

The impact of the labor market in educational outcomes in Spain

El impacto del mercado laboral en los resultados educativos en España

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Abstract

The dynamic of the labor market and the expectations to find a job have been claimed to be a strong determinant of the educational decisions of individuals. In this paper we analyze the impact of the household's labor market situation on the academic performance of Spanish students at age 15 considering personal, household and school characteristics through multilevel logistic regression analyses of PISA 2006, 2009, and 2012 microdata.

Key Words

School dropout, multilevel logistic regression, PISA, labor market.

1. Introduction

The dynamic of the labor market and the expectations to find a job have been claimed to be a strong determinant of the educational decisions of individuals, according to the conclusions reached by Carr et al. (1996) and Papagiannis, Bickel & Fuller (1983) among others. In this sense, schooling may have a counter cyclical pattern over the business cycle, being closely related to the perception of the education returns and the benefits that individuals expect to gain from this activity during a particular period of time.

Traditionally, the educational process has been perceived as the main mechanism for accumulating human capital and increasing skills (Becker, 1964) or signaling the most productive individuals (Spence, 1973). The well-established literature on monetary returns to education shows individuals with higher educational attainments obtain higher salaries (Card, 2001; Psacharopoulos and Patrinos, 2002). Additionally, better educated workers have higher activity rates and face a lower risk of unemployment (Stern et al., 1989; Gautier, 2002; Åberg, 2002). Non-monetary returns to education, such as improved health status or political participation has been stressed by authors such as Hillygus (2005), and Groot and Maassen van den Brink (2007). Consequently, education can be seen by families as an intertemporal investment decision leading to future enjoyment of monetary and non-monetary benefits (Schultz, 1961; Becker 1993).

The economic benefits usually associated with education tend to be generally perceived as positive and significant. But the impact level of these benefits depends on the interaction of labor supply factors (such as the economic cycles, the non-monetary characteristics of specific jobs, the barriers to entry and other available substitute occupations, overtime policies and the labor migration, among others) and labor demand factors, including macroeconomic conditions that affect the level of production and the levels of desired employment, the marginal revenue productivity, the productivity of the work force, changes in other productive factors and the technology, the negotiation power of the unions and the number of firms.

The desire of individuals to acquire a higher or lower level of formation is closely related to the potential expected benefits that can be gained through the education process. However the expected returns of education vary in function of the interaction of these factors of supply and demand of labor, and therefore the changes in incentives to obtain more or less education, affects the behavior of people consequently.

In this study, we address the impact of the labor market conditions on the schooling decisions of individuals. The dynamic of the labor market can affect the academic performance and the students' decisions to remain in the educational system in a number of ways. The parental occupation and their level of employment may exert a positive or negative effect on the educational attainment of young adults. As Carneiro and Heckman (2002) point out, family income is a strong predictor of education attainment, and therefore if the economic conditions of the household deteriorate, it may force students to find a job for complementing their household's income. Students may feel that they have a financial responsibility with their families, and this could motivate the decision to choose work before study, particularly in times of economic unrest (Entwisle et al. (2005)).

The material resources of the household (Strauss and Thomas, 1995) and the availability of educative services and the household environment (Rumberger, 2011) has an important influence in the individual demand for education. Families that do not have the resources to provide an adequate environment in the education process, or where the parents are not supportive enough, may have a significant influence in the decision to leave the school and look for employment for young adults.

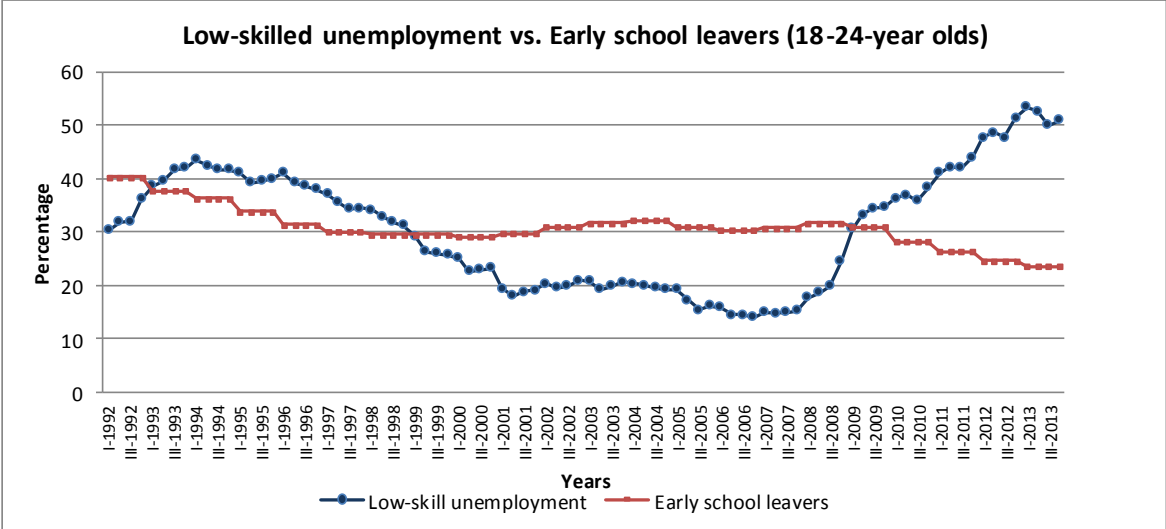
The improvement of labor market opportunities for low-skilled workers and their level of compensation is expected to have an important effect in the decisions to leave the school before time in young adults. According to Black, McKinnish & Sanders (2005) an increase in the demand for low-skilled workers may increase the opportunity costs of education, discouraging the acquisition of further levels of schooling.

