail of the distribution, that of upper secondary premia ranges between 29.9% and 39%, and the EWP for tertiary education decrease from -39.4% at the 10^{th} percentile to -17.8% at the 90^{th}. These patterns remain substantially unaffected when the estimates are replicated using more detailed information concerning different types of high school (general, vocational) and tertiary degree achievements (humanistic, professional, scientific), highlighting that previous results are not driven by measurement errors (composition effect) related to the type of schooling levels. In particular, EWP for both vocational and general high school workers decrease over

time in a similar way. As for tertiary education, humanistic and professional degrees are associated to falling EWP, while scientific degrees decrease but in a non significant way.

As for the public sector, we find out quite different patterns: EWP remain basically stable over time, except for graduates at the 75th percentiles that increase their EWP by 31.8%. These findings may be due to institutional features of the public sector, such as a greater protection for the employees in this sector against labour market conditions, mainly because of higher unions' power and wage compression.

The evidence concerning the private sector also holds when a wide set of robustness checks are performed to tackle sample selection issues. In particular, we estimate the EWP for different sub-samples of workers (male full time, including self-employed, young *vs*. adults) in order to test whether changes in labour market participation decisions could have affected the estimates. In an additional robustness check we make use of a more general specification of the wage equation, adding a wide set of covariates to the standard Mincerian approach.

These robustness checks do not necessarily address all the econometric issues related to the estimate of the returns to education, and, in particular, those associated with the endogeneity of schooling choices.[1] To handle the resulting biases a number of empirical strategies have been proposed in the literature. Among these, the instrumental variable techniques based on both "natural experiments" and "exogenous variations", and the approach of exploiting the differences between siblings or twins, have received much attention. Some previous papers on returns to education in Italy derived convincing instrumental variables in the SHIW data, exploiting information provided by the school reforms of the late 1960*s* (Brunello et al., 1999). However, this type of instrumental variables becomes much less convincing when the focus of the analysis is the time dynamics of EWP. In fact, since the effects of school reforms change according to the population sub-group involved in the reforms, the group of *compliers* affected by the instruments changes over time, affecting in turn dynamic comparison of the estimates.[2]

[1] Peracchi (2004) distinguishes between returns to education, which is a measure of the causal effect of an extra level of schooling on the worker's earnings, and educational wage premia, which is a measure of statistical association between levels of schooling and wages. We make use of this terminology in the paper.

[2] For a detailed explanation on how IV-LATE estimates can change using different instruments and different groups of compliers, see Angrist et al. (1996). Furthermore, as also stressed by Peracchi (2004), IV estimates of returns to education usually exceed OLS estimates, even though they also tend to be less precise, possibly because of a weak instrument problem. See also Ashenfelter, O., C. Harmon and H. Oosterbeek (1999).

For this reason, and since our primary goal is to focus on the evolution of the statistical relationship between educational premia and the structure of wage distribution, the issue of schooling endogeneity is not further investigated.

It is also worth noting that our findings are not in line with the empirical evidence, especially the one concerning Anglo-Saxon countries, which emphasizes the role of EWP as driving force of both increasing inequality and skill-biased changes. Instead, we provide additional evidences that phenomena related to skilled biased change seem to be much less pronounced in continental Europe. Furthermore, even among the evidence for European countries, which usually reports stable or slightly increasing EWP, the Italian case is peculiar because EWP decrease for all education attainments across the whole wage distribution, similarly only to the Austrian case (Fersterer and Winter-Ebner, 1999).

The remainder of the paper is organized as follows. Section 2 reviews the empirical literature on educational premia. Section 3 describes the database and some descriptive statistics, while the quantile regression methodology is presented in Section 4. In section 5 we set out our estimates for both the private and the public sector, while sections 6 reports some robustness checks. Section 7 concludes.

2. The empirical literature

The time trends of EWP reveal quite different patterns across countries, since differences in educational systems, income measures, data collection procedures and estimation strategies substantially affect the magnitudes of the estimates and the cross-country comparisons (Gottschalk and Smeeding, 1997; Peracchi, 2004). For this reason, in this survey we focus mainly on the dynamic pattern of educational premia derived in country specific studies. As for the US, several papers have shown considerable increases in earning differentials both between workers with different schooling levels and within workers with the same observable characteristics. More specifically, tertiary wage premia showed a marked decline during the 1970s, increased substantially during 1980s and rose with a smoother trend in the 1990s (Bound, and Johnson, 1992; Juhn, Murphy and Pierce, 1993; Card, 2001). Most of these results, however, regard the central tendency of the earning data, ruling out any concern about the heterogeneous impact of education along the wage distribution. One of the first exceptions is Buchinsky (1994), who investigated the changes in the structure of US wages during the '80s and '90s using a quantile regression technique in such a way as to measure

the effect of schooling at different quantiles of the conditional earning distribution. Buchinsky (1994) underlines two main findings. First, acquiring an additional educational qualification increases the wage at all quantiles of the distributions, with a stronger effect in the upper tail of the distribution. Second, returns increased over time at all quantiles at approximately the same rate. A similar pattern is found by Martins and Pereira (2004), who estimate the educational premia for 16 European countries during the '90s. By applying quantile regressions these authors show that EWP are generally higher at the highest quantiles of the conditional earning distribution in almost all the countries considered, although no thorough investigation is made into the dynamic pattern of these estimates.

Other interesting country specific studies for Europe, that make use of quantile regressions, are Fitzenberger and Kurz (2003) for Germany, Machado and Mata (2001) for Portugal, and Fersterer and Winter-Ebner (1999) for Austria. In particular, Fitzenberger and Kurz (2003) show that education has a greater effect on the wages of individuals at the top of the wage distribution than on those at the bottom. Using pooled data for Germany in the period 1984-1994, they report that the college premium - over the high school- amounts to 32% at the 10^{th} percentile and 41% at the 90^{th}, although there are no significant changes in these estimates over the period.

In Portugal, Machado and Mata (2001) use quantile regressions to describe the evolution of the conditional wage distribution between 1982 and 1994. Much as in the German case, they point out that EWP increase along the quantile distribution in each sample year. Further, they show that while the median returns are roughly constant, the impact of education at the two tails of the distribution follows opposite patterns: the EWP at the lowest quantiles decreased by 1.5% while the EWP at the 90^{th} increased by 3%. As for Austria, the paper by Fersterer and Winter-Ebner (1999) shows that schooling premia fell over the period 1981-1997, a result in contrast with evidence from other developed countries, and which the authors attribute to the increase in the relative supply of more educated workers in the last two decades.

