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EVIDENCE FOR SPAIN

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Human Capital

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ABSTRACT: Labor market dynamics and the expectations of finding a job are believed to be strong determinants of individuals' educational decisions. Thus, the academic performance and permanency of students in the school system are closely related to their perceptions of unemployment. The impact of high unemployment rates on schooling decisions may operate through, at least, two effects: a "family" effect, which urges individuals to dropout owing to limited access to educational resources, and a "local labor market" effect that encourages them to remain in school. In this paper we, specifically, analyze the impact of a household's labor market situation and the effect of local labor unemployment on i) the risk of early school dropout and ii) academic performance, which typically declines before the decision to dropout is taken. These relations are assessed via a set of multilevel linear and logistic regression analyses using PISA 2006, 2009 and 2012 microdata. Results suggest that both parental unemployment and local labor market unemployment increase the risk of school dropout by reducing student academic performance. However, the negative "family" and "local labor market" effects seem to decrease as labor market conditions worsen.

JEL Codes: J64, I21, E32

Keywords: School dropout, multilevel logistic regression, PISA, labor market

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1. Introduction

Labor market dynamics and the expectations of finding a job are believed to be strong determinants of individuals' educational decisions (see Belzil and Leonardi, 2007, and Raam and Røed, 2006, among others). This suggests that schooling decisions are closely related to perceptions of the returns to education and expected individual benefits. Schooling might, therefore, follow a counter-cyclical pattern to that of the business cycle. At the same time, labor market conditions may have a direct impact on schooling outcomes through the parents' labor market situation. Thus, labor market conditions can exercise two separate effects on schooling decisions. On the one hand, unemployment can increase the risk of school dropout and undermine academic performance via a first channel that we will refer to as the "family" effect of unemployment. Parental unemployment can lead to a deterioration in household conditions and in educational resources. In extreme cases, it may even compel young adults to complement the household income (Montmarquette et al., 2007). On the other hand, unemployment may have a positive influence on the individual demand for education via a "local labor market" effect. As labor opportunities worsen, the opportunity cost of education falls, and individuals are encouraged to stay on at school (Albert, 2000).

Additionally, both types of unemployment effect ("family" and "local labor market") may be heterogeneous. For example, students from lower socio-economic groups might be more sensitive to labor market conditions. Indeed, Ehrenberg and Brewer (1994) found a positive relation between the country's unemployment rate and the risk of early dropout of white students from low-income families. At the same time, male students may be more responsive to changes in the labor market, particularly in societies where differences in gender stereotypes are accentuated (Kaya Bahce and Memis, 2014).

The aim of this paper is to provide a better understanding of the links between labor market conditions and early school dropout and academic performance by disentangling the aforementioned effects of unemployment. We address these research questions by focusing on the case of Spain, which constitutes a particularly interesting case study. Spain has recently experienced a period of intense economic growth and development (2000-2007), during which the construction and service sectors boosted labor opportunities for young adults and low-skilled

workers, followed by an economic downturn, since 2008, which significantly increased adult and youth unemployment rates. Spain also had, in 2014, the highest early school dropout rate in the European Union (21.9%).

From the second half of the 1970s to the end of the 1990s, the early school dropout rate in Spain fell from 70 to 30%, maintaining a consistent trend at and around 30% until the start of the 2008 depression. Since 2000, early school dropout rates seem to have increased during periods of economic growth and to have fallen during periods of economic crisis (Figure 1). Between 2000 and 2007, the general rate of unemployment fell from 10.6 to 8.3%.

[Insert Figure 1 around here]

By 2008 the adult unemployment rate had climbed to 11.3%. Thereafter, the situation deteriorated rapidly and the general unemployment rate rose from 19.9% in 2010 to 24.8% in 2012. In the years between 2008 and 2012, the early school dropout rate recorded a marked shift falling from 38 to 28.8% for males, and from 25.7 to 20.8% for females (INE, 2015). While Figure 1 seems to point to a negative relationship between unemployment and school dropout rates, this view has not been fully supported by the economic literature and empirical research offers ambiguous results. A previous study conducted in Spain estimated a relatively weak relationship, and provided non-conclusive evidence (Lassibille and Navarro Gómez, 2008).

We explore the “family” and “local labor market” effects of unemployment on the risk of early school dropout and the academic performance of Spanish students at age 15, using logistic and linear multilevel models applied to the 2006, 2009 and 2012 waves of the OECD’s Programme for International Student Assessment (PISA). Fifteen is a critical age in the Spanish education system, as compulsory education finishes at sixteen. Given the fact that early school leaving decisions are usually the product of a cumulative process and tend to be preceded by a fall in academic performance (Barrington and Hendricks, 1989), focusing on 15-year-old students seems an appropriate choice for addressing our research questions for the Spanish case.

This study, therefore, contributes to the previous literature not only by providing further information about the link between labor market conditions and educational decisions, but also by disentangling two separate effects of unemployment on the risk of early school dropout and academic performance. Our results show that: i) parental unemployment increases the risk of

school dropout and has a negative effect on academic performance; ii) the “local labor market” effect also increases the risk of school dropout, although this effect decreases as general unemployment rates rise; and iii) the socio-economic composition of the unemployed seems to be an important driver of school permanency. As the crisis deepened, individuals with higher socio-economic profiles became jobless, while the school permanency of young adults increased.

The remainder of the paper is structured as follows: First, we present a brief review of the literature which assesses the relationship between the dynamic of the labor market and the schooling decisions of individuals. Next, we present the data and the methodology. We then turn to describe the results of the analyses. Finally the main conclusions are presented in the last section.

2. Literature review

The educational process has traditionally been perceived as the primary mechanism for accumulating human capital and increasing skills (Becker, 1964) or for signaling the most productive individuals (Spence, 1973). Better educated workers have higher activity rates and face a lower risk of unemployment (Stern et al., 1989; Gautier, 2002; Åberg, 2002). However, during economic crises, unemployment rates grow and the monetary returns to education might fall, affecting significantly the population with the lowest levels of formal instruction (Black et al., 2005). Therefore, schooling decisions may be closely related to changes in the labor market and their impact on the family and community, inducing a positive or negative response among young adults with regards to their school permanency and performance.