Spain has been particularly affected in this sense by a period of economic growth and development of the construction sector that improved the labor opportunities for low-skilled workers and generated an important shift in the dropout rates. However, historically the school failure risk and early school dropout have been significantly higher in Spain. School failure in Spain appears to have structural characteristics, as it has been present in the educational system for more than 30 years (Martin, 2007), figures fluctuating around 30% during the last two decades.

From the second half of the 70's to the end of the 90's decades the early school dropout rate decreased from 70% to 30%, maintaining a consistent trend around 30% until the start of the 2008 depression. Since then, early school dropout rates seem to have increased during economic growth periods and reduced during economic crises (figure 1). The effect of the relationship between the economic cycle and school dropout decisions has been investigated in some works such as Perais and Pastor (2000) and Petrongolo and San Segundo (2002), but most of them remain at the

descriptive level. In this paper we analyze the impact of the household's labor market situation on the academic performance of Spanish students at age 15.

Figure 1. Low-skilled unemployment and early school leavers



Sources: EUROSTAT and Encuesta de Población Activa EPA

In this paper, school failure risk and early school dropout will be defined as the probability of obtaining a score below level-2 in the evaluated competencies of mathematics, reading and science in the Programme for International Student Assessment (PISA). Although the relation between the results of the PISA tests and the dropout and school failure is not explicit, as Mahuteau and Mavroamras (2014) affirm, individual PISA scores are closely associated with individual early school dropouts, recognizing that there is a high correlation between obtaining a result below level-2 in the PISA examination, and the decision to abandon the school (Bushnik, Barr-Telford and Bussière; 2004). The analysis is performed using 2006, 2009 and 2012 PISA micro-data for Spain.

The analysis of PISA data requires a multilevel modeling specification in order to account for the hierarchical structure of the data and a logit-type specification for the binary response dependent variable. A two-level formulation proposed by Raudenbush and Bryk (2002) is implemented, the first level corresponding to data from the students clustered within schools, and the second level capturing the influence of school factors.

The paper is structured as follows: Section 2 describes the evolution of wages and unemployment for low-skilled workers in Spain, a review of the literature and the hypothesis proposed. Section 3 explains and justifies the individual, household and school-level variables

considered in the analysis. Section 4 presents the data and the methodology, while Section 5 discusses the results. Finally the main conclusions are presented in the last section.

2.1 Unemployment and dropout rate in Spain

In the first half of the 90's the general unemployment rate was close to 24% of the population, while the youth unemployment rate (under 25 years of age) was approaching 40%. During this decade, the Spanish productive model based mainly in the low cost of labor appeared to be impossible to sustain, affecting negatively the wages of the workers, but also propitiating precarious types of labor use, characterized by temporary and short term contracts, and submerged economy labor. By this time, the dropout rate had already decreased to 40% in 1992 after reaching a 70% at the end of the 70's.

From 2000 to 2007 the general rate of unemployment fell from 20.4% to 12.2% while the youth unemployment dropped from 25.1% to 14.8% as a consequence of the Spanish economy growth. The school dropout remained stable, close to 30% during this period. By the end of 2007, the United States financial crisis generated a freeze of credits all over the world affecting the Spanish economy, where real wages were not growing and the development of productivity activities was concentrated in just a few economic sectors characterized by a low level of skill of their workers, as the construction sector.

By 2009 a number of measures were taken, but with little success. At that moment the general unemployment rate was above 19% and the young unemployment was close to 35%. The situation rapidly deteriorated and the consumption and investment were almost non-existent. Firms lowered the wages and the temporary jobs increased. In 2010 the general rate of unemployment was more than 20%, and the youth unemployment rate reached 42%. The dropout rate had an important shift from 2008 to 2012 decreasing from 38% to 28.8% for males, and for females from 25.7% to 20.8%.

The wage inequality of male workers diminished during the expansion and increased during the beginning of the 90's decade as in the present recession, mainly thanks to the dynamic of the wages for low-skilled workers in the construction sector. The decline and subsequent rise of the relative wages of unskilled workers in Spain between 1986 and 2009 appear to have affected the schooling decisions of young adults.