As far as Italy is concerned, some papers estimated the average returns to schooling by applying least square or instrumental variables techniques (Brunello and Miniaci, 1999; Brunello, Comi and Lucifora 2001). For instance, Brunello and Miniaci (1999) use SHIW (Bank of Italy) data for 1993 and 1995 to measure the returns to schooling, obtaining an OLS estimate of 4.8% and an IV estimate, which exploits a reform in the school system introduced in 1969, of 5.7% for male households. Similar findings are

derived by Brunello, Comi and Lucifora (2001), who develop their analysis on the same dataset and use as instruments some variables related to family background, school system reforms and measures of individual risk aversion. They also detect an increasing trend of EWP from 1977 to 1995, which was mainly driven by higher EWP in the public sector.

It is worth noting, however, that these studies emphasise the causal interpretation of schooling investments, although they do not take into account the relationship between schooling premia and the whole wage distribution, since they apply OLS estimates. This issue is investigated by Giustinelli (2004), who apply a quantile regression framework to investigate the dynamic of EWP over the period 1993-2000 using SHIW data. The main result is that the schooling premium shows a *U* shaped pattern across the wage distribution in each sample year, while the trend over time of EWP is not deeply investigated. Another related paper is Lilla (2005), which estimates educational wage premia up to the year 2002, using SHIW data and quantile regressions. However, Lilla (2005) mainly investigates the within-between components of wage inequality in Italy, without deeply focusing on the trends in educational wage premia.

It is also important to stress that the low levels of educational attainments of the workforce represent another distinctive characteristic of the Italian labour market. According to OECD (2006), the share of individuals who had achieved a tertiary degree in 2004 stood at 11% in Italy, as compared with 24% in France, 25% in Germany, 29% in the UK, and 39% in the US. Moreover, the catch-up process is slowing down, since the tertiary enrolment rate in absolute terms decreased in 2004-2005 by 1.5% and in 2005-2006 by 4.5%. Such a slowdown is also confirmed by looking at the individuals aged 25-34: the rate of graduates in this age-class differs little from the previous figures: 15% in Italy, 24% in France, 23% in Germany, 35% in the UK and 39% in the US. On this evidence Italy displays among the lowest educational attainments among the OECD countries, while the catching up process is converging at a very slow rate.

These striking international differences might suggest that since skilled workers are relatively scarce in Italy, their wage premia should be relatively higher, according to a standard demand-supply paradigm. However, this is by no means the case. OECD (2005) states that the tertiary education premia in Italy are lower than in the other OECD countries. More specifically, with respect to secondary education (at 100), the premium for having a tertiary education degree for individuals aged between 30 and 44 is 137 in Italy, 150 in France, 163 in UK and 185 in the US (OECD, 2005). This means that EWP levels seem to be lower in Italy than in most of the OECD countries. What

about the EWP evolution over time? This paper mainly addresses this issue in a quantile regression framework for the period 1993-2004.

3. Data description and descriptive statistics

The empirical analysis is based on the *Survey of the Household Income and Wealth* (SHIW) of the Bank of Italy, from 1993 to 2004. The sample consists of employees aged 15-64. We refer to the real monthly net wage, obtained by dividing yearly income from employment, net of taxes and social security contributions, by the number of months worked in the relevant year and deflating by the consumer price index of 2004. We also use both part time and full time workers, correcting the monthly wage for part-timers with a part-time share, computed comparing the number of hours worked by part-timers with the average for the full-time workers.[3]

Table 1 gives the descriptive statistics of the main variables in 1993 and 2004 for the private sector, which is the main focus of this paper, and also for the public sector.[4] Focusing on the pattern of educational dummies it can be observed that, for both sectors, the shares of individuals with upper secondary and tertiary attainments increased over time, while the shares of individuals with primary and lower secondary education declined. Further, a higher share of graduated workers are employed in the public sector (in 2004, 27.5% of the employees in the public sector were graduated, and only 8.7% in the private one), even if differences between the two sectors are getting closer over time.

As for the level of the experience variable in the private sector, there is a falling incidence of employees with less than 15 years of experience and an increasing share of those with more than 16 years. Similarly, in the public sector the share of individuals with less than 25 years of experience decreased substantially, and the one of those with more than 25 years rose, involving an increase in the level of experience in the workforce. As for the share of female workers, it is higher in the public sector and it rose steadily in both sectors, a trend linked to the higher labour force participation of women in the last decades. With regard to the wage changes, Table 1 shows

[3] Note also that we exclude 0.05% of the observations in both the right and left tail. Further, given the greater share of highly educated workers among atypical workers (atypical in the sense that are classified as self-employed but mostly considered by both employers and the public opinion as subordinate workers, i.e., the so-called "parasubordinati – co.co.co"), we decided to include them in the analysis where identifiable (in 2004). The main results do not change excluding these workers from the sample.

[4] Following the advises of the Bank of Italy Statistical Office we define a public employee using two variables in the database (APSETT==9 & DIMAZ==7), in this way minimizing the incidence of measurement errors.

that from 1993 to 2004 the average monthly wage, in real term, remained basically stable both in the private and public sector. Further, wages are higher in the public sector than in the private one.

We also generate a finer classification of education attainments, in order to isolate different kinds of upper secondary schools and tertiary degrees. This finer classification is useful to investigate whether the EWP dynamics derived with educational classification in 4 dummies might partially depend on composition effects related to different groups included in each dummy. In particular, we create a dummy for general upper secondary degrees ('liceo') and another one for all the other vocational upper secondary degrees (including also individuals that achieve short upper secondary degrees, usually in three years). As for tertiary education, we define three categories: humanistic degrees (including humanities, social science and sociology); professional degrees (law, economics, accounting, architecture), and scientific degrees (physics, mathematics, medicine, engineering).[5] Unfortunately, since for 1993 this information was not included in the SHIW data, we have to use the SHIW survey of 1995. In table 2 we set out the related descriptive statistics, for subordinate workers aged 15-64, separately for private and public sector. As for the upper secondary levels, while the general school (*liceo*) share increased over time, it was the vocational schools that still attracted most of the students (around 88% in 2004 in the private sector). As far as tertiary education is concerned, it is worth noting that the public sector absorbs a higher share of workers with humanist degrees, while the private sector is more focused on professional and scientific degrees. Further, in the private sector the share of humanist degrees increased over time, while professionals displayed a quite impressive reduction from 37.9% to 29.2%, as well as the share of workers with scientific degree, even if more slightly. Different patterns are observed in the public sector, where the share of individuals with humanistic and professionals degrees decreased slightly, while the scientific ones increased over time.

