

The impact on schooling attainment of a sustained increase in low-skill wages: Evidence from Spain, 1987-2009

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Abstract: The extent to which the human capital accumulation decisions of young adults respond to changes anticipated returns to schooling is a key to understand the labor market productivity of future cohorts in the labor market and the evolution of inequality. Unlike other advanced economies, like the US, the UK or Germany, Spain has experienced since the mid-90s a *drop* both in the returns to tertiary education and, with a lag, a drop in schooling attainment of recent cohorts, providing the setup to estimate the response of human capital acquisition to relative increases in low-skill wages. Our identification strategy relies on the fact that different cohorts in local labor markets - defined by the regional scope of collective bargaining- faced very different wage structures at the age of 17. Our estimates suggest that an increase in the relative return to tertiary education at the age of 17 of 5 percentage points reduces the chances of having completed tertiary education at the age of 25 by 1.6 percentage points. The same increase in relative low-skill wages increases the chances of having attained only compulsory education by .6 points.

Introduction

The extent to which the human capital accumulation decisions of young adults respond to changes anticipated returns to schooling is a key to understand the labor market productivity of future cohorts in the labor market and the evolution of inequality. For example, the fact that college enrolment among US young adults has not kept up with the increase to the returns to college has led some authors to forecast an increase in wage inequality during the next decades (see Altonji et al., 2009) Unlike other advanced economies, including the United States, the United Kingdom or Germany, Spain has experienced since the mid-90s a *drop* both in the returns to tertiary education (see Lacuesta and Izquierdo, 2010 or Pijoan and Sanchez-Marcos, 2010) and, as we document below, a severe drop in the schooling attainment of recent cohorts (measured at the age of 25). Hence, the Spanish case provides an ideal setup to estimate how the decisions of young adults to accumulate human capital in the schooling system respond to increases in low-skill wages relative to high-skill ones.¹

Models of human capital acquisition stress the role of relative wages of unskilled to skilled workers in the decision to enrol in several stages of education (Willis and Rosen), and how these can interplay with credit constraints at various ages. A common prediction of all those models is that the cost of opportunity of attending school determines the amount of human capital acquired in the formal education system. We provide a new test of that hypothesis. First, we construct a measure of the return to skill using administrative records of monthly earnings at the province level. Our

¹ See, for example, Autor, Kearney and Katz (2008), for the US, Meghir, Gosling and Machin (2000) for the UK and Dustmann and Schoenberg (2009) for Germany. For evidence of the Spanish case, see Izquierdo and Lacuesta (2006), Pijoan and Sanchez-Marcos (2010)

computations suggest a severe swing in the return to skill: they increased by 10 percentage points in the early 90s to fall subsequently in the remaining of the decade. Our identification strategy relies on the fact that different cohorts in local labor markets - defined by the regional scope of collective bargaining- faced very different wage structures at the age of 17. Our estimates suggest that an increase in the relative return to tertiary education at the age of 17 of 5 percentage points reduces the chances of having completed tertiary education at the age of 25 by 1.6 percentage points. The same increase in relative low-skill wages increases the chances of having attained only compulsory education by .6 points. We provide some evidence suggesting that young adults responded by leaving the educational system at the early stages of tertiary education.

2. Trends in Wages and Schooling

2.1 The Educational System in Spain.

In the sample period we consider, there was a major change of education regime. Prior to 1993, primary schooling consisted on 8 grades, finishing at age 14. At that age, young adults could opt for a vocational track or for an academic one. The academic track consisted on three more academic years, plus a fourth that was supposed to prepare students to attend University. The vocational track instead consisted of a module of 2 years. Upon completion of that module, students could opt for a second and third ones (that we consider as tertiary education, following the definition of Eurostat).

A new educational legislation (LOGSE law 14/1990) was introduced as late as 1993. The new law extended compulsory education until age 16. It maintained the extra 2 years as secondary education, but “compulsory” secondary education. The law specified that those who were attending 3rd and 4th degree of primary education in 1993 initiate 3rd and fourth degree of the “new” primary education, being the first birth cohort that was completely affected by the new legislation (this is the generation born in 1984). Many schools, however changed before and even in the case of a late change, some individuals born before might be affected by the reform if they repeated some courses. The new system also introduced changes in the way grade retention could happen during primary education. Regarding secondary education, the system introduced a new system of upper secondary school that lasted two years. Access to tertiary education remained unchanged. The vocational track was not changed.