2.2 Literature Review

There is a number of studies exploring the relation between labor markets and schooling decisions. Still there is not a clear prediction of how local and country labor markets may affect the school permanency and performance of high school students.

Obtaining a secondary education diploma, according to Stern, Paik, Caterall and Nakata (1989), reduces the probability to be unemployed and increases the salary, regardless of individual characteristics. This result is coherent with the conclusion reached by Card (2001) and Psacharopoulos and Patrinos (2002), that the returns to education are tangible and measurable, and around 10 percent when comparing different countries.

However the monetary returns to education tend to decrease when a large majority of the population reaches a certain education level (Knight & Sabot, 2009). Changes in the demand of educated workers, and the variation in the premium to education can be explained by the variation in the supply of workers with more skills accumulated during the education process (Katz & Murphy, 1992 and Taber, 2001).

At the same time, during economic crises, unemployment rates grow and the monetary returns to education might decrease, affecting significantly the population with the lowest levels of formal instruction. The impact of macroeconomic downturns has an important and significant effect on the academic performance of students (Shady, 2004) and their decision to remain or leave the school (Duryea & Arends-Kuenning, 2003).

Higher unemployment rates may have a double effect on the educational decisions process: on the one hand, it lowers the opportunity cost of studying. As Rees and Mocan (1997) argued, there is a negative relation between the general rate of unemployment and the proportion of high school students dropping out from school at a given year.

Factors such as the dynamic of the labor market (Aparicio, 2010) and the economic cycles (Malley & Muscatelli, 1999) appear to have a significant impact on the behavior of the students related to their school permanency and their academic outcomes. Bickel and Papagiannis (1988), Bickel (1989) and McNeal (1997), establish an empiric negative relation between labor market conditions and the early school dropout decisions.

On the other hand, unemployment may force students to find a job for complementing their household's income. The socio economic characteristics of the students are in fact an important predictor of school dropout (Rumberger, 1987 and Rees & Mocan, 1997), and as Maani and Kalb (2007) point out, the economic resources of the household have an important role in the decision to leave the school.

But also, higher unemployment rates can be perceived as an indicator of negative future returns to the education investment. An increase in the adult unemployment rate can increase the probability of future expected unemployment, which may reduce the returns to education, and therefore discourage the enrolment on secondary education (Micklewright, Pearson and Smith,1990).

Rees and Mocan (1997) using cross-section data from New York school districts between 1978 to 1987, found that a high unemployment rate decreases the dropout rate after controlling the within district variability. Black et al. (2005) tried to identify the relation between the economic cycles and the educational attainment of young adults. Using the coal boom in the states of Kentucky and Pennsylvania they conclude that when labor market opportunities for low-skilled workers are improved, there is a negative effect on the young adult's decision to further their education due to the increase in the education opportunity cost. Rivkin (1995) using data from The High School and Beyond class of 1982, found that a higher unemployment rate at a country level rise the probability of school attendance for high school students.

Another important part of the literature has not been able to find significant evidence of a real effect of the labor markets on the schooling decisions of individuals. Manski and Wise (1983) using data from the National Longitudinal Study of the High School Class of 1972 found weak evidence supporting an interaction between local labor market opportunities and school permanency. Card and Lemieux (2001) using the October Current Population Survey data on high school and college enrollment data found that state level unemployment has no effect on the education attainment. Warren and Lee (2003) using census data for the U.S. conclude that there is not a significant effect of labor market conditions for high school dropout. Schady (2004) using macroeconomic data for Peru, between 1988 to 1992, conclude that the macroeconomic crisis in Peru had no significant effect on the attendance rates of students, but find a significant increase in the mean educational attainment for those young adults affected by the crisis compared to those who were not.

There are some studies that explore the relation of the labor market conditions on student achievement and the dropout in Spain. The works of Peraita and Pastor (2000) and Petrongolo and San Segundo (2002) uncover an important relation between the background of the parents and labor market conditions, on the decision to drop out school during primary and secondary education in Spain. Aparicio (2010) explores the recent Spanish construction boom and its effect on dropouts through changes in the labor conditions. Lopez-Mayan (2013) concludes that working activities have a negative effect on the educational performance of students if are performed during post-compulsory studies.

2.3 Hypothesis

The aim of this paper is to analyze the links between the labor market conditions, the academic performance and the students' decisions to remain in the educational system. This issue is addressed by exploring the influence of the Spanish labor market dynamics on academic performance, and identifying heterogeneous effects of the labor market situation on students with different profiles. The hypotheses proposed are threefold:

- 1) The labor market conditions of the parents may have an important effect on schooling decisions. Students with unemployed parents may face restricted access to educational equipment and services, and may have to deal with higher levels of stress at home. In extreme cases, they might even be forced to abandon school for providing additional income. It is plausible 15-years-old students might already be anticipating their decision of abandoning school the following year. As Barrington and Hendricks (1989) point out, the decision to abandon school occurs due to a long-term cumulative process where a diversity of factors affect the educational context of the students. Therefore, we expect a negative impact of parental unemployment on academic performance.