Several studies have provided evidence of the impact of changes in labor markets on academic performance and school dropout. Concerning the “family” effect of unemployment, family income may be a strong predictor of educational attainment (Carneiro and Heckman, 2002; Entwisle et al., 2005). Therefore, if the economic conditions of the household deteriorate, academic performance may be affected through a number of channels: firstly, via a reduction in the educational resources of the household (Strauss and Thomas, 1995) and the socio-economic characteristics of the students (Rumberger, 1987; Rees and Mocan, 1997 and Maani and Kalb, 2007); secondly, via a deterioration in the household environment (Rumberger, 2011); and,

thirdly, via the fact that a loss of household resources may prompt young adults to leave school and seek employment. Additionally, higher unemployment rates can be perceived as an indicator of negative future returns to the investment in education. Thus, an increase in the adult unemployment rate may increase the probability of future expected unemployment, which may in turn reduce the returns to education, and therefore discourage students from enrolling in secondary education (Micklewright, Pearson and Smith, 1990). In extreme cases, parental unemployment may compel students to find a job to complement the household income.

The relationship between gender and unemployment seems particularly marked in the case of women living in societies in which the expectation is for them to take on more traditional roles. In Spain, for example, there continues to be a high incidence of males in the traditional role of breadwinner (Cebrián and Moreno, 2013). As such, it is likely that the schooling decisions of males will be more sensitive to changes in the labor market.

Concerning the “local labor market” effect of unemployment, according to Black, McKinnish and Sanders (2005) an increase in the demand for low-skilled workers may increase the opportunity costs of education, discouraging the acquisition of further schooling. As Rees and Mocan (1997) argued, there is a negative relationship between the general rate of unemployment and the proportion of high school students dropping out from school in any given year. Factors such as labor market dynamics (Aparicio, 2010) and economic cycles (Malley and Muscatelli, 1999) appear to have a negative and significant impact on the behavior of students in terms of their school permanency and academic outcomes when the demand for low-skilled labor increases. Bickel and Papagiannis (1988), Bickel (1989), and McNeal (1997) establish a negative relation between labor market conditions and early school dropout decisions. Using cross-sectional data from New York school districts between 1978 and 1987, Rees and Mocan (1997) found that a high unemployment rate reduces the dropout rate, after controlling for the within district variability. Likewise, Black et al. (2005) conclude that as labor market opportunities for low-skilled workers improve, there is a negative effect on the decisions of young adults to further their education, due to the increase in educational opportunity costs. Moreover, Rivkin (1995) found that a higher unemployment rate at the country level raises the probability of school attendance for high school students. Finally, Duryea and Arends-Kuenning (2003), drawing on data from urban Brazilian students, found that an increase in local labor market opportunities made children more likely to leave school.

Another major strand in the literature has been unable to detect significant evidence of a real impact of labor markets on individual's schooling decisions. Manski and Wise (1983), drawing on data from the National Longitudinal Study of the Class of 1972 in the United States, found only weak evidence to support an interaction between local labor market opportunities and school permanency. In addition, Card and Lemieux (2001), exploring return to college trends in the United States, the United Kingdom and Canada, found that state level unemployment has no effect on educational attainment. Likewise, Warren and Lee (2003), using data from the 1988 National Educational Longitudinal Study and the 1990 United States Census, conclude that labor market conditions have no significant effect on high school dropout rates. Finally, Schady (2004) concludes that the macroeconomic crisis in Peru had no significant effect on students' school attendance rates, but found a significant increase in the mean educational attainment of those young adults affected by the crisis compared to those who were unaffected.

In the case of Spain, the effect of the relationship between the economic cycle and school dropout decisions has been investigated by Peraita and Pastor (2000) and Petrongolo and San Segundo (2002). These studies reveal an opposite relationship between the level of income, parental education and labor market conditions on the decision to drop out of school during primary and secondary education. Additionally, Aparicio (2010) has explored the recent construction boom in Spain and its impact on school dropout rates via changes in labor conditions, concluding that this temporary shock affected more significantly the employment perspectives of low-educated males and, therefore, their school dropout decision than it did that of females. Finally, Lopez-Mayan (2013) argues that working has a negative effect on the educational performance of students when these activities are undertaken during post-compulsory studies.

3. Methodological approach and data

Our study draws on information from three PISA waves (2006, 2009 and 2012), which allows us to monitor the academic performance of 15-year-old students both before and during the economic crisis (2006, 2009 and 2012). Two different econometric approaches are implemented in order to observe the incidence of unemployment on the schooling decisions of young adults. The effect of labor market variables on the risk of school dropout is assessed through a

hierarchical multilevel logistic regression (HMLR), while the analysis of the impact of unemployment on academic performance is performed through hierarchical linear regressions (HLR).

In both cases, the basic framework of the analysis is the education production function. The dependent variable is the student outcome (measured by PISA) as a function of the characteristics of the individuals, households and schools. The structure of the education production functions is shown in equation (1), which considers hierarchical multilevel logistic regression (HMLR), and equation (2), which considers hierarchical linear regression (HLR):

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

$$y_{ij} = \gamma_{00} + \sum_{k=1}^{\rho} \beta_{k0} X_{kij} + u_{0j} + \sum_{k=1}^{\rho} u_{kj} X_{kij} + \xi_{ij} \quad (2)$$

where $\log\left(\frac{p_{ij}}{1-p_{ij}}\right)$ and y_{ij} are the respective dependent variables: $\log\left(\frac{p_{ij}}{1-p_{ij}}\right)$ being the probability of performing below level 2 on the PISA mathematics competency test and y_{ij} being the competence achieved at the five plausible levels at which performance in mathematics competency is measured on the PISA test. The logistic random intercept for a dichotomous y_{ij} dependent variable is modeled according to Raudenbush and Bryk (2002). In this sense, although PISA does not allow us to establish a direct link between the school dropout decision and labor market conditions, Schleicher (2007) underlines the relationship between achieving a score below level 2 on the PISA test and the risk of school failure and early school dropout. As Mahuteau and Mavromaras (2014) report there is a high correlation between scoring below level 2 on the PISA test, and the decision to abandon school. Knighton and Bussière (2006) also conclude that poor results on the PISA test are highly correlated with the inability to obtain minimum education requirements allowing an individual to successfully join the labor market and integrate in society. Students with higher proficiency scores on PISA appear to be less likely to repeat grades and to abandon the school system before completing the basic levels of academic instruction as determined by society (Fichbach, Keller, Preckel and Brunner, 2013). In this regard, Fernandez Enguita et al. (2010) and Carabaña (2004) have pointed out that school dropout decisions in Spain can occur before the age of 16.