4. The quantile regression framework

This section presents the quantile regressions methodology, used in the paper. In general terms, let $Q_\theta(y_{i,t} \mid X_{i,t})$ be the conditional θ-th quantiles of the dependent variable on the explanatory variables $X_{i,t}$. The statistical model $Q_\theta(y_{i,t} \mid X_{i,t})$ is specified as a linear function of the covariates:

[5] We cannot consider all the other less widespread kinds of tertiary degrees (10% of the graduates in the sample), since the SHIW database put them in the same category, without any distinction. We drop these observations from the analysis.

(1) $y_i = X_i \beta_\theta + \upsilon_{\theta i}$ with $Q_\theta(y_i \mid X_i) = X_i \beta_\theta$, $\theta \in (0,1)$

where the vector of coefficients β_θ varies with θ, unless the conditional distribution of *y* is homoskedastic, in which case only the intercept included into the vector β_θ varies across quantiles. Further, in equation (1) it is assumed that the error term, $\upsilon_{i,t}$, is such that $Q_\theta(\upsilon_{\theta i} \mid X_{i,t}) = 0$.[6] Using the statistical framework (1) we adopt a linear specification of the earning function of the type introduced by Mincer (1974), where the dependent variable is the log monthly wage and the independent variables include educational attainments, work experience and gender. The following equation is then estimated, separately for 1993 and 2004:

(2) $\ln w_{i,t} = a_{\theta,t} + \eta_{\theta,t} sex_{i,t} + \delta_{\theta,t} \cdot educ_{i,t} + \mu_{\theta,t} \exp_{i,t} + \upsilon_{\theta,i,t}$ *t=1993,2004*

where i=1,…N is the number of observations in each year *t*, θ is the quantile being analysed, *sex* stands for gender, *educ* is a measure of educational attainments, *exp* stands for experience and $\alpha_{\theta,t}$, $\eta_{\theta,t}$, $\delta_{\theta,t}$, $\mu_{\theta,t}$, are the coefficients to be estimated for each year and at the chosen quantiles.

It is worth noting that equation (2) does not explicitly take into account the functional relationship between unobserved ability and schooling levels, nor the effect of their interaction on the conditional distribution of (log) wages. This omission is due to the fact that unobserved heterogeneity does not affect the temporal comparison of the estimates if the distribution of ability is time invariant, although it plays an important role in interpreting the pattern of schooling premia across the quantiles. To better explain this point, equation (2) can be modified as follows:

(3) $\ln w_{i,t} = a_{\theta,t} + \eta_{\theta,t} sex_{i,t} + \delta_{\theta,t} \cdot educ_{i,t} + \mu_{\theta,t} \exp_{i,t} + \Phi(educ_{i,t}, a_{i,t}) + \upsilon_{\theta,i,t}$

where the unknown function Φ represents the education-ability interaction, a_i stands for the unobserved ability, while the idiosyncratic error term, $\upsilon_{i,t}$, is such that $Q_\theta(\upsilon_{\theta,i,t} \mid X_i) = 0$. In such a context, it is possible to impose a parameterization of the function Φ to derive a monotonic impact of ability across the wage distribution when $educ_i$ varies. For instance, if one assumes that $\Phi(educ_{i,t}, a_{i,t}) = \sigma \cdot educ_{i,t} a_{i,t}$, where σ is a parameter which captures the effect of ability on education returns, the EWP on the θth conditional quantiles can be written as:[7]

[6] For further discussion on methodological grounds and techniques used to perform point and interval inference see Koenker and Basset (1978) and Buchinsky (1994).

[7] For further details about this specification see Arias, Hallock and Sosa-Escudero, 2001.

$$(4)\quad \frac{\partial Q_\theta[\ln w_{i,t} \mid educ_{i,t}, sex_{i,t}, \exp_{i,t}]}{\partial educ_{i,t}} = \delta_{\theta,t} + \sigma \cdot G_a^{-1}(\theta \mid educ_{i,t}, sex_{i,t}, \exp_{i,t}) \equiv \delta_{\theta,t}^{'}$$

where $\delta_{\theta,t}^{'}$ is the *quantile treatment effect* due to changes of schooling attainments at each θ and G_a is some monotonic transformation of the ability distribution in the population.[8] Two remarks help in understanding the impact of education derived in equation (4). First, the EWP estimates reflect the distribution of individual ability across the earnings distribution, underlining the fact that equation (3) is not a pure location model and that the slope of coefficients varies across quantiles.[9] Second, the comparison of the *quantile treatment effect* of education between two different time periods is not affected by the ability bias if the distribution of individual ability is supposed to be time invariant. Actually, by comparing the quantile treatment effect in two sample years, t_0 and t_1 with $t_0 < t_1$, and assuming that the inverse function G_a^{-1} is time invariant, the dynamic pattern of the educational premia corresponding to the θ^{th} quantile is equal to the difference $\delta_{\theta,t_1} - \delta_{\theta,t_0}$. Since the goal of our analysis is mainly a matter of the evolution of EWP over time, it is then possible to rule out any concern about the distribution of unobserved ability.

5. Falling EWP in Italy: quantile estimates

The empirical procedure consists in estimating two different specifications of equation (2) at five quantile regressions of the conditional (log) wage distribution, namely $\theta = .1,.25,.5,.75,.9$, separately for the years 1993 and 2004.[10] In the first specification, education is formalized through a

[8] Note also that the function $G_a^{-1}(\theta \mid educ_{i,t}, sex_{i,t}, \exp_{i,t})$ is derived by applying the probability integral transformation theorem to the conditional quantiles of the ability distribution, i.e. $Q_\theta(a_{i,t} \mid educ_{i,t}, sex_{i,t}, \exp_{i,t})$.

[9] In particular, $\sigma < 0$ entails a substitutability relationship between v_i and $educ_i$ across the wage distribution, since ability decreases the wage premia associated with an increase of education levels. Conversely, a complementary relationship between v_i and $educ_i$ occurs when $\sigma > 0$, since ability increases the wage premia associated with an increase of education levels.