- 2) Students' educational decisions are sensitive to "local" labor markets. Duryea and Arends-Kuenning (2003), using data from urban Brazilian students, found that an increase in local labor markets opportunities made children more likely to leave school. Lower unemployment rates increase the opportunity cost of studying. These will be identified as the unemployment rate of the parents of their school peers. The expected mean impact is therefore positive, in the sense students have an incentive to continue studying, as they will not find a job easily. The overall effect of 1) and 2) remains unclear.

- 3) However, both impacts -1) and 2)- may well be heterogeneous. Students from lower socio-economic groups might be more sensitive to labor market conditions. Ehrenberg and Brewer (1994) found a positive relation between the country unemployment rate and the risk of early dropout of white students from low income families. Additionally, the lack of a "safety net" (family) may also increase the sensitivity of immigrant students to labor market conditions.

2.4 Methodological Approach and Data

The basic framework of the analysis is the educational productive function. The dependent variable is the student outcome (as measured by PISA) as a function of characteristics of the individuals, the households, and schools. Labor market characteristics of the parents and schools are also included. The model also incorporates regional variables to control for territorial fixed effects. In order to check for the robustness of the results, the analyses will be replicated using the three competences assessed by PISA (mathematics, reading and science). At the same time, the dependant variable will be measured in two different ways: i) using the PISA continuous scale, for measuring the impact of labor market conditions on academic performance, and ii) using a dichotomous variable which identifies students at risk of school failure.

In that sense, although PISA does not allow us to establish a direct link between school dropout and labor market conditions, Schleicher (2007) underlines the relationship between scoring below level-2 in PISA and the risk of school failure and early school dropout. As Knighton and Bussiere (2006) conclude, low results in the PISA test are highly correlated with not being able to obtain minimum education requirements to be individuals successfully incorporated in the labor market and the society. Students with higher proficiency scores in PISA, appear to be less likely to repeat grades and to abandon the school system before completing the basic levels of academic instruction determined by society (Fichbach, Keller, Preckel and Brunner, 2013). Additionally, authors such as Fernandez Enguita et al. (2010) or Carabaña (2004) have pointed out school dropout decisions occur before age 16.

The model incorporates information from three PISA waves (2006, 2009 and 2012). In this paper, the analysis of cross section PISA data at a national level requires a two level random-slope multilevel model. Hierarchical linear models and hierarchical logistic models will be used,

depending on the nature of the dependant variable. However, in both types of model, the first level of the multilevel regression corresponds to the i students selected in the second stage of the PISA survey and, the second level, to the j schools sampled in the previous stage of the survey. The logistic random intercept for a dichotomous y_{ij} dependent variable is modeled according to Raudenbush and Bryk (2002).

Two level logistic regression model with random effects

Level 1 model: (Linear random effects specification)

$$1) y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \dots + \beta_{\rho j}X_{\rho ij} + \xi_{ij}$$

$$2) y_{ij} = \beta_{0j} + \sum_{k=1}^{\rho} \beta_{kj} X_{kij} + \xi_{ij}$$

$$\xi_{ij} \sim N(0, \sigma^2)$$

Level 1 model: (Logistic random effects specification)

$$3) \eta_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \dots + \beta_{\rho j}X_{\rho ij} + \xi_{ij}$$

$$4) p_{ij} = \frac{\exp(\eta_{ij})}{1 + \exp(\eta_{ij})}$$

$$y_{ij} = 1 \text{ with probability } p_{ij}$$

$$y_{ij} = 0 \text{ with probability } 1 - p_{ij}$$

$$5) \log\left(\frac{p_{ij}}{1 - p_{ij}}\right) = \beta_{0j} + \sum_{k=1}^{\rho} \beta_{kj} X_{kij} + \xi_{ij}$$

$$\xi_{ij} \sim N(0, \sigma^2)$$

Level 2 model

$$6) \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

$$\begin{array}{c} \vdots \\ \vdots \\ \beta_{\rho j} = \gamma_{\rho 0} + u_{\rho j} \end{array}$$

$$7) \beta_{kj} = \gamma_{k0} + u_{kj}$$

Full model: (Linear random effects specification)

$$8) y_{ij} = \gamma_{00} + \sum_{k=1}^{\rho} \beta_{k0} X_{kij} + u_{0j} + \sum_{k=1}^{\rho} u_{kj} X_{kij} + \xi_{ij}$$

Full model: (Logistic random effects specification)

$$9) \log\left(\frac{p_{ij}}{1-p_{ij}}\right) = \gamma_{00} + \sum_{k=1}^{\rho} \beta_{k0} X_{kij} + u_{0j} + \sum_{k=1}^{\rho} u_{kj} X_{kij} + \xi_{ij}$$

Missing values are handled with a multiple imputation strategy in order to reduce estimation bias. The econometric strategy incorporates in the analysis sampling weights, plausible values and the hierarchical structure of the data.

