Economic Watch
Global

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Educational attainment in the OECD, 1960-2010[1]

- **This Economic Watch analyses a new data set on educational attainment levels in 21 OECD countries from 1960 to 2010**

  Using detailed information from national censuses, surveys and educational registers, we have constructed quinquennial series of the composition of the adult population by educational attainment levels and estimated the average years of schooling in each of these countries.

- **The evidence shows high growth rates in educational attainment in the OECD and a gradual reduction of educational disparities across these countries**

  After a small spike in the 1960s, the cross-section dispersion of human capital, measured by the standard deviation of the average years of schooling of the adult population, has shown a steady decrease during the past four decades, with a cumulative fall of 40% relative to its initial value in 1960.

- **Spain has made significant progress in education over the past half-century, but there is little room for complacency**

  Despite considerable improvements in educational attainment, Spain remains in the second to last position in terms of its relative human capital, only ahead of Portugal among the major advanced economies.

- **Years of schooling seem to be a more relevant determinant of per capita income than the stocks of physical and technological capital**

  The evidence also shows that in 2010 our estimates of years of schooling show a higher correlation with GDP per person of workingage than other indicators of human capital that have been widely employed in the literature, such as the percentage of the adult population that has attained at least upper secondary education (OECD) or Barro and Lee's (2011) estimates of years of schooling.

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1. Introduction

In a recent working paper, de la Fuente and Doménech (2012) **provide new estimates of educational attainment in 21 OECD countries from 1960 to 2010.** These estimates refer to the breakdown of the adult population (aged 25 and over) according to its level of educational attainment and to its average years of schooling. The new series are a revised and updated version of the human capital data set constructed by de la Fuente and Doménech (2002, 2006).

2. Sources of data and construction of the series

De la Fuente and Doménech estimate the fraction of the population aged 25 and over which has reached each of the following levels of education: illiterates (L0), primary schooling (L1), lower and upper secondary schooling (L2.1 and L2.2) and first and second cycle of higher education (L3.1 and L3.2). L0 is estimated only for the four countries where illiteracy rates have been significant during most of the period under study (Portugal, Greece, Spain and Italy). For the rest of the sample, the lowest reported category is L1, which includes all those who have not reached secondary school.

Table 1 summarises the basic information used to construct the schooling series. For each country, the table shows the fraction of the observations that are based on direct information (from censuses, surveys and national educational registers) regarding the fraction of the population that has reached each school cycle, as well as the year of the earliest and the latest available direct observations. The number of possible observations is typically 22, both for secondary and for higher education (two cycles per schooling level and eleven observations between 1960 and 2010 at a 5-year frequency) but it can be less because certain schooling cycles do not exist in some countries.[2] For those countries where primary education and the first cycle of secondary education tend to be grouped together (identified with an asterisk in the table), the two categories included in the columns for secondary education are L1+L2.1 and L2.2.

Table 1 also includes some backward projections of attainment shares that have been constructed using detailed census data disaggregated by age group and allowing for differences in mortality rates between educational attainment levels. This procedure has been used to estimate attainment in early years when no census data were available. Gaps between direct observations are generally filled by linear interpolation. Remaining gaps in the data have been filled with different procedures that exploit the best information available in each case.

The more problematic cases are highlighted using bold characters. For Denmark and West Germany (at the secondary level), the earliest available direct observation refers to 1970 or later. In these two cases, attainment rates have been projected backward to 1960 using the available information, but the quality of the data is doubtful. Belgium is also a problematic case because, even though it is possible to construct a backward projection for 1961 using data from the 1981 census, it is risky to extrapolate this information over such a long period, particularly when the available age breakdown of the population is not very detailed.

2: In the case of Italy, for example, traditionally there have been no short higher education courses, so the number of possible observations at the university level drops to 11.

