

Returns to schooling in Spain: 2008-2019

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Abstract

The empirical literature dealing with returns to schooling in Spain is quite scarce. This paper estimates private returns to schooling in Spain over 2008-2019. While average years of schooling increased steadily over the period 2008-2019, returns to schooling followed the same path only until 2014 when they came to a halt. From 2014-2019 a decrease in returns of around 16% took place. Future research framing these results in terms of the labor market adjustments caused by the Great recession and the post-Great recession period will be worthwhile undertaking.

Keywords: Mincer-earnings function, Wages, Schooling, Experience, Spain

JEL classification: J24, I21, I26

Received: 15 February 2021; Received in revised form: 10 July 2021; Accepted: 20 July 2021

1. Introduction

The international empirical literature that estimates the returns to schooling using Mincerian earnings functions is quite abundant (see for an international comparison Montenegro and Patrinos, 2014). However, the literature related to the Spanish case, on the contrary, is quite scarce (Arrazola et al. 2003, Alba-Ramirez and San-Segundo, 1995, Barceinas et al. 2000, Oliver et al. 1998). This paper analyses the Spanish case over the period 2008-2019 treating the education variable as a continuous variable and using information on working age wage-earners obtained from the annual waves of the Spanish household budget survey. The results of our cross-sectional estimates of the private-returns to schooling show an increasing path from 2008 until

2014 going from a minimum of 6.89% in the year 2008 to a maximum of 10.49% in 2014. From the 2014 peak until 2019 a decreasing trend can be observed with a rate of return of 8.84% in 2019. These discordant trajectories happen despite the average years of schooling have steadily increased over our time frame. The 2014 turning-point allow us to frame our results within the context of two differentiated periods, the Great-recession period (2008-2014) and the post-Great-recession period (2015-2019). Pool cross-sectional estimates for these two periods show average private returns of 8.73% and 9.22% respectively. Differentiating by gender, the results are 8.59% for male and 9.94% for female for the period 2008-2014, and 9.12% and 10.33% for the period 2015-2019. Our results call for a detailed analysis of the specific labor market features that characterize these two periods to shed more light to the discordant trajectories of returns to schooling.

2. Data and methodology

2.1. Methodology

Mincer (1974) seminal paper¹ incorporates an important extension in his earnings model related to workers training when considering that the experience on the job is one of the key and essential ingredients of the learning process besides the time periods spent on formal schooling. This incorporation to the earnings equation to approximate an optimizing model of schooling choice and work experience can be empirically estimated by regressing a semi-logarithmic wage equation against schooling, experience, and the square of the experience. This regression is usually termed as the Mincer's (1974) earnings equation. Mathematically, the Mincer equation can be expressed as follows:

$$\ln[W_i(S, E)] = \alpha_0 + \alpha_1 S_i + \alpha_2 E_i + \alpha_3 E_i^2 + \varepsilon_i \quad (1)$$

Where $W_i(S, E)$ is a wage measure for individual i varying with years of schooling and experience, S_i represents the educational attainment level for individual i , E_i represents experience on the job. ε_i represents the error terms which is assumed to be independent of the other variables in the equation. This equation therefore gives estimates for the percentual increase in earnings of one additional year of education or in other words, the rate of growth of earnings with respect to education.

2.2. Data description

The estimation of equation (#1) is carried out using the microdata files from the Spanish household budget surveys² (HBS-Spain) of the Spanish Institute for Statistics³ (INE), which contain anonymized individual data over the period 2008-2019. HBS-Spain contains three microdata files with information of households and single individuals, named as household, members of household, and expenses. For the preparation of our database we use the household file and the members of household file which contain all the relevant information related to the variables required to estimate equation #1. The microdata files were prepared using COBOL programming language and the estimations where carried out using Stata.

¹ This paper draws on contributions made by Becker and Chiswick (1966).

² Encuesta de Presupuestos Familiares is the term used in the Spanish jargon.

³ www.ine.es

Table 1 shows year on year the number of observations used and those discarded. The dropped observations referred to: a) individuals who have not wanted to answer essential questions, or there has been a failure in their digitization; b) individuals who are self-employed (only wage-earners are considered in our sample) because it is difficult to separate their wages from their benefits (see Vila and Mora, 1998); c) individuals over the official retirement age (we only consider individuals aged 16-67).