3. Results

The regression results are shown in Tables 1 to 6. Tables 1, 2 and 3 correspond to the Hierarchical Linear Model regression for the Reading, Mathematics and Scientific competencies respectively. The estimation results, standard errors and odd-ratios of the Hierarchical Logistic Model regression for the Reading, Mathematics and Scientific competencies, are presented from Tables 3 to 6. The interpretation of the odd- ratios depends on the specification of the variables and the sign of the coefficients. When the variable has a positive coefficient, every 0.1 over 1.0 represents a 10% increase in the probability that the student scores below level-2 in the reading competence. On the contrary, if the coefficient is negative, every 0.1 under 1 represents a 10% decrease in the probability of obtaining a grade under level-2.

3.1 Hierarchical Logistic Model Regression Results

Regarding personal and household characteristics, the variable that identifies the gender of the student (SEX) is a dummy taking value 1 if the individual is a man and 0 if a woman. In the reading competences this variable appears to be statistically significant in each one of the waves sampled, and positively related with the risk of school failure and dropout from school. Being a man increases the risk of obtaining a score below the level-2 in a 100%.

In the mathematic competences the variable is only significant in the 2009 and 2012 waves. The negative sign of the coefficient indicates that being a man decreases the risk of school dropout. Being male increases one's chance of obtaining a result over level-2 in mathematic competence by over 20%. In the science competence the gender is not significant as a predictor of the dropout and its effect is negligible in all three years.

Single-parent families are identified through a dichotomous variable (SP) taking value 1 if in the household there is only one parent and 0 if both parents are present. This variable was not included in the results of the 2006 wave due to the absence of data available. Living on a single-parent family is positively related with the risk of school dropout. In the reading competences this variable is barely significant and increases the risk by a 20%, while in the mathematic and science competences is only significant in 2009, indicating that students who live with only one of its parents are more prone to fail to obtain a result over level-2 in mathematic competence by a 20%.

The number of siblings (SIB) is a dummy variable taking value 1 if the individual has siblings and 0 if not. Due to the lack of available data this variable was not included in the 2006 estimations. Having siblings increases the likelihood of early school leaving, as the positive sign of the coefficient estimates indicates. In the reading competences this variable was not significant and as the odd-ratio associated indicates the effect is negligible. In the mathematic competences the variable is barely significant in 2009 and 2012, increasing the risk of obtaining a score below level-2 by a 10% and a 20% respectively, while in the science competence the variable is not significant at all.

Labor Status of the Father (LSF) is a dichotomous variable taking value 1 if the father is unemployed and 0 otherwise. The positive coefficient in all regressions indicates that having an unemployed father is positively associated with the risk of school failure and early school dropout.

In the reading competences LSF is statistically significant in all three samples, increasing the probability in a 50% during 2006, 20% in 2009 and 30% by 2012. In the mathematic competencies the results are significant in all years, but tend to be less significant for every subsequent year sampled. In this competence the odd-ratios associated to the LSF variable indicate and increasing in the probability of being at risk of failure on the mathematic competence by and 80% in 2006, and 20% in 2009 and 2012. In the science competence the variable LSF is very significant in 2006 and barely significant in 2012. The risk of obtaining a poor result in the science competence increases by an 80% in 2006 and a 30% in 2012.

SDESCS is a normalized index with respect to data for Spain. The index has a mean of 0 and standard deviations measured with respect to the Economic, Social and Cultural Status index provided by PISA. The results indicate a negative relation between the dropout risk and highest occupational status of the parents and their level of education, the family wealth, home educational resources and the cultural possessions of the family. In the reading, mathematics and scientific competences the variable is statistically significant in all samples, decreasing the likelihood of a lower performance on the test by a 30% in the reading competencies, 40% in the mathematic test and close to 30% in the science examination for all years sampled.

The young local unemployment rate (YLUR) is a continuous variable that indicates the percentage of juvenile unemployment (for individuals with 25 years-old or less) for each one of the autonomous communities in Spain. The sign of the coefficient in all HLM regressions indicates that the juvenile unemployment is positively related with the risk of school failure and early dropout from school. In the reading and science competencies this variable is statistically significant for the 2009 and 2012 samples. For the mathematics test the odd-ratios associated to the variable are 8.5 and 4.9 for the 2009 and 2012 regressions respectively, while in the science examination the odd-ratios are 14.6 in 2009 and 5.3 by 2012. The results for this variable estimation are significant in all years of the mathematic competencies, with odd ratios close to 26, 33 and 7 respectively for the 2006, 2009 and 2012 samples.

Regarding the school level characteristics, the index of Home Educational Resources provided by PISA is modified to indicate in a continuous variable (AHEDRES) the average of the index for each one of the schools. The variable is statistically significant in all three competences for all years. In the reading competences the variable is positively related with the dropout risk in 2006 and negatively related in the two subsequent samples, decreasing the risk of obtaining a score below level-2 by a 50% in 2009 and a 20% in 2012. The effect in 2006 is negligible.