Given those legislative changes, there are three levels of schooling attainment that are coherent across time

1. “High-school dropouts”: Under this heading, we include young adults who did not attain an upper secondary title.² For the first system means not attaining PREU, for the second system it means failing to achieve COU or vocational training third degree. For the third system (no attainment of Bachiller or advanced vocational training). In terms of the age of people who progress correctly, this means to finish secondary schooling before the age of 18.

² We include here young adults who did not even complete the “compulsory secondary education” under the post-1993 system. Those constitute a non-trivial fraction of the population, reaching 30% for some cohorts.

2. “Upper secondary” school: This group include all young adults who completed high school (in the academic track) in either the old or the new systems. Young adults in this group failed to finish education without a tertiary education degree (either university or vocational training)

3. “Tertiary education” Young adults who completed some form of college or, alternatively, the second module of vocational training.

Trends in Schooling Attainment:

Figure 1 shows a rapid increase in educational attainment across cohorts born in the early seventies: the fraction of youth who completed at least high school was close to 55% among those born in 1971. The corresponding estimate among those born in 1977 was 70%. However, the trend was reversed for cohorts born in the late seventies and early eighties. After reaching a peak for the cohort born in 1977, subsequent cohorts have not attained higher degrees of college and low secondary. By age 22, for example, the fraction of youth who had completed college has not increased among the cohorts born. This, in turn might reflect that individuals are attending longer university degrees over time. However, this decrease in educational attainment is especially evident in other degrees such as the fall in the proportion of individuals who report to have attained upper secondary and the late increase in individuals who report to have finished only primary education.

3. The data and methods

3.1. Data:

3.1.1 Main dataset:

We use the 1992-2007 wages of the Spanish Labor Force Survey “*Encuesta de Población Activa*”. The microdata is conducted by the Spanish Statistical Institute mainly used to compute the unemployment rate and the active population. The EPA is representative of the Spanish population, interviewing some 20,000 households every quarter gives extensive information on the educational attainment and labor market outcomes of individuals above 15 years old and when they are in school, the current grade. In the case of young adults person still resides in the parental house we also have information on the structure and characteristics of the household. While the public-release EPA typically codes the age of individuals in five-year bands, the Spanish Statistical Institute generously provided us with the age in years. The EPA does not contain wages.

The question on *schooling attainment* is asked from every respondent above the age of 16. The question about *schooling enrolment* asks about whether children over 16 were in school during the last four weeks. People have the option of reporting to be on vacation, but we found an inconsistency with the data before and after 2005 and that is the reason we preferred to drop all third quarters (the quarter spanning the summer). Prior to 2005 there was only one question on attendance, but after that date there was a separation of regular and non-regular courses. The mere fact of separating the pre-2005 question into two seems to have led additional respondents to report they were attending school. Since before 2000, the distinction between regular and non-regular courses was

not available, we are forced to consider non-regular students as enrolled in the educational system. However, the break in the series due to the change in the questionnaire is not evident below the age of 20.

3.1.2 Information on wages:

The Spanish Labor Force Survey (EPA) contains no information on earnings, so we rely on out-of-sample information to construct measures of the wages that a young adult would expect in the province of residence. We use administrative records of earnings as drawn from Social Security records *Muestra Continua de Vidas Laborales*: Waves 2007. This dataset is a random sample of 4% of individuals who were affiliated to the Social Security system in 2007 (either as employees or unemployed). The sample contains the monthly earnings of all labor relationships since the moment when the person joined the Social Security system. That feature of the sample allows us to construct a time series of median earnings at each province for workers in different years.

There are two possible concerns with our measure of earnings. The first is that monthly earnings are capped at the maximum wage that the Social Security uses to compute contributions. The second is that the sampling method does not guarantee that the wage that a worker in 2006 perceived ten years before is representative of the distribution of earnings in 1996 if there is selective attrition. To overcome the problem of censoring in earnings, our analysis focuses on median wages. Censoring affects very little the median of young worker's wages, that are very concentrated and typically far away from the cap. The issue becomes more problematic for our measures of other age groups, so in this draft we limit ourselves to groups up to 40 years of age. Second, regarding the representativeness of the sample, we use only males' earnings, as males are much less likely to go in and out the labor force over the life cycle than females are.