Table 1
Availability of direct data

	Secondary attainment			University attainment		
	Direct/tot. observ.	**First observ.**	**Last observ**	**Direct/tot. observ.**	**First observ.**	**Last observ**
Australia	15/22	1961	2006	16/22	1961	2006
Austria*	14/22	1961	2010	14/22	1961	2010
Belgium	12/22	1961	2010	14/22	1961	2010
Canada*	20/22	1961	2010	20/22	1961	2010
Denmark*	14/22	**1973**	2010	14/22	**1973**	2010
Finland*	22/22	1960	2010	22/22	1960	2010
France	16/22	1960	2010	11/22	1960	2010
Greece	12/22	1961	2010	12/22	1961	2010
W. Germany*	8/14	**1970**	1991	13/14	1961	1991
United Germany	9/10	1991	2010	10/10	1991	2010
Ireland	10/22	1961	2006	9/22	1961	2006
Italy	14/22	1961	2010	7/11	1961	2010
Japan*	12/22	1960	2010	12/22	1960	2010
Netherlands	14/22	1960	2010	14/22	1960	2010
N. Zealand	14/22	**1966**	2008	14/22	**1966**	2008
Norway*	18/22	1960	2010	18/22	1960	2010
Portugal	11/22	1960	2011	11/22	1960	2011
Spain	14/22	1960	2010	14/22	1960	2010
Sweden	16/22	1960	2010	16/22	1960	2010
Switzerland*	13/22	1960	2010	13/22	1960	2010
UK	12/22	1961	2010	10/22	1961	2010
USA	22/22	1960	2010	22/22	1960	2010

Note: (*) Countries that generally provide information only on compulsory schooling without distinguishing between primary and lower secondary education.
Source: de la Fuente and Doménech (2012)

3. The evolution of human capital between 1960 and 2010

After estimating the breakdown of the population by educational level, we estimate the average number of years of schooling taking into account the theoretical length of the different school cycles in each country. Results are shown in Table 2.

Our estimates reveal **rapid growth in educational attainment in the OECD and a gradual reduction of educational disparities across countries**. After a small spike in the 1960s, the cross-section dispersion of human capital, measured by the standard deviation of the average number of years of schooling, has fallen steadily during the past four decades, accumulating a decrease of around 40% relative to its initial value (see Figure 1).

The major improvement in the educational level of the Spanish population is apparent in Figure 2. In 1960, 15% of the adult Spanish population did not how to read or write, 94% had not gone beyond primary school and less than 3% had any kind of higher education. **Half a century later, illiteracy had practically disappeared, over 70% of the population had received at least some secondary education and almost 20% had reached university.** As a result, the average years of schooling of the adult population more than doubled, increasing from 4.7 in 1960 to 9.4 in 2010.

Table 2
Average years of schooling

	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010
Australia	10,23	10,33	10,46	10,61	10,89	11,08	11,33	11,61	11,88	12,15	12,47
Austria	9,22	9,40	9,57	9,83	10,11	10,43	10,71	10,94	11,17	11,65	11,93
Belgium	7,28	7,57	7,86	8,11	8,35	8,74	9,17	9,77	10,41	10,85	11,29
Canada	9,88	10,23	10,62	11,11	11,63	11,97	12,29	12,55	12,80	13,04	13,29
Denmark	10,34	10,50	10,65	10,83	11,01	11,15	11,22	11,44	11,70	11,95	12,13
Finland	7,89	8,18	8,53	8,97	9,42	9,89	10,36	10,82	11,25	11,67	12,07
France	6,43	6,67	7,03	7,56	8,09	8,71	9,40	9,97	10,57	11,29	11,89
W. Germany	9,60	10,04	10,48	10,92	11,35	11,82					
Germany*							11,95	12,03	12,05	12,11	12,21
Greece	5,43	5,75	6,06	6,48	6,93	7,38	7,84	8,46	9,12	9,64	10,12
Ireland	7,46	7,60	7,72	8,10	8,54	8,99	9,45	9,97	10,50	11,05	11,59
Italy	4,95	5,21	5,46	5,94	6,48	7,00	7,51	8,15	8,83	9,51	9,99
Japan	8,59	9,02	9,46	9,99	10,52	10,92	11,31	11,61	11,90	12,16	12,43
Netherlands	8,09	8,45	8,81	9,29	9,81	10,32	10,84	11,26	11,63	12,15	12,36
N. Zealand	7,75	8,08	8,41	8,73	9,06	9,39	9,86	10,10	10,67	11,15	11,31
Norway	10,96	11,22	11,48	11,69	11,90	12,05	12,22	12,43	12,68	12,90	13,11
Portugal	3,75	3,81	3,86	4,46	5,06	5,69	6,33	6,96	7,58	8,22	8,88
Spain	4,70	4,82	4,95	5,30	5,66	6,17	6,73	7,42	8,13	8,97	9,39
Sweden	9,04	9,30	9,57	10,05	10,53	11,02	11,65	12,14	12,67	13,08	13,40
Switzerland	10,28	10,53	10,78	10,96	11,13	11,35	11,57	11,81	11,94	12,12	12,35
UK	6,69	7,13	7,58	8,03	8,48	9,08	9,70	10,40	10,86	11,18	11,60
USA	10,56	10,97	11,33	11,76	12,14	12,44	12,66	13,01	13,19	13,30	13,46