[10] We decided to begin our analysis in 1993 because in 1992-1993 the former wage indexation mechanism ('*scala mobile*') was replaced by a completely new bargaining system. Since then, the bargaining structure of the wage setting can be described as a two-tier system: national contracts are devoted to preserve the purchasing power of wages, whereas decentralised wage bargaining at firm level should be related to rent-sharing, in case of positive surplus.

continuous variable, namely years of schooling.[11] In the second, education is expressed in four dummy variables for different schooling attainments (no-school and primary education, lower secondary, upper secondary and tertiary). In this latter case, we further extend the analysis to a finer classification of education categories in order to address issues related to the type of upper secondary schools and the quality of skills acquired with a tertiary degree. As for the experience variable, it is defined as the difference between the current age of the worker and the age of that worker at the beginning of his/her labour career, and it is classified in eight categorical dummies. The estimation method consists of a simultaneous quantile regression, performed for each sample year, as standard tests reject the homoscedasticity hypothesis of the error terms.[12]

Table 3 reports the EWP at selected quantiles for 1993 and 2004, for the sample of employees in the private sector. In a cross sectional perspective, the estimated coefficient for years of schooling (continuous specification) shows a convex pattern across quantiles of the wage distribution in 1993 and an increasing pattern along the distribution in 2004, ranging from 3.3% at first decile to 5.7% at last decile.

The shape of the EWP is slightly different when education is measured by dummies. In such a case, there is a positive relationship between the premia of tertiary education and quantiles of the wage distribution in both sample years, varying from 0.72 to 0.88 in 1993 and from 0.438 to 0.72 in 2004, from the first to the last decile. Differently, wage premia for upper secondary display a convex shape across the distribution both in 1993 and 2004, while the lower secondary premia have irregular patterns in each year.

Although the broad picture emerging from cross sectional analysis does not change greatly from 1993 to 2004, the differences in the evolution over time of the estimates at different points of the distribution are remarkable (table 3). In particular, when a continuous specification for schooling is adopted, the educational premia decreased by 38.6% at 10th, 30.2% at the

[11] Education in the continuous specification is computed attributing 5 years for elementary school attainment, 8 years for lower secondary school, 13 years for upper secondary school and 17 for more highly educated workers. Note also that our classification for education is consistent with the international classification ISCED.

[12] In particular, we perform simultaneous quantile regressions obtaining an estimate of the variance-covariance matrix via bootstrapping. The standard errors are based on the heteroscedastic bootstrap methods where the sample size is equal to the number of observations each year. Further, to validate the heteroscedasticity hypothesis of the quantile regressions we successfully test that the coefficients estimated at different quantiles be statistically different from each other (Buchinsky, 1994, Koenker and Basset, 1978).

25th, 25.1% at the median, 21.1% at 75th and by 12.3% at the 90th percentile.[13] The decline of EWP is, then, higher at the bottom of the distribution than at highest quantiles. A similar dynamics of EWP emerges also when education is classified in dummies. In particular, the observed decline concerning lower secondary education is around 50% and takes place in the upper tail of the distribution, while the change for upper secondary range between -42.5% at 10th to -29.9% at 90th.[14] Quite interestingly, also the wage premia for university degree decrease significantly over time at all the selected quantiles: the decline is equal to 39.4% at 10th, 31.1% at 25th, 26.6% at the median, 21.5% at 75th and 17.8% at 90th percentile.[15] Even though the decline of EWP for graduates become lower at highest quantiles of the wage distribution, these findings contrast with most of the available empirical evidence on returns to education. Figure 1a, 1b, 1c, and 1d display also the over time variations for EWP for lower secondary, upper secondary, tertiary attainments, and for the continuous specification, extending results shown in table 3 to all quantiles of the distribution.[16]

As mentioned above, we also make use of a finer classification for education, in which it is possible to distinguish two categories (general and vocational) for upper secondary education and three categories (humanistic, professional, and scientific) for tertiary degrees. From Table 4 it can be observed that EWP decrease significantly for both categories of upper secondary school ('general' and 'vocational'), confirming previous results. As for different categories of graduates, the premia generally decrease at all quantiles of the wage distribution, even though the statistical significance of these variations differs according to the type of degree considered. More

[13] To test whether the variation over time of EWP coefficients is significant we assume that each coefficient is distributed normally and that the population in 2004 is independent from the 1993 population. This is quite plausible, since only 10% of the SHIW population in 2004 were also interviewed in 1993, in the panel component of the SHIW.

[14] Note that the share of individuals with an upper secondary degree increased in the private sector from 33% to 46%, in the period 1993-2004. Hence, the falling EWP for this category might be explained using a demand-supply paradigm.

[15] The estimated coefficients of the educational dummies have to be interpreted as differentials with respect to the omitted category, i.e. having a primary school degree (which includes also those who have not achieved any educational degree). Note that the related share of the omitted dummy decreased over time, since educational levels are increasing in Italy. This means that belonging to this category should be increasingly related to unskilled and low paid occupations in the labour market. Ceteris paribus, the premia of having lower secondary, upper secondary and tertiary degrees could have increased over time, since the labour market should have rewarded the omitted category ever less. This is not the case: lower secondary, upper secondary and tertiary degrees reduce their EWP with respect to the omitted category.

[16] Table 3 also points out that using OLS estimates all coefficients decrease significantly over time, both in the dummies and in the continuous specification.

specifically, the premia for humanistic degrees decrease significantly at all quantiles, expect the 75th, from 29% to 47%, as well as wage premia for professionals that decrease over the entire distribution (from -24 to -43%in different quantiles). As for scientific degrees, EWP decrease over time but not in a significant way. Figure 2.*a-f* extends to all quantiles of the wage distribution the variations over time when of the different types of upper secondary and tertiary attainments. From figure *2f* it is also possible to note that the variations over time for scientific degrees are always negative and very close to be significantly different from zero.

Using this finer classification it is possible to argue that composition effects do not play a significant role, since sub-groups identified within the upper secondary and tertiary attainments display similar trends with respect to their aggregate classification. For this reason, in the following of the analysis we consider the classification in four dummies.

To sum up the findings for the private sector, it is important to underline that the falling in EWP questions the empirical literature available for most of developed countries, especially for the Anglo-Saxon ones, which have detected increasing returns to education and increased earnings inequality. Instead, we provide additional evidence in favour of the thesis that skilled biased changes and the related increasing patterns in inequality and EWP are much less pronounced in continental Europe. In this paper we do not further investigate what are the driving forces of the falling EWP in Italy. They could be for instance related to the technological contents of the productive process, or linked to other explanations, such as the evolution over time of labour demand and supply, the impact of international trade on domestic labour market, the changes in the organizational attributes of Italian firms, or other institutional features that are quite different between Anglo-Saxon countries and continental Europe (Acemoglu, 2002). Further, also considering evidence for Europe, which usually detects stable or slightly increasing EWP, the Italian case stands out as peculiar since EWP decrease for all educational attainments at all quantiles, similarly only to the Austrian case.