Measuring the expected return to skill at age 17

The concept we would like to approximate is the expected wage profile over a lifetime if the worker obtained tertiary education and that if the worker obtained a lower level of education. For this draft, we approximate such measure using cross-sectional median wages of the population in the year the young adult was 17 and in the province where the young adult currently lives. Spain has 52 provinces, and the average population of a province is 884,000 individuals. The province is a natural unit to look at wages, as industry and sectoral collective agreements are bargained at that level.

We construct a measure of returns to skill that is based on the wages that firms report to the Social Security purposes. For Social Security purposes, workers are classified into 11 occupation groups. The different groups reflect a partition that is a mix of occupation and skill. The first two groups correspond to individuals with a college degree or equivalent. Importantly, such classification is not merely administrative: collective agreements specify wages for each of those groups separately, and those increase with the occupational level.³

³ Namely, the 11 groups are 1: Holders of a college degree (*Ingenieros y Licenciados*) 2: Holders of a 2-year college degree (*Ingenieros Técnicos, Péritos y Ayudantes Titulados*), 3: Administrative qualified workers (*Jefes Administrativos y de Taller*) 4. Administrative workers without a degree (*Ayudantes no titulados*) 5: Officers (*Oficiales Administrativos*) 6: Sub-officers (*SUbalternos*) 7: Auxiliary Workers

While there is not a one-to-one relationship between educational attainment and the administrative group, the first two groups in the administrative classification correspond explicitly to workers with tertiary education. Hence, the measure of skilled wages is based on the cross-sectional median of workers in the province who belong to the top two groups between 25 and 30 years of age. We also experiment with a broader measure that computes the mean wage between 25 and 40 years of age of skilled workers. The measure of unskilled wages is the cross-sectional median of workers in the bottom eight groups who are between 16 and 20 years of age. By taking cross-sectional moments, we are implicitly assuming that young adults at age 17 infer the wage they would earn if they acquire tertiary education at age 40 from the current median wage of workers at age 40. While the assumption has been used by other authors, it merits additional investigation in a further draft.

Figure 2 displays the evolution of the ratio of unskilled to skilled wages faced at the age of 17 by cohorts born between 1971 and 1985, or the prevailing wage. According to our assumptions, cohorts born between 1971 and 1975 “observed” a ratio of unskilled to skilled wages of .38 (if the median of skilled worker’s wages are taken between ages 25 and 30). The cohorts born between 1976 and 1980 saw a 8 percentage points drop in unskilled wages: from .38 to .26. Finally, cohorts born between 1980 and 1985 observed a marked drop in skilled wages, and the ratio went back to .36. Considering an alternative measure of skilled wages that takes into account the wages of workers up to the age of 40 yields a very similar picture.

3.2 Methods

3.2.1. Impact of wages on schooling attainment:

We examine the long-term impacts of the fluctuations in the opportunity cost of attending school by fitting a multinomial Logit with three possible outcomes at the age of 25. The first is whether the maximum grade attained at various ages is primary school or less. The second outcome is whether the maximum grade attained is upper secondary school. The third is tertiary education, defined above. We estimate limited dependent variables of schooling attainment

$$A_{ipt}^c = \beta_0 + \beta_1 \frac{W_{unsk}}{W_{skilled}} + \sum_{p=2}^{p=52} \delta_p P_p + \sum_{t=1995}^{t=2009} \lambda_t D_t + \theta X_{ipt} + \varepsilon_{ipt}^c \quad (1)$$

Where A_{ipt}^c is a latent variable denoting the propensity to complete the three outcomes we focus on. The first is “completing primary education”. To obtain a consistent definition of primary education over the years, we lump together primary schooling (as defined by the pre-1999 system, when the earliest age a young adult could leave school was 14) and lower secondary schooling (up to age 16). The measure should then be consistent across periods. The second outcome of interest is upper secondary school. That outcome includes both the academic and the vocational track. The third outcome includes tertiary education, again including both tracks. ε_{ipt}^c is a type-1 extreme distribution.