(*) Germany refers to the united country. In this case, the "1990" observations refer to 1991.
Source: de la Fuente and Doménech (2012)

Chart 1
Standard deviation of average years of schooling, 1960 = 100
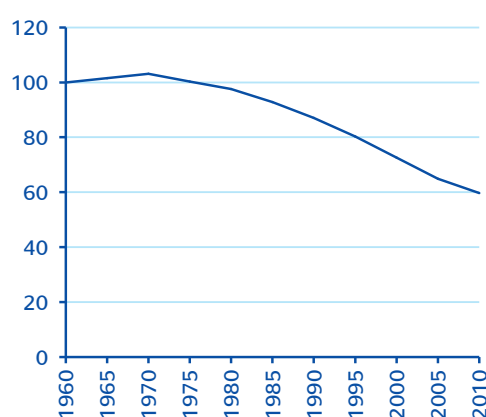
Source: de la Fuente and Doménech (2012)

Chart2
Breakdown of the adult Spanish population by educational attainment, percentages of total

■1960 ■2010
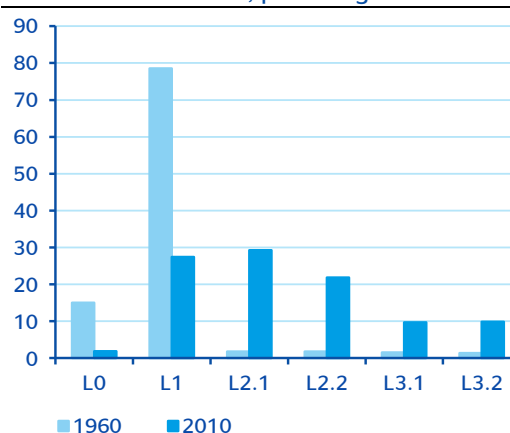
Source: BBVA de la Fuente and Doménech (2012)

In relative terms, however Spain's performance has not been particularly impressive because educational attainment levels have also improved rapidly in all the countries in the sample. This can be seen clearly in Figures 3 to 5, where the Spanish situation is compared with the OECD average and with the maximum and minimum levels of the relevant variable for every year in the sample.