Returning to models 1 and 2, X_{kij} are a set of variables for individual i , from school j ; v_{0j} and u_{0j} are the disturbance terms at the individual-level for the logistic and linear regressions; v_{kj} and u_{kj} are the error terms for the schools, measuring the deviation of each school from the mean slope in both the logistic and linear models; finally μ_{ij} and ξ_{ij} correspond to a series of random or stochastic effects for both models.

To establish the “family” effect of unemployment on the schooling decisions of young adults (research question 1), the household occupation status is included. This variable identifies households in which both parents are unemployed.

Two variables that capture the effect of the labor status associated with each school are incorporated in order to measure the “local labor market” effect” (research question 2) on unemployment: 1) The average labor status of the fathers by school, and 2) the average labor status of the mothers by school. These variables are expected to capture the reality of the labor market situation closest to the students, i.e. that related to their peers’ families. We therefore proxy local labor market conditions through these variables.

To sum up, our models analyze two effects: the “family” effect and the “local labor market” effect. In addition, various interactions between different labor market variables are also tested: the mother and father’s average labor status and the student’s gender; the mother and father’s average labor status and the highest quartile of the distribution of the index of economic, social and cultural status (ESCS) as provided by PISA; and, household unemployment and each of the quartiles of the ESCS index. By including these interactions and adopting a random effects strategy, we expect to determine whether changes in labor market conditions affect more significantly young adults’ schooling decisions, depending on their gender and socio-economic status.

The personal and household explanatory (level-1) variables included are the following: student’s gender; family composition (single-parent families vs. families with both parents living at home); the size of the household (whether the student has siblings at home or is an only child); and student origin (national students and first and second generation immigrant students). The independent variables related to school characteristics (level-2) are: the size of the community in which the school is located (measured in terms of number of inhabitants); type of school (publicly owned, privately owned, or *concertado* – privately owned but government dependent, this latter category being quite common in Spain); the percentage of girls by school; the student-

teacher ratio; the ratio of immigrant students by school; the degree of autonomy regarding the school's budgetary allocation and in determining the school's curriculum content. Table A in the Appendix provides the summary statistics of the explanatory variables.

Table 1 provides information about the labor status of the students' parents and the average labor status of parents by school, and the probability of obtaining a result below level 2 on the PISA mathematics test. This table shows that when a student's father or mother is jobless, they are more likely to obtain a deficient result on the PISA test, and consequently are at a higher risk of abandoning the school system. If both parents are unemployed, the risk of school dropout almost doubles.

[Insert Table 1 around here]

In order to check the robustness of the results and the variation of the results over time, the analyses were replicated using each of the three competences assessed by PISA (mathematics, reading and science) in three PISA waves (2006, 2009 and 2012). In this paper, we specifically present the results for mathematics (and not reading or science), as Ananat et al. (2011) suggest that in conditions of economic unrest and high unemployment mathematics scores are most likely to fall. Additionally, McIntosh and Vignoles (2001) show that better mathematics skills are associated with higher employment rates. However, the results obtained using the other two competencies confirm our main findings and are available on request.

4. Empirical analysis

This section is structured as follows. First, we describe the results from the logistic regression. Table 2 displays the main results, while Table 3 provides information about the different interactions we introduced. Second, we present the results of the HLR, with Tables 4 and 5 showing the main results and the results of the interactions, respectively. Finally, the section closes with the analysis of trends over time.

4.1. Logistic regression results

Results for the logistic regression are presented in Table 2¹. The interpretation of the odds ratios on the logistic regression results 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 represents a 10% increase in the probability that a student will score below level 2 on the mathematics competency test and, therefore, a 10% increase in their risk of abandoning the school system before time. In contrast, if the coefficient is negative, every 0.1 under 1 represents a 10% reduction in their probability of scoring under level 2 and a 10% decrease in their risk of abandoning school. In the 2006 regressions, the results for the variables that account for single parent families and siblings at home were omitted due to a lack of available information in the database.

[Insert Table 2 around here]

Family effect. This effect was measured using a variable that accounts for households in which both parents are unemployed. The logistic regression results for this variable were positive but only significant in 2006. Thus, the “family” effect of unemployment indicates that when both parents are unemployed there is a significant increase in the possibility of a student scoring below level 2. Specifically, the risk of early school dropout rises by 40% compared to students in households where at least one of the parents is working. For the remaining years sampled, the effect was negligible. However, the ESCS index variable, which works as a proxy of the socio-economic background of the students, remained significant in all the periods sampled.

Local labor market effect. The logistic regression results indicate that attending a school at which a high proportion of the fathers are unemployed has a marked effect on the students’ probability of abandoning their schooling. In 2006, students attending schools at which the majority of fathers were unemployed were four times more likely to score below level 2 on the mathematics competency test. By 2012 the dropout risk had fallen by half compared to the risk in 2006. However, in 2009, the coefficients were not statistically significant. Although this result needs to be interpreted with caution, a possible explanation may be that the “local labor market”

¹ A comparison of the variance analyses of the different models and those of the null models was performed in order to contrast the explanatory power of the different models, their fit and validity. Results are available upon request.

effect of unemployment decreased in importance compared to the importance of the “family” effect, gradually reducing the risk of dropout. The variable related to the proportion of mothers being unemployed was not significant, suggesting that this factor is only relevant when it affects the fathers.

Personal, household and school characteristics. Being male increased the probability of scoring above level 2 on the mathematics competency test and, therefore, the likelihood of remaining in school. It should be borne in mind that the dependent variable is derived from the results of the mathematics competency test, where boys usually outperform girls. The index of economic, social and cultural status (ESCS) reduced the risk of abandoning the school system by almost 50% in all years, whereas the effect of the index of home educational resources (HEDRES) was slightly higher (60-80%). Students born outside Spain (first generation immigrants) were at a greater risk of obtaining poor results on the mathematics test than were their peers born in Spain. Having siblings at home and being in a single-parent family were hardly significant. As for school centers, the average ESCS by school had a negative effect on the school dropout risk, while students from a lower socio-economic background were at a greater risk of dropping out, but this effect did not seem to intensify as unemployment became more widespread (in 2009 and 2012). School autonomy on budget allocation also reduced the probability of leaving school before time by 50% (only in 2012), whereas autonomy on course content had no effect. Schools with an enrolment of more than 30% immigrant students saw their probability of scoring below level 2 increase by 20% in 2012. Finally, variables such as school ownership, percentage of females in the school, the student/teacher ratio and the town in which the school is located were not significant.