5.1 EWP dynamics in the public sector: a different pattern

Whatever the driving force behind the falling in EWP in the private sector, it is interesting to assess the dynamics of EWP in the public sector, a sector characterized by higher wage compression and higher unions' power. Hence, we perform the same quantile regression exercise for the sample of public employees, in 1993 and 2004.

The first clear finding that comes out from table 5 is that variations over time of EWP between 1993 and 2004 and almost never significant, for all educational attainments. In particular, comparing the results presented in table 3 and table 5 we observe that lower secondary and upper secondary wage premia are generally lower in public sector than in private sector in both years considered and that their time variations are not statistically significant, in contrast with the falling dynamics found in the private sector. For what concerns graduate workers, in a cross section perspective, the premia in the public sector are remarkably lower than in the private sector across the wage distribution in 1993. The premia associated with tertiary education continues to be lower between 25th and 75th percentile in 2004, even though in this sample year graduates gain more in public sector than in the private one at 90th percentile. As for dynamic variations of EWP in the public sector for graduates, they are positive at all quantiles, even though significant only at the 75th percentile (+31.8%).

Such a result confirms that high skilled workers have been relatively favoured in the public sector, especially those situated in the upper tail of the distribution. However, whether this evidence has been driven by the spread of new technologies in the public sector is questionable. Rather, an institutional explanation could be more appropriate, related to stronger unions' power, higher wage compression, and related also to the fact that the public sector is much less affected by shocks in labour market conditions.

6. Robustness checks

The choices concerning the econometric specification of the wage equation or the sub-sample of workers considered might have affected previous results regarding the decrease of EWP from 1993 to 2004 in the private sector. In order to take these potential arguments into account we carried out some robustness checks.[17]

[17] This strategy of carrying out several robustness checks for different sub-groups and different specifications allows us, moreover, to control to some extent for the endogeneity of schooling, as credible instrumental variables or randomized experiment are not available over time. As already stressed, previous papers on returns to education in Italy derived convincing instrumental variables in the SHIW data, exploiting information concerning the schooling reforms in the late 60s (Brunello et al. 2001). However, these instrumental variables become much less convincing when the focus of the analysis is the time dynamic of EWP. Actually, since the effects of schooling reforms change according to the population sub-group involved in the reforms, the group of *compliers* affected by the instruments changes over time, affecting in turn the dynamic comparison of the estimates. See Angrist et al. (1996).

In the first robustness check we restrict our analysis to full time male workers aged 15-64, in order to test whether the increases both in the participation decisions and in the EWP of women over time could have affected the estimates performed on the whole sample (Giustinelli, 2004). As shown in column (1) of table 6, however, the results do not change much: the EWP decrease over time and these variations are mostly significant for upper secondary and tertiary education, except for graduates situated at 90th percentile. This result suggests that the cross sectional EWP for females show no remarkable distinctive features with respect to those of the male sample.

Another robustness check regards the inclusion of self-employed in our sample. Actually one might argue that wage compression in Italy could have induced (subordinate) skilled workers to move towards self-employment, especially in the case where these incentives had been increasing over time. If this were the case, the evolution of educational premia would have been affected by non-random transitions across groups and by selection biases. Column (2) of table 6, again, shows that this is not the case: EWP decline between 1993 and 2004, especially in the lower part of the distribution.

A further robustness check concerns a more general specification of the wage equation (2). We depart from a standard Mincerian specification including additional covariates available in the SHIW database, which might be related to our human capital variables. In particular, in this specification we add as regressors age (8 dummies), occupation (5 dummies), region (5 dummies), industry (9 dummies), firm size, hours worked, part-time/fulltime. As shown in the third column of table 6, the EWP are lower both in 1993 and 2004, confirming that some of the additional variables actually capture part of the educational premia. For what concerns the time variation, EWP of tertiary education decrease significantly at all quantiles of the distribution (except for the 75th) , as well as the premia associated to upper secondary degrees, while the EWP for lower secondary did not vary significantly over time (except for the 90th percentile).

In the last robustness check we investigate whether the decline in EWP is different when separate regressions are performed for the young and adults employed in private sector (under and over 35), i.e. whether some discontinuities in age are at work. Actually, in the nineties several reforms concerning the education system were carried out in Italy. The school system was reformed between 1993 and 2004 (in 2000 and 2003), as well as the tertiary education system (in 1999). A possible explanation for the falling EWP might be related to a negative impact of such reforms on the average quality of colleges and graduates: firms attribute lower premia to formal

education since its quality decreases over time. If this were the case, we would expect stable patterns for individuals over 35 (not affected by the reforms) and declining premia for the young, who are also the more educated segment of the workforce. Evidence from table 7 does not support such an explanation: the negative variations of premia for upper secondary and tertiary education are mostly significant for individuals over 35, while they are usually not significant for those under 35.

Moreover, it is also worth noting that during the nineties a number of labour market reforms were carried out in Italy, notably in 1997 and in 2003. The essence of these reforms was to introduce flexible labour contracts for outsiders, which in particular involved young individuals at early stages of their careers. For these categories of workers, the market forces, without the constraints imposed by employment protection regulations, should have exerted a pressure towards a widening of the wage distribution. This pressure might have been even reinforced by the fact that younger workers are more educated than prime age workers. The evidence from table 7 seems to belie this scenario, suggesting that the partial deregulation induced by labour market reforms for young individuals does not seem to represent the driving force of the falling trends of EWP.[18]

7. Conclusion

The main purpose of this paper is to analyse the dynamics of EWP between 1993 and 2004 across the wage distribution. We find out that in the private sector wage premia of lower secondary and upper secondary education decline considerably over time at all quantiles. Quite interesting, also the premia associated with tertiary education decline significantly over time. Similar results hold when a finer classification concerning the type of high-school and tertiary attainments is used, and even after controlling for a wide set of robustness checks to tackle sample selection issues. As for public sector employees, instead, the time variations of wage premia are not statistically significant across the wage distribution, except for an increase of EWP for graduates situated at 75th.The different patterns of EWP between private and public sectors are probably due to institutional features of the two labour markets.

[18] Others robustness checks (1. using hourly wages instead of monthly wages; 2. using experience in a quadratic specification instead of the categorical specification; 3. using a pooled specification introducing interacted dummies for time and education) have been carried out by the authors, and are available on request. The results basically confirm the observed trends in EWP.