Chart 3
Percentage of the population with secondary but not higher education
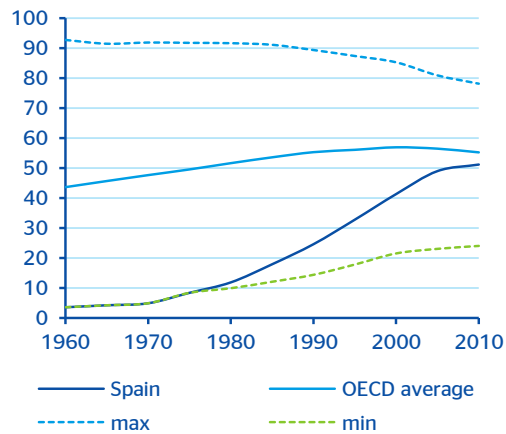
Source: de la Fuente and Doménech (2012)

Chart 4
Percentage of the population with some higher education
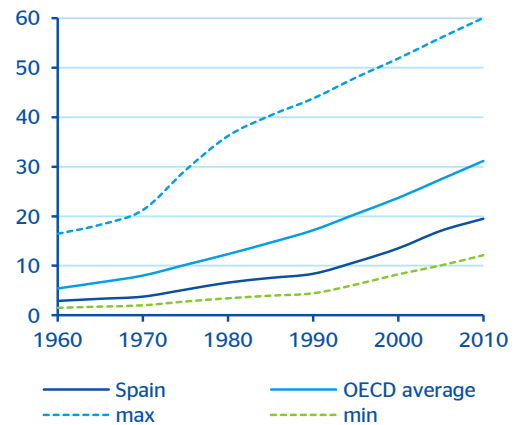
Source: de la Fuente and Doménech (2012)

Chart 5
Average years of schooling
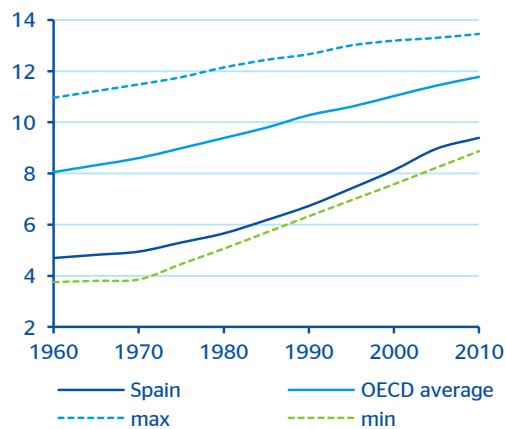
Source: de la Fuente and Doménech (2012)

Chart 6
Relative schooling levels in 1960 and 2010 (OECD average = 100)
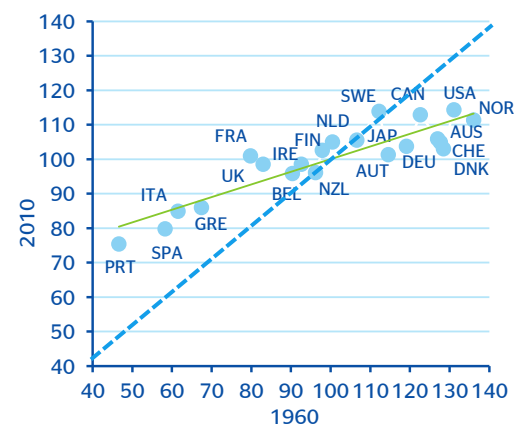
Source: de la Fuente and Doménech (2012)

In the case of the fraction of the population with secondary education, from 1980 onwards the number rapidly approaches the average (see Figure 3) due to the raising of the minimum school-leaving age to 16 years. In the case of higher education, the improvement is also significant but far slower (Figure 4). Figure 5 shows the net effect of all these improvements on average years of schooling: despite reducing the gap with the OECD average by 22 percentage points (from 58 in 1960 to 80 in 2010), **Spain continues to be ranked second to last during the entire period, ahead only of Portugal.** The margin for relative improvement is, therefore, very substantial.