Interactions by gender and ESCS. We were primarily interested in the effect of unemployment on the schooling decisions of young adults, but it is possible that this impact may vary in relation to a number of potentially correlated factors. We tested this possibility by modeling an interaction between the “local labor market” effect on unemployment and i) the gender of the student and, ii) the lowest quartile of the socio-economic distribution. We also tested the possible interaction between the “family” effect of unemployment and each of the quartiles of the socio-economic distribution index provided by PISA.

These interactions were tested using a random effects approach to explore possible heterogeneous effects between schools. We recalculated three new regressions using the same variables as in the model proposed in Table 2, and adding three different groups of interaction in each regression: i) schools where the job loss of parents was more frequent interacted with male students (local labor market effect); ii) schools with a high proportion of unemployed fathers and unemployed mothers interacted with the lowest quartile of the socio-economic index provided by PISA (local labor market effect); iii) and both parents being unemployed interacted with the quartiles of the ESCS index provided by PISA (family effect). Table 3 displays the coefficients linked to these interactions. The results for the complete models are available on request.

[Insert Table 3 around here]

The results only indicate a significant interaction when testing the average labor status of the mother interacted with male students in 2009 (albeit only at 10% level). The interaction suggested a 40% fall in the school dropout risk (Table 3).

There is no strong evidence to support a distinctive effect on the schooling decisions of individuals by gender or socio-economic status. Even when the ESCS index was tested for different quartiles of the sampled population, the results were not statistically significant. The “family” effect of unemployment when interacting with the socio-economic index for the entire quartiles array was not significant in any of the years tested.

4.2. Linear regression results

Results for the linear regression are presented in Table 4. Positive coefficients imply a positive effect on the academic performance of the students (measured by their score on the mathematic competence test), while the magnitude of the coefficients can be interpreted as the impact of the variables on the students’ score on the PISA mathematics competency test.

Family effect. According to the results, when both parents are unemployed the academic performance of the students worsens, a fall of 30 points on the test score in 2006. However, this result appears to be non-conclusive in 2009 and 2012. These results are very similar to those observed on the logistic regression.

Local labor market effect. Contrary to expectations, the “local labor market” effect of unemployment did not seem to boost the academic performance of students. In fact, average levels of unemployment among fathers are negatively related to student competence in mathematics. For fathers, the absolute value of the effect decreased as the crisis worsened (2009 and 2012). Thus, the effect of the unemployment of fathers served to reduce student achievement by 73 points in 2006, 59 points in 2009, and 37 points in 2012. The concentration of unemployed mothers by school was only significant in 2006, reducing the expected performance on the test by 27 points.

Personal, household and school characteristics. Being male increased the chance of obtaining a high score on the test by 10 points in 2006, 20 points in 2009 and 17 points in 2012. Students with an ESCS index over the sampled average were likely to obtain 20 points more on the mathematics test in all years, showing the importance of socio-economic background on a student’s performance. These results support the conclusions of Rumberger (1987) and Rees & Mocan (1997). Additionally, HEDRES also enhanced academic performance. Students with siblings at home, decreased their score by 9 points in 2009 and 5 points in 2012, while students from single-parent households achieved 5 points less by 2009 compared to households where both parents are present. First generation immigrants obtained lower results compared to native student in the mathematic test score: 35 points less in 2006, 41 points in 2009, and 32 points by 2012.

At the school level, the average ESCS index by school had a marked effect, increasing the likelihood of obtaining a high score on the test, but the effect appears to decrease as unemployment became more widespread, and the socio-economic composition of schools changed. Schools with an enrolment of more than 30% immigrant students presented a negative impact on the expected outcome of students on the test (although in 2009 this effect was negligible). The town population was only significant in communities with more than a million inhabitants, but only in 2012, increasing the expected test outcome by 13 points. The student/teacher ratio and the autonomy on budget allocation were only significant in 2012, and negligible in the remaining years adding 6 and 21 points respectively to the test score in 2012. The school ownership, the percentage of females by school, and the autonomy on course content

where not significant in any of the waves sampled. The results of the variables in this group are quite similar to those reported in the logistic regression.

[Insert Table 4 around here]

Interactions by gender and ESCS. As with the logistic regression, interactions between parental labor status and the lowest quartile of the ESCS distribution, and between household unemployment and ESCS quartiles were tested in order to capture heterogeneous effects. Results were non-significant. However, the interaction between the labor status of the mother and the lowest quartile of the ESCS index distribution showed that, when the mother is out of work and belongs to the highest socio-economic quartile, the expected result of the students on the mathematics competencies of PISA 2009 increased by 26 points (Table 5).

[Insert Table 5 around here]

4.3. Trends

Finally, we describe the trends in the performance of students in the mathematics competence test by group: the whole sample of students tested; students with both parents unemployed; and, students with either the father or mother unemployed. We tracked the evolution in performance between 2006 and 2009, and 2009 and 2012. As such, we calculated trend indicators following the three-step method suggested by the OECD (2009a) and considering four variables: changes in the mathematical performance of the general student population; changes in the performance of students with both parents unemployed; changes in the performance of students with the father unemployed; and, changes in the performance of students with the mother unemployed. The results in Table 6 suggest that overall performance in mathematics by Spanish students remained unchanged for the whole period.

This also holds true between 2009 and 2012 when considering possible changes in the performance of students with both parents unemployed. However, between 2006 and 2009 there was a negative change in their performance coinciding with the transition from the outbreak of the crisis to the economic downturn. A possible explanation for this might be that as labor opportunities deteriorate, the “family” effect of unemployment overcomes the “local labor

market” effect, and the net effect is a negative impact of parental unemployment on academic performance. This result holds when considering changes in the performance of young adults when the father is unemployed and also when the mother is not working.

The trend followed by these two last variables, indicates that the performance of young adults improved when their father and mother were unemployed between 2009 and 2012. From 2006 to 2009 we expected to observe a decrease in mathematics test scores due to the improvement in labor opportunities for young adults, and between 2009 and 2012 a positive change in the PISA results was anticipated as a consequence of the increase in the opportunity costs of studying. When determining whether there had been a negative change in student performance in Spain between 2006 and 2009, our results were negative and significant, corroborating the proposed hypothesis for students with both parents unemployed, for students whose father was unemployed, and for students whose mother was unemployed. Subsequently, when considering if there had been a positive impact in student performance in Spain between 2009 and 2012, the results of the trend analysis were positive and significant, but only for students whose father was unemployed and for students whose mother was unemployed.