In the mathematic and science competencies the odd-ratio associated to this variable in 2006 is null, while in the 2009 decreases the risk of obtaining an unsatisfactory result in the competence test results by a 40% for the mathematic test and a 50% for the science competence, and a 30% by 2012 for the reading competence and a 20% for the science examination.

The average ESCS by school (AEBS) is a continuous variable that identifies the mean of the ESCS index for each one of the sampled schools. The coefficients of the estimates are negative and significant in all HLM regressions, indicating a negative relation between the school dropout and schools with highest ESCS. In the reading competences the risk of obtaining a result under level-2 is reduced by a 50% in 2006, 20% by 2009 and a 30% in 2012. In the mathematic competencies the probability of being at risk is lowered by a 40% in 2006, 20% in 2009 and a 30% in 2012. Very similar results are obtained with the science test results, where the likelihood to score under level-2 is diminished respectively a 50%, 20% and 40% in all three years sampled.

The Average Labor Status of the Father by School (ALSF) is a continuous variable that account for the percentage of fathers unemployed by each one of the schools sampled. The coefficient sign in all three HLM regressions indicates that this variable is positively related with the dropout risk. In the reading competences the variable is barely significant by 2006 and 2009, and not significant at all in 2012. The odd-ratio associated indicates that schools with a large number of fathers unemployed have 7 times more risk of obtaining a score below level-2 in 2006, 3 times in 2009 and 1.5 times in 2012. In the mathematics competence this variable appears only significant in the 2009 and 2012 results, where the risk of obtaining a poor result on the mathematic test is increased 3 times in 2009 and 4 times on 2012. Regarding the science competence, the variable ALSF is only significant in 2009, and increases the risk of underscore in the test 4 times.

The Average Labor Status of the Mother by School (ALSM) is a continuous variable that account for the percentage of mothers unemployed by each one of the schools sampled. In all the three competences the variable appears to be not significant, and its impact on the probability to score under level-2 is almost null.

3.2 Hierarchical Linear Regression Results

The variable SEX is statistically significant in all three regressions. While being a man decreases the results in the reading score by close to 30 points in all three years sampled, in the

mathematic and science competences increase the results. In 2006 being a male increased the mathematics and science scores by 10 and 5 points respectively. In 2009 and 2012 increases the mathematic score in 17 points, and by close to 7 points in the science test.

The variable SP is only significant for the 2009 and 2012 mathematics competence, indicating that living in a single-parent household reduces the expected score by 8 points in 2009 and 5 points in 2012.

The number of siblings (SIB) is significant in the reading competence only in 2009, reducing the expected outcome of the test by 8 points. Regarding the mathematic and science competences this variable appears statistically significant in both years sampled, reducing the score by 9 and close to 8 points in the 2009 and 2012 samples.

The labor status of the father (LSF) is significant in all competencies for all the years sampled. Having an unemployed father reduces the expected test results on the PISA tests on a similar way. The effect is larger during 2006, where the effect is a reduction close to 30 points in all tests, and for the 2009 and 2012 results the reduction ranges between 5 to 10 points in all three tests.

The SDESCS variable is statistically significant in all three years and for all the competences tested. The results are very close and consistent during the regressions, indicating an increase of approximately 20 points for schools with one standard deviation over the mean.

The young local unemployment rate is significant for all years and competences tested, affecting negatively the expected outcome of the students by a significant amount of points. In the reading competences the score is expected to be reduced close to 100 points, from 100 to 150 points in the science expected results and close to 200 in the mathematics results.

The variable AHEDRES has a negative impact on the expected score in all three competences during 2006 but has a negligible effect on the score. During 2009 the effect is positive, increasing the expected outcome in the reading and mathematics score by close to 25 points, and 30 points for the science competence. In 2012 increases the score of the reading test by 11 points and close to 20 points for the mathematics and science results.

The variable AEBS is positive and significant in all the regressions, for all years and competencies. During 2006 increases the expected outcome in the reading competences by close to 25 points. In 2009 increases in 7 points the expected results of the mathematics and science

competences and 12 points in the reading test. In 2012 the increase on the expected outcome of the mathematics and science test is close to 15 points and 20 points for the reading competences.

The average labor status of the father by school (ALSF) is not significant for the reading competences. The variable appears to be significant for the mathematics competence in 2009 and 2012 reducing the expected outcome by 60 points. Regarding the science competence the variable is statistically significant only in 2009, reducing the expected score in 50 points.

The average labor status of the mother by school (ALSM) seems to be only significant in the reading competence and during the 2009, reducing the expected score by 40 points.

4. Conclusions

The most interesting contribution of this paper to the previous literature on the effect of labor market conditions on the schooling decisions of individuals is the possibility of observing the evolution before and after the Spanish economic downturn of a group of factors that appear to have an important impact on the students' decisions to remain in the educational system. Other interesting result is that math scores tended to drop more with the economy downturn than reading and science scores.