Figure 6 shows the relationship between average years of schooling in 1960 and in 2010. Both variables are expressed in relative terms to the OECD average. Figure 6 also shows two lines. The dotted one is the 45º line that would correspond to a situation in which the initial and final relative schooling rates are exactly the same for all countries. The continuous line is the fitted regression line that shows the relationship between relative educational attainments in the two years considered. Note that the slope of this line is positive but smaller than the slope of the diagonal, indicating that, in general, **OECD countries have tended to converge towards the average, with improvements in those countries with low relative educational attainments and declines in those with higher relative levels.**

The vertical distance between each point and the diagonal corresponds to the change experienced by the relative educational attainment level of each country. The vertical distance between each point and the fitted regression line is also interesting: those countries above this line have done "better than expected", given their initial educational attainment level, whereas those countries below the line have performed below the average. **Spain, for example, has gained 22 points in terms of its relative schooling rate, but is slightly below the regression line, meaning that its performance has been a little worse than expected given its initial situation.**

4. Human capital and per capita income

In order to assess the relevance of human capital as a determinant of income levels, Figure 7 shows the relationship between **GDP per person of working age in 2010** and average years of schooling. **The correlation between these two variables is very high (0.84),** and so is the correlation between years of schooling and GDP per person employed (0.59) or GDP per hour worked (0.59).

Human capital shows a greater correlation with GDP than other productive factors, including the stock of productive capital per person of working age (0.70), or investment in R&D as a percentage of GDP (0.50).[3] This result indicates that, at least in this sample of developed economies in 2010, human capital appears to be a more relevant production factor than physical or technological capital.

Chart 7
Average years of schooling and GDP per working-age population, 2010
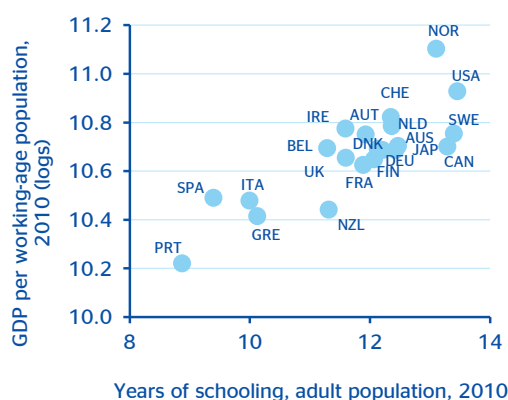
Source: de la Fuente and Doménech (2012) and OECD (2012)

Chart 8
Average years of schooling and percentage of the adult population that has attained at least upper secondary education, 2010
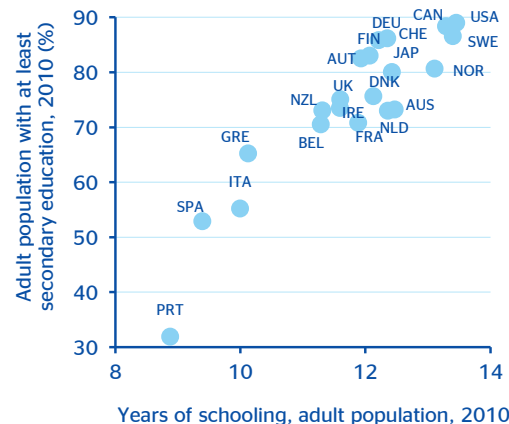
Source: de la Fuente and Doménech (2012) and OECD (2012)

Finally, we have analysed the relationship between our estimates of average years of schooling and other alternative measures of human capital The first alternative is the percentage of the adult population (aged 25 and over) with at least upper secondary education (OECD, *Education at a Glance*, 2012). In Figure 8, we observe that the relationship between the two variables is very close (the correlation is 0.91). Despite this, however, **the correlation of GDP per working-age population with average years of schooling (0.84) is greater than that with the percentage of the adult population that has attained at least upper secondary education (0.78).** The second measure corresponds to the years of schooling of the adult population estimated by Barro and Lee (2011). The correlation between both measures of human capital is lower (0.71) than in the previous case. Furthermore, **the correlation of GDP per person of working age with Barro and Lee's years of schooling is significantly lower (0.54) than with our measure of human capital.**

3: Productive capital stocks have been estimated using data on public and private non-residential investment since 1950 and a perpetual inventory procedure, as described in de la Fuente and Doménech (2006). Spending on R&D activities as a percentage of GDP refers to 2009 (OECD, 2011).

References

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