[Insert Table 6 around here]

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 in any given year.

Students with an ESCS index above the sampled average are likely to obtain 20 more points on the mathematics test in all years, showing the importance of socio-economic background on a student’s performance. These results support the conclusions of Rumberger (1987) and Rees & Mocan (1997).

5. Discussion and conclusions

The results of the linear and logistic regressions suggest that parental unemployment reduces the academic performance of students and, when both parents are unemployed, increases the probability of school dropout. In this regard, the “family” effect of parental unemployment is

significant; however, it appears to lose its explanatory power as more individuals become unemployed. Thus, as the crisis deepened and more families from different socio-economic backgrounds became jobless, the impact of unemployment on student performance faded.

In 2006, Spain was enjoying a period of economic growth and unemployment levels were very low. At that time, the majority of the jobless presented a low socio-economic status. By 2012 the financial crisis was widespread and unemployment rates were very high and as the numbers of jobless increased, their socio-economic composition changed. In short, the socio-economic level of the unemployed in 2012 had risen in comparison to that of those that were jobless in 2006. Overall, therefore, the results seem to confirm our first hypothesis.

The effect of “local labor markets” on educational decisions, proxied by the percentage of students with unemployed parents at each school, provided an unexpected outcome with respect to our second research question. Thus, as the crisis deepened, while this variable remained significant, its impact on the risk of dropout and on negative academic performance diminished in magnitude. Indeed, the impact is only relevant in the case of fathers and not in that of the students’ mothers.

We recognize that these results are not sufficiently compelling to claim that the “local labor market” effect of unemployment generated an upturn in students’ academic outcomes as the crisis become more intense. However, the positive relationship with school dropout rates presented a decreasing trend during the economic crisis. Whether this trend continued beyond 2012 needs to be addressed in future research.

The trends recorded indicate a downturn in the performance of those students with one or both parents unemployed at the beginning of the crisis (2006 to 2009), lending weight to the idea of a strong initial “family” effect of unemployment on students’ academic performance. However, as the crisis deepened (2009 to 2012), we observed a positive – or, at least, a non-negative – shift in the students’ performance. This can partially be explained by the aforementioned fall in the negative impact of both the “family” and “local labor market” effects during the period 2009 to 2012. Yet, it is not possible to completely disentangle which part of the previous evolution was driven by the change in the social composition of the unemployed and which part was driven by the net effect of unemployment on the schooling decisions of young adults.

The above results highlight the sensitivity of the educational decisions and academic performance of Spanish students to shifts in the labor market. This suggests that strategies aimed

at reducing early school dropout rates should not be restricted solely to the education system. In other words, school failure does not only depend on schools and, hence, on education policies. A comprehensive strategy should therefore aim to i) identify during the early stages of education those students most at risk of school dropout; ii) reduce the importance of financial obstacles for academic decisions; iii) establish mechanisms to make the academic activities and labor market participation of young adults more compatible; iv) ensure that young adults who participate in the labor market are engaged in learning and training activities; and v) establish pathways for early leavers who decide to return to the education system.

Certain limitations in our methodological approach could have been overcome if longitudinal data had been available. Nevertheless, this paper contributes to the existing literature by providing new evidence on the relationship between short-term labor market dynamics, the risk of school dropout and academic performance. More specifically, this paper represents a significant step forward in comparison to the previous literature as it has provided responses to three key questions for a country suffering high unemployment and high early school dropout during a period of intense economic crisis. To conclude, the deep, persistent crisis experienced in Spain, following a period of rapid growth, may have had a significant impact on the perceptions of young adults, encouraging a change in their expectations and social attitudes towards education. If this were in fact the case, then we can expect to observe a continuing decline in the early school dropout rate once the economic recovery begins. As such, this can be as a positive, long-run effect of the crisis. However, further research will be needed to answer this question.

References

- Åberg R (2002) Överutbildning: Ett arbetsmarknadspolitiskt problem? In *K. Abrahamsson, L. Abrahamsson, T. Björkman, P.-E. Ellström, & J. Johansson* (Eds.), *Utbildning, kompetens och arbete* (pp. 41-61). Lund, SE: Studentlitteratur.
- Albert C (2000) Higher education demand in Spain: The influence of labour market signals and family background. *Higher Education* Volume 40, Issue 2, pp 147-162
- Ananat E, Gassman-Pines A, Francis D and Gibson-Davis C (2011) Children Left Behind: The Effects of Statewide Job Loss on Student Achievement. *National Bureau of Economic Research* NBER Working Paper No. 17104.

- Aparicio A (2010) High-school dropouts and transitory labor market shocks: The case of the Spanish housing boom. *Institute for the Study of Labor (IZA) discussion paper series // Forschungsinstitut zur Zukunft der Arbeit*, No. 5139
- Barrington B and Hendricks B (1989) Differentiating characteristics of high school graduates, dropouts and nongraduates. *Journal of Educational Research* 86(6): 309–319.
- Becker G. S. (1964) Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. *National Bureau of Economic Research* Columbia University Press.
- Belzil C and Leonardi M (2007) Can risk aversion explain schooling attainments? Evidence from Italy, *Labour Economics* Volume 14, Issue 6, December 2007, Pages 957–970
- Bickel R (1989) Opportunity and High School Completion. *The Urban Review* 21, 61-84.
- Bickel R and Papagiannis G (1988) Post-High School Prospects and District-Level Dropout Rates. *Youth and Society* v20 n2 p123-47
- Black D, McKinnish T and Sanders S. (2005) The Economic Impact of the Coal Boom and Bust. *The Economic Journal* Volume 115, Issue 503, pages 449–476
- Carabaña J (2004) Educación y movilidad social. En: Navarro, V. (coord.): El Estado de Bienestar en España. Cap. 8, pp. 209-237. Tecnos – UPF, Madrid
- Card D and Lemieux T (2001) Can Falling Supply Explain The Rising Return To College For Younger Men? A Cohort-Based Analysis. *The Quarterly Journal of Economics* MIT Press, vol. 116(2), pages 705-746, May.
- Carneiro P and Heckman J (2002) The Evidence on Credit Constraints in Post-Secondary Schooling. *The Economic Journal* Volume 112, Issue 482, pages 705–734
- Cebrián I and Moreno G (2013) Labour Market Intermittency and its Effect on Gender Wage Gap in Spain. *Revue d'Interventions économiques* 47 (2013) Emploi et inégalités sociales
- Duryea S and Arends-Kuenning M (2003) School Attendance, Child Labor, and Local Labor Markets in Urban Brazil. *World Development* 31(7): 1165-1178.
- Ehrenberg R and Brewer D (1994) Did Teachers' Verbal Ability and Race Matter in the 1960s? Coleman revisited. *Economics of Education Review* 14, 1-21.
- Entwisle D, Alexander K and Olson L (2005) First grade and educational attainment by age 22: a new story 1. *American Journal of Sociology* 110, 1458–1502.