Further, our findings question the empirical findings available for most of developed countries, especially for the Anglo-Saxon ones, which have experienced increasing returns to education and increasing earnings inequality. Instead, we provide additional evidence in favour of the thesis that all the phenomena related to increasing EWP and inequality are much less pronounced in continental Europe. And even within the European evidence, where EWP are usually stable or slightly increasing, the Italian case seems to be quite peculiar, because EWP fall over time. In this paper we do not investigate which are the driving forces of the falling EWP in Italy. It could be related to the technological contents of productive process, or it could linked to other explanations, such as the evolution over time of supply and demand of education, the 'organizational change', the impact of international trade on domestic labour market, or to institutional features that are quite different between US and Europe.[19] This analysis will be investigated in our future research. Another important issue that we want to investigate in future research is the relation between the falling in EWP and wage structure and inequality, disentangling the impact of prices, covariates and unobserved factors (Autor et al., 2005, Naticchioni, Ricci and Rustichelli, 2007).

Acknowledgment

We thank Andrea Brandolini, Piero Cipollone, Bart Cockx, Muriel Dejemeppe, Juan Dolado, Claudio Lucifora, Andrea Neri, Franco Peracchi, Daniela Vuri, Bruno Van der Linden, Robert Waldmann, and seminar participants at the Brucchi Luchino 2006 conference, the AIEL 2006 conference, the DSE-ISFOL workshop, and the meeting of the IEIILM research group.

[19] See for instance Acemoglu (2002) for a detailed survey of all this literature.

References

Acemoglu, D. (2002) Technical Change, Inequality, and the Labor Market, *Journal of Economic Literature*, 40, pp.7-72.

Angrist, Joshua D., Guido W. Imbens and Donald B. Rubin (1996), Identification of Causal Effects Using Instrumental Variables, *Journal of the American Statistical Association*, 91, 444–472.

Arias, O., Hallock, K.F., Sosa-Escudero, W. (2001), Individual Hererogeneity in the returns to schooling: instrumental variable quantile regression using twins data, *Empirical Economics*, vol.26, pp.7-40.

Ashenfelter, O., C. Harmon and H. Oosterbeek (1999) A Review of Estimates of the Schooling/Earnings Relationship with Test for Publication Bias, *Labour Economics*, n. 6, pp. 453-470

Autor, D.A, Katz, L.F., Kearney, M.S. (2005), Rising Wage Inequality: The Role of Composition and Prices, NBER no. 11628.

Bound, J. and G. Johnson (1992), Changes in the Structure of Wages in the 1980s: An Evaluation of Alternative Explanations, *American Economic Review,* 82, pp. 371-92.

Brunello G., Comi S. and Lucifora C. (2001) The Returns to Education in Italy: A New Look at the Evidence, in Harmon C., Walker I. and Westergard-Nielsen N. (eds), *The Returns to Education in Europe*, Cheltenham (UK) Edward Elgar.

Brunello G., Miniaci R. (1999) The Economics Returns to Schooling for Italian Men. An Evaluation Based on Instrumental Variables, *Labour Economics*, vol. 6, n. 4, pp.509-519.

Buchinsky, M. (1994) Changes in the U.S. Wage Structure 1963-1987: Application of Quantile Regression, *Econometrica* 62, pp.405-458.

Card, D. (2001) Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems, *Econometrica*, vol. 69(5), pp. 1127-60.

Fersterer J. F. and R. Winter-Ebner (2003) Are Austrian Returns to Education falling over time?, *Labour Economis*, vol. 10(1), pp. 73-89

Fitzenberger, B, and Kurz, C. (2003) New insights on Earnings Trends across Skill Groups and Industries in West Germany", 2003, *Empirical Economics*, Vol. 28, pp. 479-514.

Giustinelli, P. (2004) Quantile Regression Evidence on Italian Education Returns", *Rivista di Politica Economica*, XI-XII.

Gottschalk, P. and T.M. Smeeding (1997) Cross-National Comparisons of Earnings and Income Inequality, *Journal of Economic Literature*, 35, 633-687.

Harmon, C., H. Oosterbeek and I. Walker (2003) The Returns to Education: Microeconomics, *Journal of Economics Surveys*, 17, pp. 115-155

Juhn, C., Murphy, K.M, and Pierce, B. (1993) Wage Inequality and the Rise in Returns to Skill, *Journal of Political Economy*, 101, pp.410-42.

Koenker, R., Basset, G. (1978),"Regression Quantiles", *Econometrica*, vol. 46, pp. 33-50

Koenker, R., Basset, G. (1982) Robust test for Heteroscedasticity Based on Regression Quintiles, *Econometrica*, 50, pp.43-61.

Lilla, M. (2005), "Disuguaglianze salariali en italia: nuove evidenze dai microdati SHIW", *Politica economica*, no.1, pp. 71-102

Machado, J. and J. Mata (2001) Earning functions in Portugal 1982-1994: Evidence from quantile regression, *Empirical Economics*, vol. 26(1), pp. 115-134

Mincer J. (1974) *Schooling, Experience and Earnings*, Columbia University Press, New York

Naticchioni, P., Ricci, A., Rustichelli, E. (2007) Educational wage premia and inequality: is Italy an outlier?, mimeo.

Peracchi, F. (2004) Educational wage premia and the distribution of earnings: an international perspectives, in E.Hanushek and F.Welch (eds.), *Handbook of the Economics of Education*, North-Holland, Amsterdam, forthcoming.

Pereira, P., Martins, P. (2004) Does Education Reduce Wage Inequality? Quantile Regression Evidence From 16 Countries, *Labour Economics*, 11(3), 355-371.

OECD (2005) *Education at a glance*, Paris.

OECD (2006) *Education at a glance*, Paris.

Tables and Figures

Table 1: SHIW Sample descriptives

	Private sector		Public sector	
	1993	2004	1993	2004
Share on tot employment	67.2	76.8	32.8	23.2
Wage (log)	1319.3	1308.1	1467.6	1492.8
Female	33.0	38.0	46.0	53.6
Education				
Primary - no school	20.2	8.9	7.3	2.3
Lower secondary	41.2	36.3	25.6	19.8
Upper secondary	33.7	46.1	43.8	50.4
Univ. Degree or higher	4.9	8.7	23.3	27.5
	100	100	100	100
Experience (year)				
eps1 - 0-5	17.9	15.1	8.7	6.7
eps2 - 6-10	13.7	13.2	9.8	7.7
eps3 - 11-15	13.1	11.7	14.5	10.4
eps4 - 16-20	13.2	14.1	17.8	12.6
eps5 - 21-25	12.5	13.5	17.9	17.0
eps6 - 26-30	11.0	12.2	11.4	21.2
eps7 - 31-35	8.8	9.9	10.1	15.0
eps8 - >36	10.0	10.3	9.9	9.4
	100	100	100	100
Observations	4072	4366	1988	1317

Note: 0.025% of the observation in the right and left tails dropped. Wages delfated using CPI - 2004.