Among the personal variables the gender of the students appears not to have a strong effect on the probability of abandon the school system when all competences are considered. However as many other studies point out, results show consistently that male student tend to perform better on mathematic competences and women student on reading competences.

Students living on single-parent families seem to be more prone to school failure and early school dropout. In this sense, the lack of affective and financial support of both parents seems to affect the score on tests of cognitive functioning and standardized tests, and appear to complete fewer years of school when compared to children from two parents household.

The presence of siblings is positively related with lower outcomes and increases the probability of dropout from school. The increase in the family size appear to have an important effect lowering the educational expectative of the students, where parents are faced with less resource to invest on the education of their sons, saving less money for colleges and universities, and this students also have fewer educational materials available.

Having an unemployed father is a strong predictor of future school dropout. The results show that this factor has a strong positive influence on the increase of the risk of school failure and dropout from school. Students whose parents have lost their jobs tend to lead to lower student test scores.

The socio economic status of the parents is also a very significant factor negatively related to the probability of obtaining lower academic results, school failure and school dropout. Low socioeconomic status seems to be correlated with low academic results and school dropouts. Students of parents with lower educational attainment are more likely not to complete high school. Parents who place a low value on a high school education transfer this low value to their children, thereby increasing their children's chances of dropping out of high school.

The young local unemployment rate is highly correlated with the adult local unemployment rate and the risk of drop out from school, indicating perhaps that the unemployment effect forcing students to abandon the school system appears to be stronger than the effect that discourage them to do so, due to the lack of labor opportunities for them.

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Reading Competencies PISA						
	2006 HLM		2009 HLM		2012 HLM	
	Coeff.	Odd Ratio	Coeff.	Odd Ratio	Coeff.	Odd Ratio
Intercept	-1.756 (0.058)		-1.931 (0.042)		-2.077 (0.039)	
SEX	0.745*** (0.049)	2.1	0.642*** (0.042)	1.9	0.685*** (0.046)	2.0
MF			0.158* (0.072)	1.2	0.183* (0.099)	1.2
SIB			0.079 (0.061)	1.1	0.064 (0.075)	1.0
LSF	0.426*** (0.132)	1.5	0.171** (0.078)	1.2	0.235** (0.093)	1.3
SDESCS	-0.409*** (0.037)	0.7	-0.378*** (0.025)	0.7	-0.348*** (0.032)	0.7
YLUR	1.878 (1.349)	7.6	2.096*** (0.671)	8.5	1.583** (0.521)	4.9
AHEDRES	0.005** (0.002)	1.0	-0.618*** (0.155)	0.5	-0.231 (0.129)	0.8
AEBS	-0.609*** (0.101)	0.5	-0.258*** (0.078)	0.8	-0.456*** (0.090)	0.6
ALSF	1.853* (1.040)	6.6	0.965* (0.524)	2.7	0.389 (0.419)	1.5
ALSM	-0.102 (0.401)	0.9	0.696* (0.354)	2.0	0.325 (0.376)	1.4
Observations	19,604		25,887		25,313	
Number of Schoolid	686		889		902	

Mathematics Competencies
PISA

	2006 HLM		2009 HLM		2012 HLM	
	Coeff.	Odd Ratio	Coeff.	Odd Ratio	Coeff.	Odd Ratio
Intercept	-1.388 (0.051)		-1.275 (0.039)		-1.392 (0.038)	
SEX	-0.053 (0.053)	0.9	-0.242*** (0.044)	0.8	-0.165*** (0.046)	0.8
MF			0.210** (0.075)	1.2	0.129 (0.090)	1.1
SIB			0.130* (0.061)	1.1	0.156* (0.073)	1.2
LSF	0.596*** (0.132)	1.8	0.166** (0.075)	1.2	0.184* (0.095)	1.2
SDESCS	-0.469*** (0.034)	0.6	-0.447*** (0.023)	0.6	-0.471*** (0.031)	0.6
YLUR	3.190** (1.319)	25.4	3.477*** (0.682)	33.0	1.950** (0.497)	7.3
AHEDRES	0.008*** (0.003)	1.0	-0.542*** (0.145)	0.6	-0.298** (0.134)	0.7
AEBS	-0.559*** (0.101)	0.6	-0.193* (0.093)	0.8	-0.395** (0.098)	0.7
ALSF	1.280 (0.948)	3.7	1.131** (0.474)	3.1	1.358*** (0.433)	4.0
ALSM	-0.064 (0.305)	0.9	0.175 (0.353)	1.2	-0.016 (0.305)	1.0
Observations	19,604		25,887		25,313	
Number of Schoolid	686		889		902	