- Gautier P (2002) Unemployment and Search Externalities in a Model with Heterogeneous Jobs and Workers. *Economica*, London School of Economics and Political Science vol. 69(273), pages 21-40.
- Instituto Nacional de Estadística (INE) (2015). Labor Force Survey (LFS) Education statistics. Level of education, training and permanent abandonment: Exploration of educational variables of labour force survey. Available at: <https://www.educacion.gob.es/educabase/menu.do?type=pcaxis&path=/Formacionym/EPA2014/Indi&file=pcaxis&l=s0>
- Kaya Bahce S and Memis E (2014) The impact of the economic crisis on joblessness in Turkey. *The Economic and Labour Relations Review* Vol. 25(1), pages 130-153.
- Knighton T and Bussière P (2006) Educational outcomes at age 19 associated with reading ability at age 15. Ottawa: Statistics Canada.
- Lassibille G and Navarro Gómez L (2008) Why do higher education students drop out? Evidence from Spain. *Education Economics*, Taylor & Francis Journals vol. 16(1), pages 89-105.
- Lopez-Mayan C (2013) Performance in Post-compulsory Education: Evidence from Vocational and Academic Tracks, *Working Papers wpdea1302* Department of Applied Economics at Universitat Autònoma de Barcelona.
- Maani S and Kalb G (2007) Academic performance, childhood economic resources, and the choice to leave school at age 16. *Economics of Education Review* Elsevier, vol. 26(3), pages 361-374, June.
- Manski C and Wise D (1983) College Choice in America. *Cambridge, Mass: Harvard University Press*, 1983
- Mahuteau S and Mavromaras K (2014) An analysis of the impact of socio-economic disadvantage and school quality on the probability of school dropout. *Education Economics* Taylor & Francis Journals vol. 22(4), pages 389-411.
- Malley J and Muscatelli V (1999) Business cycles and productivity growth: Are temporary downturns productive or wasteful? *Research in Economics* Elsevier vol. 53(4), pages 337-364.
- McIntosh S and Vignoles A (2001) Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes. *Oxford Economic Papers* Vol. 53, No. 3, Special Issue on Skills Measurement and Economic Analysis (Jul., 2001) pp. 453-481.

- McNeal R (1997) High school dropouts: A closer examination of school effects. *Social Science Quarterly* 78, 210-222.
- Micklewright J, Pearson M and Smith S (1990) Unemployment and early school leaving. *The Economic Journal* 100 (400) pp. 163-169.
- Montmarquette C, Viennot-Briot N and Dagenais M (2007) Dropout, School Performance, and Working while in School. *The Review of Economics and Statistics* Vol. 89, No. 4, Pages 752-760.
- Peraita C and Pastor M (2000). The primary school dropout in Spain: the influence of family background and labor market conditions. *Education Economics* vol. 8, no.2
- Petrongolo B and San Segundo M. J. (2002) Staying-on at school at 16: the impact of labor market conditions in Spain. *Economics of Education Review* Elsevier, vol. 21(4), pages 353-365.
- Raudenbush S and Bryk A (2002) Hierarchical Linear Models: Applications and Data Analysis Methods. Second Edition. Sage Publications Inc.
- Raaum O and Røed K (2006) Do Business Cycle Conditions at the Time of Labor Market Entry Affect Future Employment Prospects? *The Review of Economics and Statistics* Vol. 88, No. 2 (May, 2006), pp. 193-210.
- Rees D I and Mocan H N (1997) Labor market conditions and the high school dropout rate: Evidence from New York State. *Economics of Education Review* Elsevier vol. 16(2), pages 103-109, April.
- Rivkin M (1995) *The Great Outdoors: Restoring Children's Right to Play Outside*. Washington, NAEYC
- Rumberger R W (2011) *Dropping Out*. *Harvard University Press*, Nov 29, 2011
- Rumberger R W (1987) High school dropouts: A review of issues and evidence. *Review of Educational Research* 57, 101-121.
- Spence M (1973) Job Market Signaling. *The Quarterly Journal of Economics* Vol. 87, No.3, pp. 355 – 374.
- Stern D, Paik I W, Catterall J S and Nakata Y F (1989) Labor market experience of teenagers with and without high school diplomas. *Economics of Education Review* 8 (3): 233 –246
- Schady N R (2004) Do macroeconomic crises always slow human capital accumulation? *World Bank Economic Review* 18(2), 131-153.

Strauss J and Thomas D (1995) Human resources: Empirical modeling of household and family decisions. *Handbook of Development Economics* Volume IIIA, edited by J. Behrman and T.N. Srinivasan. Amsterdam, Netherlands, Elsevier, 1995. 1883-2023

Warren J R and Lee J C (2003) The impact of adolescent employment on high school dropout: differences by individual and labor - market characteristics. *Social Science Research* 32, 98 - 128