Table 1 - Observations used and discarded

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Observations-used	4206	4498	4332	4644	4800	5243	5343	5396	5714	5537	4997	4981	59691
Observations-discarded	17871	17848	17871	17036	17008	16814	16803	16734	16297	16506	16398	15836	203022

Source: Own-elaboration based on HBS-Spain.

The variables of equation #1 have been proxy using the information contained in the microdata as follows:

$W_i(S, E)$ represents the monthly earnings of the individuals; We use the log operator on wages since log (wages) is close to a normal distribution and is more convenient to interpret the results. S_i captures the individual's years of schooling. Table 2 shows the years of schooling which correspond to the different schooling levels⁴.

E_i , the individual's experience on the job. Since the survey does not directly provide this information, we use what is usually known as "potential experience on the job" which is approach using the following expression:

$$E_i = \text{age} - (S_i + 6) \quad (2)$$

E_i^2 , the square of the values obtained in expression (#2).

Table 2 - Years assigned to different schooling levels

CNED-P Category	S_i	
LEVEL-A	A0	0
	A1	6
	A2	10
LEVEL-B	B3	12
	B4	12
LEVEL-C	C5	14
	C6	15
	C7-C8	17

Source: own-elaboration.

Table 3 shows statistical information regarding the variables used in our estimations:

⁴ The reference method is the National Classification of Education (CNED-P: classification of programs in educational levels). CNED is the adaptation of the UNESCO International Standard Classification of Education (ISCED).

Table 3 - Descriptive statistics (2008-2019)

Variables	Mean	St. deviation
$Wi(S,E)$	1387.038	774.9461
Si	11.49614	3.455104
Ei	30.94348	12.17265

Source: Own elaboration based on HBS-Spain.

3. Empirical findings

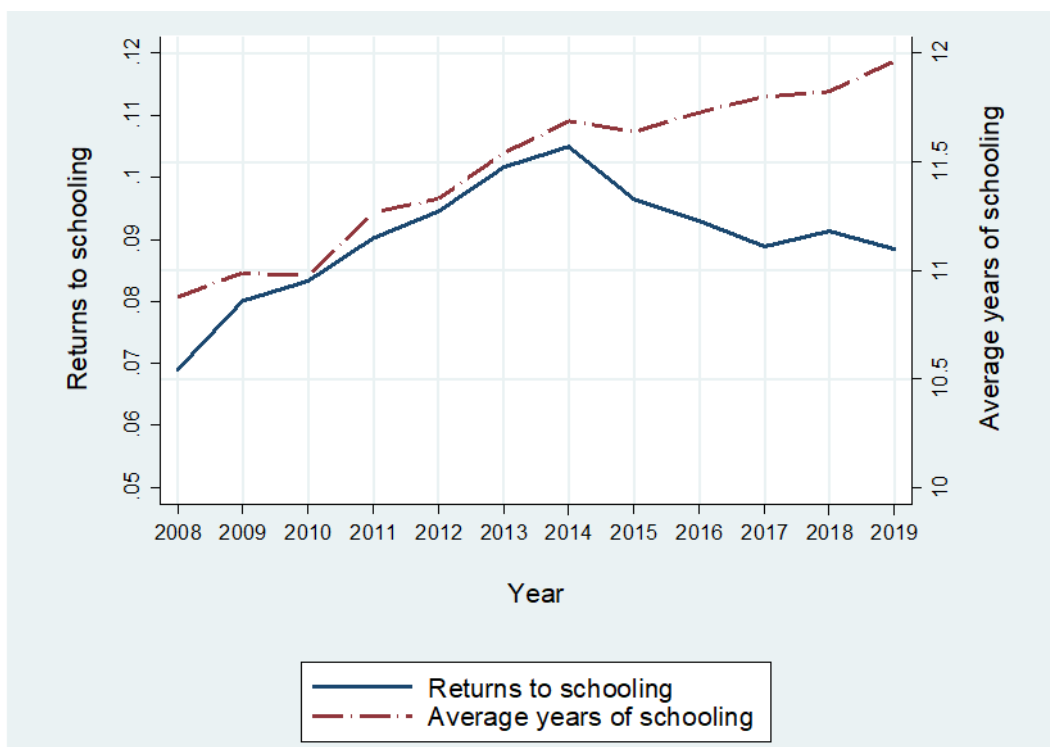
3.1. Average earnings and average years of schooling: a descriptive approach

Table 4 shows the average earnings and average years of schooling in Spain over the period 2008-2019. Figure 1 depicts the discordant trajectories of returns to schooling in Spain over the period 2008-2019 along with the average years of schooling of the individuals.