Scientific Competencies
PISA

	2006 HLM		2009 HLM		2012 HLM	
	Coeff.	Odd Ratio	Coeff.	Odd Ratio	Coeff.	Odd Ratio
Intercept	-1.677 (0.058)		-1.684 (0.039)		-1.890 (0.039)	
SEX	-0.028 (0.055)	1.0	-0.009 (0.045)	1.0	0.024 (0.046)	1.0
MF			0.148* (0.071)	1.2	0.121 (0.110)	1.1
SIB			0.101 (0.064)	1.1	0.069 (0.068)	1.1
LSF	0.617*** (0.142)	1.8	0.109 (0.070)	1.1	0.255* (0.103)	1.3
SDESCS	-0.476*** (0.037)	0.6	-0.391*** (0.024)	0.7	-0.353*** (0.034)	0.7
YLUR	2.295 (1.654)	10.6	2.639*** (0.622)	14.6	1.632*** (0.537)	5.3
AHEDRES	0.007*** (0.002)	1.0	-0.747*** (0.147)	0.5	-0.283* (0.139)	0.8
AEBS	-0.603*** (0.101)	0.5	-0.239** (0.092)	0.8	-0.499*** (0.089)	0.6
ALSF	1.200 (0.981)	3.4	1.434*** (0.480)	4.2	0.405 (0.387)	1.5
ALSM	-0.506 (0.365)	0.6	-0.036 (0.335)	1.0	-0.064 (0.329)	1.0
Observations	19,604		25,887		25,313	
Number of Schoolid	686		889		902	

Reading Competencies
PISA

	2006 HLLR	2009 HLLR	2012 HLLR
	Coeff.	Coeff.	Coeff.
Intercept	517.235 (10.167)	570.593 (11.521)	567.434 (13.459)
SEX	-34.557*** (1.898)	-30.243*** (2.037)	-28.013*** (1.821)
MF		-2.230 (3.00)	-4.264 (3.406)
SIB		-8.028*** (2.180)	-5.321 (2.681)
LSF	-26.188*** (4.957)	-9.659*** (2.464)	-8.090** (2.185)
SDESCS	17.955*** (1.195)	20.087*** (0.869)	22.064*** (1.086)
YLUR	-107.212* (55.524)	-104.802*** (30.464)	-97.303*** (25.836)
AHEDRES	-0.304*** (0.119)	26.286*** (7.231)	11.588* (6.598)
AEBS	23.427** (4.502)	12.450*** (4.507)	20.297*** (4.544)
ALSF	-65.599 (48.991)	-26.02 (21.316)	4.156 (22.428)
ALSM	-0.482 (17.882)	-39.983*** (14.957)	-4.251 (14.577)
Observations	19,604	25,887	25,313
Number of Schoolid	686	889	902

Mathematics Competencies
PISA

	2006 HLLR	2009 HLLR	2012 HLLR
	Coeff.	Coeff.	Coeff.
Intercept	523.637 (8.451)	575.218 (12.456)	562.710 (11.669)
SEX	9.944*** (1.949)	17.693*** (1.985)	17.061*** (1.731)
MF		-7.888** (3.169)	-4.792* (2.738)
SIB		-9.034*** (2.323)	-6.531** (2.440)
LSF	-28.270*** (5.095)	-6.197** (2.644)	-8.147*** (2.401)
SDESCS	20.913*** (1.148)	22.670*** (0.957)	24.068*** (0.973)
YLUR	-180.348*** (48.346)	-186.842*** (32.851)	-125.754** (21.401)
AHEDRES	-0.338** (0.137)	25.512*** (6.746)	19.098*** (5.802)
AEBS	22.003*** (4.062)	7.734* (4.487)	14.045** (4.181)
ALSF	-54.711 (38.592)	-60.165*** (21.389)	-58.656*** (18.628)
ALSM	6.139 (12.287)	-13.687 (15.365)	6.481 (11.164)
Observations	19,604	25,887	25,313
Number of Schoolid	686	889	902

Science Competencies
PISA

	2006 HLLR	2009 HLLR	2012 HLLR
	Coeff.	Coeff.	Coeff.
Intercept	520.768 (9.406)	567.792 (12.007)	558.287 (13.415)
SEX	5.611*** (1.961)	7.190*** (2.249)	7.808** (1.699)
MF		-1.978 (3.066)	-3.319 (2.970)
SIB		-9.071*** (2.308)	-8.030*** (2.529)
LSF	-31.411*** (5.058)	-4.046 (2.637)	-9.054** (2.613)
SDESCS	22.629*** (1.269)	21.163*** (0.966)	22.385*** (1.039)
YLUR	-125.247** (51.948)	-146.538*** (30.752)	-102.291*** (25.912)
AHEDRES	-0.316*** (0.091)	29.939*** (6.866)	17.397*** (6.419)
AEBS	24.957*** (3.683)	7.167 (5.069)	16.337*** (4.038)
ALSF	-64.286 (36.773)	-52.493** (19.727)	-18.574 (17.549)
ALSM	23.698 (14.357)	-13.910 (14.552)	16.698 (13.031)
Observations	19,604	25,887	25,313
Number of Schoolid	686	889	902