(*AUXiliares Administrativos*) 8: Officers of class 1 and 2, 9 Third class officers 10: Laborers 11: Workers below 18 years of age.

The covariate of interest is our measure of the returns to skill, described in the previous subsection. Familial characteristics exhibited a steady improvement over the sample period, so to control for those, we focus on a sample of co-resident young adults. Namely, we include in Xs controls for family size, whether or not the mother is present and the educational attainment of the mother. Finally, we also include province and year dummies. Year dummies absorb any nationwide trend, such as changes in the educational system. Hence, the identification of the parameter of interest β_1 is obtained from differential provincial trends in the ratio of unskilled to skilled wages when a cohort reaches the age of 17.

We examine impacts at different ages (23 and 24) to be able to detect if changes in the cut-off when age is observed make a substantial difference. We also explore the sensitivity of our sample selection assumptions by trying specifications without parental covariates and by running the model on the full sample of co-residents and non-co-residents.

Finally, to get an idea of the channels through which a higher ratio of unskilled to skilled wages affect schooling decisions, we also investigate age-specific impacts of current ratio of unskilled to skilled wages on schooling attendance. Basically, we want to assess if the impact of wages on schooling attainment at age 25 is due to drop outs or to grade repetition. To that end, we estimate OLS models of the following form:

$$S_{ipt} = \alpha_0 + \sum_{k=17}^{k=21} \alpha_{k-16} \frac{W_{unsk}}{W_{skilled}} * Age_{ipt} + \sum_{p=2}^{p=52} \delta_p P_p + \sum_{t=1995}^{t=2009} \lambda_t D_t + \theta X_{ipt} + u_{ipt}^c$$

S_{ipt} is a measure of (regular) schooling attendance between 16 and 21 years of age, and $\frac{W_{unsk}}{W_{skilled}}$ is the contemporaneous ratio of skilled to unskilled wages. We can infer at what ages do outside opportunities matter by examine the age profile at the α_{k-16} coefficients.

3.2.2 Econometric concerns:

We see two problems in model (1). The first is that our measure of median wages contains sampling error (we are inferring provincial wages from sample medians). In a linear model classical measurement error is likely to bias the coefficients downward.

A second concern is an endogeneity bias caused by correlated shifts in the demand and supply of young workers. In the absence of covariates, model (1) is equivalent to running a grouped regression at the province-year levels, where each observation is weighted by the number of observations in the sample. Province-time variation in the the fraction of youth attending school coincides with variation in the inverse of the supply of workers. Any model of the labor market would predict that provincial wages, labor supply and schooling attendance are jointly determined. In this draft, we alleviate the problem by regressing schooling attainment during year t on previous year's October wages. We are currently constructing alternative wage measures derived from collective agreements (that are industry specific) using an alternative draft, and plan to revise our findings for the next draft. Finally, we use multinomial logits, but one can argue that we need to use a nested logit instead. We expect to address the issue in a future draft.

4. Results

4.1 Completing at least high school

Table 1 presents estimates of the impact of the ratio of unskilled to skilled wages that a young adult observed when he was 17 on his probability of having completed at least upper high school at various ages (23, 24 and 25). We control for the fact that some wages are computed with a limited number of workers by weighting our estimates by the number of skilled workers who were used to compute the provincial measure of wages, but also present unweighted OLS and Probit estimates. Standard errors are clustered at the province-year level, because wages are imputed at that level (see Moulton), and allow for arbitrary heteroscedasticity across units.

Panel A in Table 1 contains results when the measure of skilled wages are taken between the ages of 26 and 30. The impact is negative, but increases as attainment is measured at later ages. In particular, the estimate in Column 3, row 1 of Panel A suggests that an ratio of unskilled to skilled wages 10 percentage points higher diminishes the chances of completing high school at age 25 by 3 percentage points. The estimate is around .9 percentage points when we use unweighted OLS (column 3, row 2). The estimates are relatively higher when we use measures of skilled wages that span for a larger number of years. The OLS and Probit estimates in rows 2 and 3 of Panel B of Table 1 are remarkably similar, suggesting that biases due to the use of a linear specification are minor.