Table 4 - Average earnings and average years of schooling

Year	Average earnings (€/month)	Average years of Schooling (years)
2008	1405.61	10.87803
2009	1411.86	10.98866
2010	1365.34	10.97345
2011	1332.60	11.26701
2012	1303.52	11.33104
2013	1301.41	11.54015
2014	1310.18	11.68725
2015	1358.29	11.63807
2016	1394.75	11.72804
2017	1445.69	11.79989
2018	1471.97	11.82510
2019	1543.52	11.96487

Source: Own-elaboration based on HBS-Spain.



Source: Own-elaboration based on HBS-Spain.

Figure 1 - Rates of return of schooling

3.2. Mincer earnings equation: cross-sectional estimations

OLS cross-sectional estimations for the years 2008-2019 are reported in Table 5. The estimated coefficient for education α_1 is positive and statistically significant across all years. A sizeable differential-impacts in terms of returns to schooling can be appreciated comparing the estimated coefficients for 2008 and 2014 (minimum and maximum values respectively). While in the year 2008 one additional year of education will lead to an increase in wages of 6.89%, it will increase up to 10.49% in 2014. Part of this increase can be attributed to an increase in the years of schooling of 7.45% between 2008 and 2014 moving from an average of 10.87 years to 11.68 years. Moreover, the estimated coefficients for α_1 over 2008-2014, show an upward trend which at the same time, runs in parallel with the onset of the Great recession (2008) until the first positive macroeconomic data⁵ for Spain in 2014. Another important reason behind this steady increase in the returns to schooling over 2008-2014 are related to the features of the Spanish labor market and its adjustment through the period of the Great recession. Non-permanent jobs, usually filled in by young and less well-paid workers easy to be fired-off (usually they have a lower level of labor protection) versus permanent jobs occupied by tenured and better paid individuals (with high labor protection) means that in a situation such as the one represented by the Great-recession, the labor market will expel in big numbers young and less well-paid individuals. Tenured better-paid individuals have more secured jobs. This process leads to a recomposition of the labor market where average wages per employed person increase and therefore returns to

⁵ The first year of positive numbers for variables such as GDP growth rates and unemployment after the onset of the Great recession was 2014.

schooling show a higher impact. The period 2015-2019 is characterized by a downward trend in terms of returns to schooling from 9.64% in 2015 to 8.84% in 2019 even though the years of schooling, have continued to increase over this period.

Again, the labor market in this post Great-recession period is at the core of these results. The incorporation to the labor market of less well-paid individuals impacts again in lower labor market average wages which pressures down the returns to schooling

Table 5 - Mincer cross-sectional estimates

	2008	2009	2010	2011	2012	2013
S (a_1)	0.068993*** (30.43)	0.080094*** (35.53)	0.083317*** (35.04)	0.090223*** (36.09)	0.094579*** (36.70)	0.10161*** (37.52)
E(a_2)	0.022565*** (9.21)	0.018348*** (7.46)	0.018702*** (7.29)	0.0097479*** (3.63)	0.0092775*** (3.40)	0.0062856* (2.12)
E ² (a_3)	-0.00033638*** (-8.49)	-0.00020765*** (-5.19)	-0.00018855*** (-4.54)	-0.000056216 (-1.29)	-0.000019451 (-0.44)	0.000072769 (1.53)
Constant	6.05738*** (130.58)	5.90962*** (130.06)	5.79676*** (124.19)	5.79404*** (117.59)	5.68539*** (109.07)	5.56326*** (102.44)
R ²	0.2501	0.2601	0.2527	0.2418	0.2353	0.2378
Adjusted R ²	0.2495	0.2596	0.2522	0.2413	0.2349	0.2373
AIC	5020.52	5629.01	5765.78	6686.78	7138.31	8166.06
BIC	5045.89	5654.66	5791.27	6712.55	7164.21	8192.32
F	447.062	494.122	478.314	485.413	469.952	479.950
Observations	4206	4498	4332	4644	4800	5243