Appendix

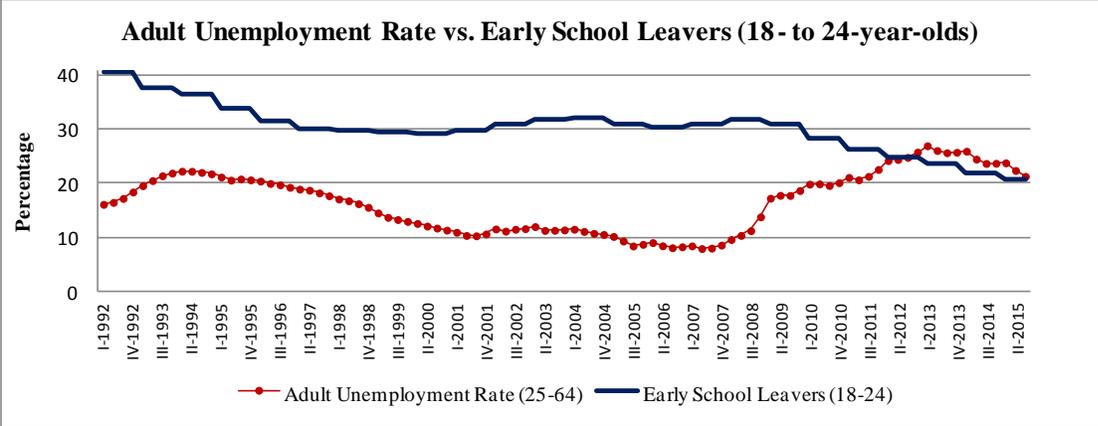
Appendix Table A. Variable sample summary statistics – personal, household and school variables

Variable	Sample	Observations	Mean	SD	Min	Max
Gender (male)	2006	19.604	0,500	0,500	0	1
	2009	25.887	0,508	0,500	0	1
	2012	25.313	0,499	0,500	0	1
Single-Parent Families	2006					
	2009	25.887	0,104	0,305	0	1
	2012	25.313	0,099	0,298	0	1
Siblings at home	2006					
	2009	25.887	0,829	0,376	0	1
	2012	25.313	0,833	0,373	0	1
Parental unemployment	2006	19.604	0,017	0,128	0	1
	2009	25.887	0,049	0,216	0	1
	2012	25.313	0,060	0,237	0	1
ESCS index	2006	19.604	0,063	1,031	-4,848	3,035
	2009	25.887	0,036	1,054	-5,053	3,698
	2012	25.313	0,038	1,003	-5,150	2,880
Students born in Spain	2006	19.604	0,937	0,243	0	1
	2009	25.887	0,895	0,306	0	1
	2012	25.313	0,877	0,329	0	1
First generation immigrants	2006	19.604	0,045	0,208	0	1
	2009	25.887	0,085	0,278	0	1
	2012	25.313	0,095	0,294	0	1
Second generation immigrants	2006	19.604	0,035	0,184	0	1
	2009	25.887	0,053	0,225	0	1
	2012	25.313	0,049	0,216	0	1
Communities with less than 100,000 inhabitants	2006	19.604	0,597	0,490	0	1
	2009	25.887	0,639	0,480	0	1
	2012	25.313	0,629	0,483	0	1
Communities with more than 1,000,000 inhabitants	2006	19.604	0,034	0,182	0	1
	2009	25.887	0,036	0,186	0	1
	2012	25.313	0,033	0,180	0	1

Appendix Table A. Variable sample summary statistics – personal, household and school variables (continued)

Private schools	2006	19.604	0,067	0,251	0	1
	2009	25.887	0,034	0,182	0	1
	2012	25.313	0,050	0,218	0	1
Public schools	2006	19.604	0,583	0,493	0	1
	2009	25.887	0,651	0,477	0	1
	2012	25.313	0,644	0,479	0	1
<i>Concertado</i> – privately owned but govt. dependent schools	2006	19.604	0,349	0,477	0	1
	2009	25.887	0,315	0,464	0	1
	2012	25.313	0,306	0,461	0	1
Average HEDRES index by school	2006	19.604	0,316	0,254	-1,424	1,032
	2009	25.887	-0,121	0,266	-1,436	0,667
	2012	25.313	0,072	0,245	-1,800	1,120
Average ESCS index by school	2006	19.604	-0,158	0,549	-1,571	1,568
	2009	25.887	-0,253	0,550	-1,885	1,508
	2012	25.313	-0,112	0,507	-2,360	1,423
Average labor status of the father by school	2006	19.604	0,042	0,048	0	0,382
	2009	25.887	0,115	0,082	0	0,625
	2012	25.313	0,164	0,094	0	1
Average labor status of the mother by school	2006	19.604	0,251	0,126	0	0,724
	2009	25.887	0,334	0,142	0	0,824
	2012	25.313	0,313	0,132	0	1
% of female students over the average school population	2006	19.604	0,251	0,126	0	0,724
	2009	25.887	0,334	0,142	0	0,824
	2012	25.313	0,313	0,132	0	1
N° of schools with >30% immigrant students	2006	19.604	0,022	0,147	0	1
	2009	25.887	0,063	0,243	0	1
	2012	25.313	0,081	0,273	0	1
School curriculum content autonomy	2006	19.604	0,582	0,493	0	1
	2009	25.887	0,632	0,482	0	1
	2012	25.313	0,581	0,493	0	1
School budgetary allocation autonomy	2006	19.604	0,967	0,175	0	1
	2009	25.887	0,935	0,246	0	1
	2012	25.313	0,948	0,222	0	1

Figure 1. Adult Unemployment Rate Vs. Early School Leavers (18 to 24-year-olds)



Source: EUROSTAT and Spanish Labor Force Survey (EPA). Quarterly data.

Table 1. Probabilities of obtaining a grade under level 2 in the PISA mathematics test according to personal and household characteristics

Personal and household variables	Mathematics Competencies		
	2006	2009	2012
LABOR STATUS OF THE FATHER			
Unemployed	26,76%	33,32%	30,93%
Occupied	16,90%	20,35%	17,53%
LABOR STATUS OF THE MOTHER			
Unemployed	21,95%	28,29%	24,28%
Occupied	15,76%	18,60%	17,65%
HOUSEHOLD OCCUPATION STATUS			
Both parents unemployed	30,79%	42,46%	37,22%
At least one parent working	17,08%	20,77%	18,61%
AGGREGATE MEAN	17,31%	21,84%	19,73%

Source: Own compilation with OECD-PISA 2006, 2009 and 2012 databases.