A fact that is perhaps surprising is that the impact of relative unskilled wages depends a lot on when is schooling measured: the estimates are somewhat lower when schooling is measured at age 24, and much lower when measured at age 23. Our interpretation is that schooling attainment measures are very noisy before formal education is finished.

4.2 Completing at least tertiary school

Table 2 examines if the impact on a narrower measure of schooling attainment: completion of some tertiary education. The WLS estimates suggest that the negative impact of unskilled wages in the province at the age of 17 on schooling attainment reported in Table 1 are mostly associated to completion of tertiary education. Using either skilled wages between ages 26-30 or 26-40, WLS estimates are large and negative. An increase in the unskilled wages ratio diminishes the chances of having completed tertiary education by age 24 between 2.4 and 3 percentage points, depending on the specification. The fact that WLS estimates are larger when the outcome is “attaining tertiary education” than when it is “completing upper secondary” is possibly due to our skilled wage measure, that reflects mainly college education.

4.3 Relative odds of tertiary vs secondary education

Table 3 gives more formal evidence on the relative impact of the ratio of unskilled to skilled wages on the chances of completing high school vs tertiary education by using a multinomial Logit. The omitted outcome is completing primary education. The results in Table 3 confirm the hypothesis that the main response of schooling attainment to an increase in the unskilled-to skill wage ratio at the age of 17 is the attainment of tertiary

education at ages 24 or 25. The estimates are largest when we weight estimates with the number of workers used to compute skilled wages. The results shown are log-odds ratio. To give an idea of the magnitude of the estimates, we present in brackets the relative drop in the chances of completing the different levels of education when there is an increase in 10 percentage points in the unskilled-to-skilled wage ratio reshuffles the composition of schooling attainment at age 25 by increasing the weight of tertiary education by 2 percentage points. The drop in tertiary education attainment between the cohorts born in 1976 and 1985 was of 5 percentage points.

Table 4 performs some robustness checks. We first exclude covariates in the sample of coresident young adults, with little impact on the results. The estimates become somewhat smaller when we use the full sample. We plan to examine the issue on a future draft of the paper.

4.3 The response of schooling attendance.

Finally, we infer through which channels do relative wages of the unskilled affect completion. To that end, we fit model (2) to the data. Column 1 of Table 5 suggests that a contemporaneous increase in the unskilled wage ratio diminishes attendance at ages 18 and 19 the ages at which individuals are supposed to start tertiary education.

5. Research agenda

Between 1986 and 2009 Spain experienced a large swing in the wage of unskilled young workers relative to the wage of older skilled ones, diminishing up to the mid 90s and increasing afterwards. At the same time, the schooling attainment of Spanish cohorts experienced improvement until that borm in 1976 and deteriorated afterwards. We use administrative records on earnings and information on educational attainment in an employment survey to estimate how the schooling attainment of cohorts was affected by exposure to a lower return to skill at the age of 17 and our findings to date suggest that exposure to higher unskilled wages correlates negatively with young men accumulating less human capital.

Our next steps include refining our measure of unskilled wages to take care of differential returns to experience and to handle simultaneity biases. To handle the last problem, we are currently compiling information on collective agreements signed at the provincial level. Collective agreements are bargained by mature workers for long periods of time and are arguably public knowledge.

6. References (incomplete)

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Table 1: The response of upper secondary completion at various ages to the ratio of unskilled to skilled wages when cohort was 17

Estimation method: WLS, OLS, Probit			
	Age 23	Age 24	Age 25
<i>Panel A: Wage of skilled workers is the cross-sectional median of workers in the province, ages 21-30</i>			
WLS, weights are the number of workers in the province used to compute skilled wages			
1. Wage unskilled 16-21/Wage skilled 20s	-0.091 (.092)	-0.088 (.094)	-0.298 (.103)***
R-squared	[0.034]	[.0835]	[0.086]
OLS			
2. Wage unskilled 16-21/Wage skilled 20s	0.009 (.059)	-0.113 (.063)*	-0.086 (.057)*
<i>Panel B: Wage of skilled workers is the cross-sectional median of workers in the province, ages 21-40</i>			
	Age 23	Age 24	Age 25
WLS, weights are the number of workers in the province used to compute skilled wages			
1. Wage unskilled 16-21/ (.5*Wage skilled 20s+.5*Wage skilled 30s)	-0.104 (.118)	-0.053 (.12)	-0.322 (.124)***
OLS			
2. Wage unskilled 16-21/ (.5*Wage skilled 20s+.5*Wage skilled 30s)	-0.0498 (.075)	-0.088 (.081)	-0.132 (.073)*
PROBIT			
3. Wage unskilled 16-21/ (.5*Wage skilled 20s+.5*Wage skilled 30s)	-0.0399 (.0816)	-0.089 (.088)	-0.135 (.078)*
Sample size:	55498	47432	41368