Table 2: Sample descriptives with a finer classification for education

	Private sector		Public sector	
	1995	2004	1995	2004
Upper secondary				
General (liceo)	8.4	12.1	12.4	14.1
Vocational	91.6	87.9	87.6	85.9
	100	100	100	100
Observations	1474	2002	1049	662
Tertiary education				
Humanistic	17.0	29.2	46.1	44.1
Professionals	37.9	29.2	18.4	16.0
Scientific	45.1	41.7	35.5	39.9
	100	100	100	100
Observations	156	326	477	309

Note: 0.05% of the observation in the right and left tails dropped.

Table 3: Quantile Estimates of Educational Wage Premia for employees in the private sector, using continuous and (4) dummies specification for education

Dep var log monthly wage		1993	2004	Variation	% Var.
q10	Lower secondary	0.134	0.092	-0.042	-31.5 *
	Upper Secondary	0.418	0.240	-0.178	-42.5
	University	0.722	0.438	-0.285	-39.4
	(continous)	0.054	0.033	-0.021	-38.6
q25	Lower secondary	0.132	0.084	-0.048	-36.2 *
	Upper Secondary	0.379	0.244	-0.136	-35.8
	University	0.683	0.471	-0.212	-31.1
	(continous)	0.050	0.035	-0.015	-30.2
q50	Lower secondary	0.142	0.069	-0.073	-51.5
	Upper Secondary	0.395	0.247	-0.148	-37.5
	University	0.757	0.556	-0.201	-26.6
	(continous)	0.051	0.039	-0.013	-25.1
q75	Lower secondary	0.152	0.073	-0.080	-52.2
	Upper Secondary	0.452	0.276	-0.176	-39.0
	University	0.818	0.643	-0.176	-21.5
	(continous)	0.058	0.046	-0.012	-21.1
q90	Lower secondary	0.157	0.073	-0.084	-53.7
	Upper Secondary	0.487	0.341	-0.146	-29.9
	University	0.875	0.720	-0.156	-17.8
	(continous)	0.064	0.057	-0.008	-12.3
OLS	Lower secondary	0.145	0.074	-0.070	-48.7
	Upper Secondary	0.432	0.260	-0.172	-39.9
	University	0.774	0.567	-0.207	-26.8
	(continous)	0.057	0.042	-0.015	-26.2

Omitted dummy: no-school - primary. All coefficients in 1993 and 2004 are significant at 5%. * stands for variation over time not statistically different at 5%

Table 4: Quantile Estimates of Educational Wage Premia for employees in the private sector, using a 7 dummies specification for education

	Dep. Var. log monthly wage	1995	2004	Variation	% Var.
q10	Lower secondary	0.161	0.093	-0.068	-42.2 *
	Upper Secondary: no liceo	0.356	0.243	-0.114	-31.9
	Upper Secondary: liceo	0.519	0.269	-0.250	-48.1
	Graduate: Humanistic	0.786	0.411	-0.374	-47.6
	Graduate: Professionals	0.820	0.464	-0.356	-43.4
	Graduate: Scientific	0.713	0.588	-0.125	-17.6 *
q25	Lower secondary	0.143	0.078	-0.064	-45.1
	Upper Secondary: no liceo	0.344	0.232	-0.112	-32.6
	Upper Secondary: liceo	0.471	0.320	-0.152	-32.2
	Graduate: Humanistic	0.660	0.383	-0.277	-41.9
	Graduate: Professionals	0.740	0.475	-0.265	-35.8
	Graduate: Scientific	0.746	0.638	-0.108	-14.5 *
q50	Lower secondary	0.146	0.071	-0.075	-51.2
	Upper Secondary: no liceo	0.366	0.244	-0.123	-33.5
	Upper Secondary: liceo	0.468	0.284	-0.184	-39.3
	Graduate: Humanistic	0.618	0.433	-0.185	-29.9
	Graduate: Professionals	0.831	0.574	-0.257	-31.0
	Graduate: Scientific	0.772	0.661	-0.111	-14.4 *
q75	Lower secondary	0.173	0.066	-0.107	-61.7
	Upper Secondary: no liceo	0.427	0.264	-0.163	-38.3
	Upper Secondary: liceo	0.559	0.311	-0.248	-44.4
	Graduate: Humanistic	0.694	0.453	-0.241	-34.8 *
	Graduate: Professionals	0.937	0.711	-0.226	-24.1
	Graduate: Scientific	0.921	0.789	-0.132	-14.3 *
q90	Lower secondary	0.166	0.077	-0.089	-53.8
	Upper Secondary: no liceo	0.478	0.336	-0.142	-29.8
	Upper Secondary: liceo	0.506	0.438	-0.068	-13.5 *
	Graduate: Humanistic	0.882	0.514	-0.369	-41.8
	Graduate: Professionals	1.089	0.674	-0.415	-38.1
	Graduate: Scientific	0.896	0.866	-0.031	-3.4 *

Omitted dummy: no-school - primary. All coefficients in 1993 and 2004 are significant at 5%. * stands for variation over time not statistically different at 5%

Table 5: Quantile Estimates of Educational Wage Premia for public employees, using (4) dummies specification for education

Dep var log monthly wage		1993	2004	Variation	% Var.
q10	Lower secondary	0.112	0.183	0.071	63.2 *
	Upper Secondary	0.238	0.341	0.103	43.3 *
	University	0.365	0.495	0.129	35.4 *
q25	Lower secondary	0.152	0.129	-0.023	-15.0 *
	Upper Secondary	0.266	0.257	-0.010	-3.6 *
	University	0.397	0.402	0.005	1.3 *
q50	Lower secondary	0.102	0.076	-0.026	-25.2 *
	Upper Secondary	0.227	0.209	-0.018	-8.0 *
	University	0.336	0.389	0.053	15.8 *
q75	Lower secondary	0.104	0.102	-0.002	-2.1 *
	Upper Secondary	0.236	0.221	-0.015	-6.2 *
	University	0.398	0.525	0.127	31.8
q90	Lower secondary	0.150	0.249	0.098	65.4 *
	Upper Secondary	0.314	0.356	0.042	13.5 *
	University	0.587	0.798	0.211	35.8 *

Omitted dummy: no-school - primary. All coefficients in 1993 and 2004 are significant at 5%. * stands for variation over time not statistically different at 5%

Table 6: Robustness checks of quantile Estimates of returns to education for employees in the private sector*