	2014	2015	2016	2017	2018	2019
S (a_1)	0.10496*** (41.95)	0.096444*** (41.49)	0.092949*** (38.75)	0.088812*** (38.63)	0.091351*** (38.76)	0.088461*** (35.94)
E(a_2)	0.0050242 (1.72)	0.00056663 (0.20)	0.00071677 (0.26)	0.0069792* (2.56)	0.0070080* (2.43)	0.012099*** (3.93)
E ² (a_3)	0.000079046 (1.70)	0.00012770** (2.80)	0.00012770** (2.86)	6.3770e-06 (0.15)	0.000011056 (0.24)	-0.000069575 (-1.43)
Constant	5.54860*** (101.01)	5.76961*** (114.34)	5.82804*** (114.03)	5.85079*** (117.46)	5.83043*** (115.73)	5.83079*** (105.93)
R ²	0.2535	0.2578	0.2370	0.2303	0.2465	0.2354
Adjusted R ²	0.2530	0.2574	0.2366	0.2299	0.2461	0.2350
AIC	8145.07	8124.67	8666.82	8150.33	7053.46	6988.54
BIC	8171.41	8151.04	8693.42	8176.81	7079.53	7014.59
F	607.933	606.341	542.944	527.712	541.216	469.044
Observations	5343	5396	5714	5537	4997	4981

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; t-statistics between parenthesis

Source: Own-elaboration based on HBS-Spain.

3.3. Mincer earnings equation: pool cross-sectional estimations

Table 6 shows the results of the pool-estimations periods 2008-2014 and 2015-2019 for the total sample, and males and females separately. Comparing the returns to schooling for the Great-recession and post-Great recession periods for the whole sample, we can conclude that the returns to schooling are greater during the post-Great recession by a factor of more than 5%.

When comparing the returns to schooling across gender, males have lower returns to education than females, regardless the period considered.

One more year of education will produce males wage increase by 8.6% (9.1%) and 9.9% (10.3%) percent for females for the periods 2008-2014 (2015-2019). These results imply sizeable sex differences (more than 1%) in the returns to schooling in Spain.

Table 6 - Mincer pool cross-sectional estimates

2008-2014	Pool	Male	Female
S (a_1)	0.087303*** (92.58)	0.085966*** (78.03)	0.099466*** (55.85)
E(a_2)	0.011740*** (11.41)	0.0086627*** (6.90)	0.011757*** (6.86)
E ² (a_3)	-0.000078510*** (-4.73)	-0.000038528 (-1.94)	-0.000076913** (-2.66)
Constant	5.79941*** (303.72)	5.93021*** (262.07)	5.49853*** (161.58)
R ²	0.2301	0.2302	0.2913
Adjusted R ²	0.2301	0.2301	0.2911
AIC	47710.6	32265.0	13995.0
BIC	47744.2	32297.2	14023.7
F	3174.16	2202.25	1247.00
Observations	33066	23278	9788
2015-2019	Pool	Male	Female
S (a_1)	0.092265*** (86.62)	0.091207*** (70.82)	0.10338*** (55.66)
E(a_2)	0.0054526*** (4.25)	0.0028065 (1.75)	0.0049639* (2.37)
E ² (a_3)	0.000043571* (2.13)	0.000068064** (2.72)	0.000070431* (2.02)
Constant	5.80973*** (252.54)	5.95824*** (212.72)	5.50530*** (140.31)
R ²	0.2422	0.2514	0.2867
Adjusted R ²	0.2421	0.2513	0.2865
AIC	39146.0	24207.5	13539.0
BIC	39178.7	24238.6	13567.4
F	2683.16	1817.01	1090.30
Observations	26625	17544	9081

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; t-statistics between parenthesis.

Source: Own-elaboration based on HBS-Spain.

4. Final remarks

In this paper, we have estimated the returns to schooling in Spain over the period 2008-2019. Several conclusions can be reached: First, the results of our cross-sectional estimates point out to sizeable differences and the existence of discordant trajectories of the returns to schooling. An upward trend for the period 2008-2014 and a downward trend for 2015-2019 compatible with a steady increase in the years of schooling over time. Second, pooling our data for the periods 2008-2014 and 2015-2019, and comparing returns across gender, inform us that males return is

lower than females regardless of the period being considered. Finally, a detailed analysis of the Spanish labor market adjustment during the Great-recession and post-Great recession periods, which is far beyond the scope of this paper, will constitute a fruitful research avenue to a better understanding of the discordant trajectories in the returns to schooling over 2008-2019

Acknowledgements

We want to thank the editors of the journal and the referees for the comments given to the previous versions of this paper which substantially improved the quality of this work. This paper is based on Chapter 1 of the PhD thesis of the third author. The usual disclaimer applies.

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