Sample of coresident young males of ages 23 (column 1), 24 (column 2) and 25 (column 3)

All specifications control for 52 province dummies and 14 time dummies, and for three dummies with the educational attainment of the mother, 5 dummies of family size, a dummy for whether the mother does not live in the household. Standard errors clustered at the province-year level.

Table 2: The response of college completion at 22, 23 and 24 to the ratio of unskilled to skilled wages when the cohort was 17

Estimation method: OLS/WLS			
	Age 23	Age 24	Age 25
<i>Panel A: Wage of skilled workers is the cross-sectional median of workers in the province, ages 21-30</i>			
WLS, weights are the number of workers used to compute skilled wages			
1. Wage unskilled 16-21/Wage skilled 20s	-0.151 (.092)*	-0.241 (.104)**	-0.294 (.107)***
OLS			
2. Wage unskilled 16-21/Wage skilled 20s	-0.001 (.054)	-0.059 (.059)	-0.05 (.063)
<i>Panel B: Wage of skilled workers is the cross-sectional median of workers in the province, ages 21-40</i>			
	Age 23	Age 24	Age 25
WLS, weights are the number of workers used to compute skilled wages			
1. Wage unskilled 16-21/ (.5*Wage skilled 20s+.5*Wage skilled 30s)	-.132 (.118)	-0.214 (.12)*	-0.321 (.124)***
OLS			
2. Wage unskilled 16-21/ (.5*Wage skilled 20s+.5*Wage skilled 30s)	.0135 (.0712)	-0.009 (.0767)	-0.118 (.082)
Sample size:	55498	47432	41368

Sample of coresident young males of ages 23 (column 1), 24 (column 2) and 25 (column 3)

All specifications control for 52 province dummies and 14 time dummies, and for three dummies with the educational attainment of the mother, 5 dummies of family size, a dummy for whether the mother does not live in the household
Standard errors clustered at the province-year level.

Table 3: The response of schooling attainment at various ages to the ratio of unskilled to skilled wages when the cohort was 17

Estimation method: Multinomial Logit

	Sample of coresidents, covariates						
	Age 23		Age 24		Primary	Age 25	
	Upper high school	College	Upper high school	College		UppHS	College
<i>Panel A: Skilled wages averaged over ages 20-30 when cohort is 17 years of age</i>							
1. [Wage unskilled/Wage skilled] in province, age 17 weighted	0.060 (.433)	-0.72 (.56)	0.284 (.48)	-0.874 (.56)	-- [.01]	-0.91 (58)* [.01]	-1.689 (.59)** [-.02]
2. [Wage unskilled/Wage skilled] in province, age 17 unweighted	0.15 (.286)	0.044 (.35)	-0.449 (.33)	-0.48 (.34)		-0.327 (.37)	-0.358 (.298)
<i>Panel B: Skilled wages averaged over ages 20-40 when cohort is 17 years of age</i>							
1. [Wage unskilled/Wage skilled] in province, age 17 weighted	-0.047 (.528)	-0.638 (.69)	0.442 (.61)	-0.612 (.68)		-0.946 (.749) [.012]	-1.817 (.657)*** [-.024]
2. [Wage unskilled/Wage skilled] in province, age 17 unweighted	-0.203 (.38)	-0.0481 (.44)	-0.428 (.43)	-0.228 (.39)		-0.387 (.48)	-0.715 (.39)*
Sample size:	55498		47432		41368		

Sample of coresident young males of ages 23 (column 1), 24 (column 2) and 25 (column 3). The omitted outcome is "completing compulsory education"
 All specifications control for 52 province dummies and 14 time dummies, and for three dummies with the educational attainment of the mother, 5 dummies of family size, a dummy for whether the mother does not live in the household
 Standard errors clustered at the province-year level.