		(1) Only male fulltime		T	(2) spec. with self-employed		T	(3) Full specification		T
		1993	2004		1993	2004		1993	2004	
q10	Lower secondary	0.114	0.081	*	0.434	0.262	*	0.042	-0.002	*
	Upper Secondary	0.389	0.223		0.762	0.448		0.116	0.013	
	University	0.635	0.498	*	0.968	0.716		0.266	0.096	
	(continous)	0.048	0.033		0.075	0.051		0.019	0.003	
q25	Lower secondary	0.114	0.049		0.343	0.182		0.062	0.031	*
	Upper Secondary	0.376	0.213		0.640	0.369		0.141	0.068	
	University	0.729	0.504		0.940	0.655		0.294	0.155	
	(continous)	0.049	0.034		0.070	0.045		0.019	0.009	
q50	Lower secondary	0.156	0.056		0.199	0.134		0.057	0.038	*
	Upper Secondary	0.408	0.243		0.484	0.332		0.137	0.083	
	University	0.818	0.616		0.828	0.655		0.298	0.187	
	(continous)	0.053	0.042		0.061	0.047		0.019	0.012	
q75	Lower secondary	0.148	0.059		0.174	0.121	*	0.055	0.019	*
	Upper Secondary	0.473	0.270		0.484	0.343		0.117	0.081	*
	University	0.885	0.730		0.817	0.770	*	0.278	0.219	*
	(continous)	0.061	0.049		0.062	0.055		0.017	0.015	*
q90	Lower secondary	0.163	0.080	*	0.212	0.058		0.068	0.001	
	Upper Secondary	0.536	0.379		0.523	0.329		0.163	0.059	
	University	0.988	0.868	*	0.962	0.806		0.335	0.183	
	(continous)	0.070	0.061		0.069	0.065	*	0.024	0.013	

Omitted dummy: no-school - primary. T stands for "test of the variation over time" and * stands for variation over time not statistically different at 5%,

Table 7: Educational wage premia for over and under 35

		(1) Over 35		T	(2) Under 35		T
		1993	**2004**		**1993**	**2004**	
q10	Lower secondary	0.176	0.265	*	0.051	0.265	
	Upper Secondary	0.438	0.236		0.295	0.426	*
	University	0.615	0.453		0.672	0.625	*
q25	Lower secondary	0.129	0.078		0.124	0.220	*
	Upper Secondary	0.367	0.244		0.353	0.369	*
	University	0.620	0.468		0.718	0.591	*
q50	Lower secondary	0.158	0.064		0.098	0.120	*
	Upper Secondary	0.409	0.259		0.319	0.258	*
	University	0.688	0.576	*	0.722	0.535	
q75	Lower secondary	0.161	0.089		0.095	0.001	*
	Upper Secondary	0.494	0.318		0.350	0.150	
	University	0.824	0.731	*	0.668	0.396	
q90	Lower secondary	0.201	0.092		0.025	0.002	*
	Upper Secondary	0.544	0.431		0.309	0.154	*
	University	0.924	0.793	*	0.624	0.472	*

Omitted dummy: no-school - primary. T stands for "test of the variation over time" and * stands for variation over time not statistically different at 5%

Figure 1: EWP variations at all quantiles, 1993-2004, using (4) dummies and continuous specifications.

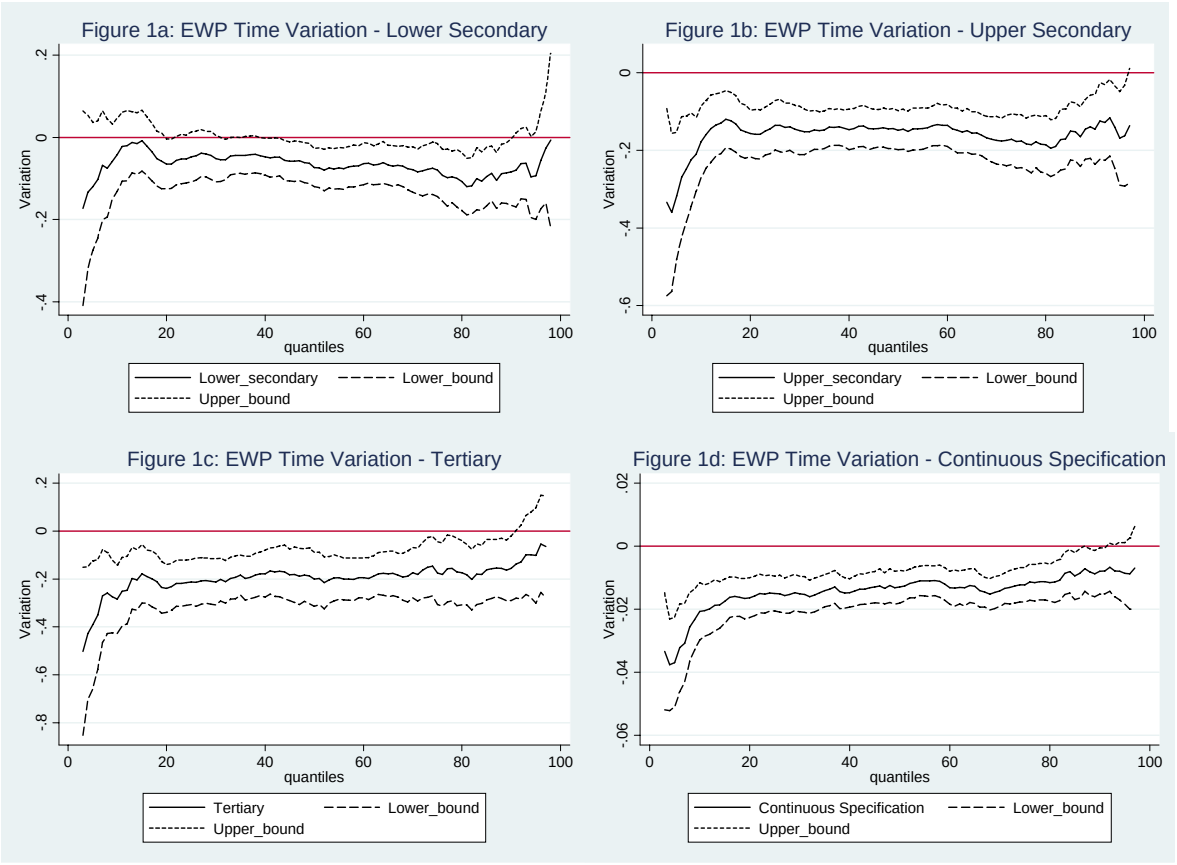

Figure 2: EWP variations at all quantiles, 1993-2004, using (7) dummies and continuous specifications.