Table 4: The response of schooling attainment at age 25 to the ratio of unskilled to skilled wages when the cohort is 17: specification checks

Estimation method: Multinomial Logit

	Coresidents, no covariates Age 25		Full sample, no covariates Age 25	
	Upper high school	College	Upper high school	College
<i>Panel A: Skilled wages averaged over ages 20-30 when cohort is 17 years of age</i>				
1. [Wage unskilled/Wage skilled] in province, age 17 weighted	-0.78 (.618)	-1.578 (.61)**	-0.398 (.559)	-1.09 (.57)*
2. [Wage unskilled/Wage skilled] in province, age 17 unweighted	-0.345 (.347)	-0.402 (.29)	-0.208 (.34)	-0.323 (.29)
<i>Panel B: Skilled wages averaged over ages 20-40 when cohort is 17 years of age</i>				
1. [Wage unskilled/Wage skilled] in province, age 17 weighted	-0.53 (.81)	-1.495 (.706)**	-0.195 (.721)	-1.06 (.68)*
2. [Wage unskilled/Wage skilled] in province, age 17 unweighted	-0.367 (.477)	-0.711 (.369)*	-0.17 (.43)	-0.601 (.37)*
Sample size:	41368			

Sample of coresident young males of age 25 (column 1) and full sample (column 2). The omitted outcome is "completing compulsory education"

All specifications control for 52 province dummies and 14 time dummies, and for three dummies with the educational attainment of the mother, 5 dummies of family size, a dummy for whether the mother does not live in the household
Standard errors clustered at the province-year level.

Table 5: The response of school attendance to ratio of unskilled to skilled wages, by age.

Dependent variable: Young adult attends regular school

	Full sample		Coresident young adults	
	OLS estimates (1)	Impact, by age (2)	OLS est. (3)	Impact, by age (4)
[Wage unskilled/Wage skilled]	.0473 (.037)	--	-0.0538 (.037)	
1. [Wage unskilled/Wage skilled], age 17	-0.072 (.036)**	-0.0247	0.0356 (.025)	-0.0182
2. [Wage unskilled/Wage skilled] , age 18	-0.13 (.025)**	-0.0827	0.0126 (.037)	-0.0412
3. [Wage unskilled/Wage skilled], age 19	-0.175 (.0316)***	-0.1277	-0.0278 (.041)	-0.0816
4. [Wage unskilled/Wage skilled], age 20	-0.207 (.0388)***	-0.1597	-0.112 (.040)	-0.1658
5. [Wage unskilled/Wage skilled], age 21	-0.203 (.046)***	-0.1557	-0.21 (.045)	-0.2638
Unemployment in the province	0.065 (.019)		0.059 (.020)	
1. Youth unemployment in province, age 17	-0.06 (.021)**	0.005	0.0008 (.019)	0.060
2. Youth unemployment in province, age 18	-0.0957 (.019)**	-0.031	-0.0363 (.0234)	0.023
3. Youth unemployment in province, age 19	-0.12 (.022)***	-0.055	-0.079 (.262)	-0.02
4. Youth unemployment in province, age 20	-0.08 (.0255)***	-0.015	-0.0735 (.278)	-0.01
5. Youth unemployment in province, age 21	-0.0543 (.027)***	0.011	-0.109 (.286)	-0.05
Age-16			-0.125 (.012)	
Age - 16, squared			0.013 (.0024)	
Mother has basic schooling	--		-0.304 (.005)	
Mother has lower high school	--		-0.13 (.005)	
Mother has tertiary education	--		0.133 (.0042)	
Family size equals 2	--		-0.009 (.007)	
Family size equals 3	--		0.003 (.0025)	
Family size equals 5	--		-0.034 (.003)	
Family size equals 6 or more	--		-0.124 (.004)	
Only mother	--		-0.04 (.007)	
Only father	--		-.112 (.006)	
Sample size:	377,780		358036	

Sample of coresident young adults, ages 16 to 21. Covariates not shown include year and province dummies

Figure 1 Ratio of unskilled to skilled male wages when cohort was 17

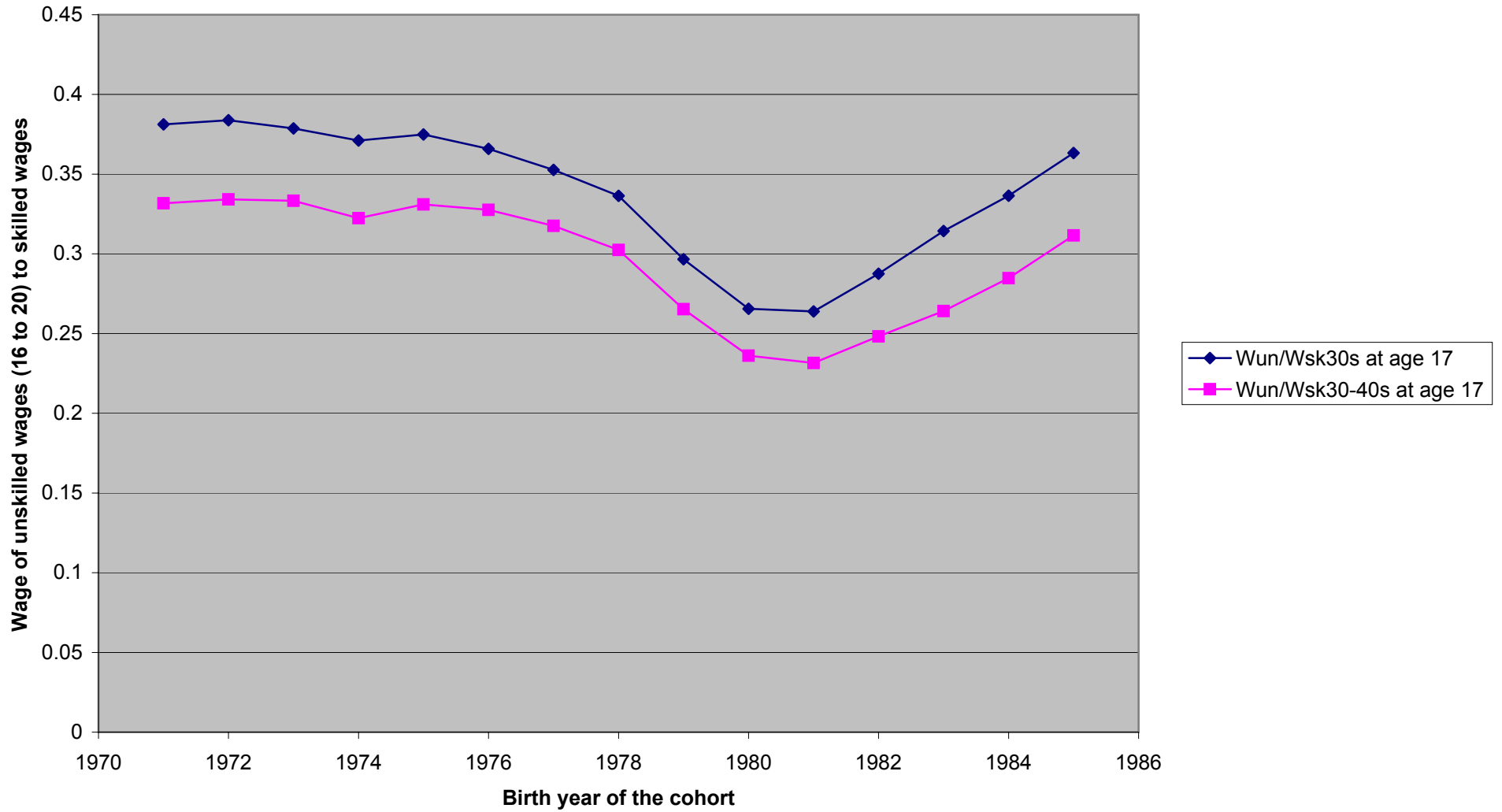


Figure 2: Maximum grade attained at age 24, by cohort