Table 2. Hierarchical Logistic Regression: Effect of labor market, personal and school variables on the risk of school dropout

	HLRM 2006		HLRM 2006		HLRM 2012	
	Coeff.	Odds ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio
Intercept	-1,602 (-0.045)		-1,28 (-0.043)		-1,418 (-0.038)	
Household unemployment	0.584** (-0.222)	1,4	0,18 (-0.136)	1,0	0,115 (-0.108)	0,9
Schools with high incidence of father's unemployment	1.593* (-0.912)	4,0	0,873 (-0.592)	2,4	0,873* (-0.478)	1,9
Schools with high incidence of mother's unemployment	0,57 (-0.347)	1,4	0,052 (-0.395)	1,0	0,267 (-0.319)	1,0
HEDRES index	0,001 (-0.001)	0,8	-0.250*** (-0.032)	0,6	-0.187*** (-0.042)	0,7
Gender	-0,045 (-0.053)	0,8	-0.284*** (-0.054)	0,5	-0.200*** (-0.056)	0,7
Single-parent families			0.186* (-0.091)	1,0	0,135 (-0.096)	0,9
Siblings at home			0.158* (-0.073)	1,0	0,141 (-0.085)	0,9
ESCS index	-0.509*** (-0.039)	0,5	-0.417*** (-0.03)	0,4	-0.450*** (-0.037)	0,5
First generation immigrants	0.867*** (-0.164)	1,9	0.829*** (-0.086)	2,0	0.710*** (-0.086)	1,6
Second generation immigrants	0,009 (-0.177)	0,8	0,05 (-0.118)	0,8	-0,119 (-0.134)	0,7
Average ESCS by school	-0.461*** (-0.116)	0,5	-0.355** (-0.161)	0,7	-0.281** (-0.112)	0,6
Community (<100,000 inhabitants)	-0,071 (-0.104)	0,7	0,082 (-0.129)	1,1	-0,073 (-0.079)	0,7
Community (>1,000,000 inhabitants)	-0,132 (-0.207)	0,7	-0,281 (-0.202)	0,8	-0,186 (-0.187)	0,6
School private public dependent	-0,048 (-0.213)	0,8	0,085 (-0.273)	1,1	-0,015 (-0.163)	0,8
School public	-0,045 (-0.228)	0,8	0,197 (-0.269)	1,2	0,238 (-0.17)	1,0

Table 2. Hierarchical Logistic Regression: Effect of labor market, personal and school variables on the risk of school dropout (continued)

	HLRM 2006		HLRM 2006		HLRM 2012	
	Coeff.	Odds ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio
Percentage of girls by school	-0,007 (-0.081)	0,8	-0,004 (-0.107)	1,0	-0,057 (-0.082)	0,7
Immigrant ratio (over 30%)	0,537 (-0.257)	1,4	0,083 (-0.15)	1,1	0.392*** (-0.131)	1,2
Student/teacher ratio	-0,145 (-0.118)	0,7	0,112 (-0.131)	1,1	-0,169 (-0.099)	0,7
Autonomy on budget allocation	-0,062 (-0.346)	0,7	0,002 (-0.149)	1,0	-0.369** (-0.147)	0,5
Autonomy on course content	-0,081 (-0.087)	0,7	-0,136 (-0.087)	0,9	-0,067 (-0.078)	0,7
Observations	19.604	19.604	25.887		25.313	

Note: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The base category is constructed around these characteristics: Personal and household variables: Being female; Living in a household where both parents are present; Being and only child; Living in a household where at least one of the parents is working; Being born in Spain. School variables: Schools with high incidence of employed fathers; Schools with high incidence of employed mothers; Community where the school is located has more than 100,000 inhabitants and less than 1,000,000; Schools privately owned; Percentage of girls in the school; Immigrant students ratio less than or equal to 29% of the school population; Student-teacher ratio; School without autonomy on budget allocation and course content.

Source: Based on OECD-PISA 2006, 2009 and 2012 databases.

Table 3. Interaction regression results – Logistic regression random effects

Interactions	2006 HMLR		2009 HMLR		2012 HMLR	
	Coeff.	Odds ratio	Coeff.	Odds ratio	Coeff.	Odds ratio
Average Labor Father * Male Student	1,072 (-1.073)	4,1	-0,151 (-0.643)	0,9	-0,23 (-0.602)	0,9
Average Labor Mother * Male Student	-0,295 (-0.394)	0,8	-0.804* (-0.381)	0,4	0,369 (-0.428)	1,4
Average Labor Father * 1st ESCS quartile	1,283 (-1.073)	3,2	0,255 (-0.69)	0,9	0,338 (-0.653)	1,4
Average Labor Mother * 1st ESCS quartile	-0,278 (-0.296)	0,8	-0,374 (-0.326)	0,4	-0,397 (-0.412)	0,7
Household Unemployment * 1st ESCS quartile	-0,342 (-0.783)	0,7	0,039 (-0.701)	0,9	-0,495 (-0.521)	0,6
Household Unemployment * 2nd ESCS quartile	-0,259 (-0.905)	0,8	-0,097 (-0.675)	0,8	-0,197 (-0.493)	0,8
Household Unemployment * 3rd ESCS quartile	-0,193 (-0.738)	0,8	0,372 (-0.703)	1,3	0,302 (-0.542)	1,3
Observations	19.604		25.887		25.313	
Number of schools	686		889		902	

Note: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The individual personal, school and household variables are included in the regression but not shown.

Source: Based on OECD-PISA 2006, 2009 and 2012 databases.

Table 4. Hierarchical Linear Regression: Effect of labor market, personal and school variables on the academic performance

	2006 HLR	2009 HLR	2012 HLR
	Coeff.	Coeff.	Coeff.
Intercept	489,95 (-1.489)	477,54 (-1.536)	482,71 (-1.265)
Household unemployment	-30.240*** (-8.896)	-5,126 (-5.553)	-3,531 (-3.988)
Schools with high incidence of father's unemployment	-72.756** (-36.269)	-59.096*** (-22.071)	-36.858** (-18.221)
Schools with high incidence of mother's unemployment	-26.616** (-12.378)	4,648 (-16.208)	-1,389 (-11.413)
HEDRES index	-0,021 (-0.019)	10.853*** (-1.03)	7.427*** (-1.231)
Gender	9.516*** (-1.796)	19.641*** (-1.742)	16.521*** (-1.637)
Single-parent families		-5.387* (-2.864)	-4,473 (-3.125)
Siblings at home		-8.854*** (-2.409)	-5.099** (-2.394)
ESCS index	21.430*** (-1.186)	18.546*** (-0.979)	21.153*** (-1.014)
First generation immigrants	-34.739*** (-6.557)	-41.330*** (-3.255)	-32.252*** (-2.967)
Second generation immigrants	-0,044 (-5.256)	-1,68 (-4.053)	-1,911 (-3.413)
Average ESCS by school	18.839*** (-4.452)	13.643*** (-4.989)	11.791*** (-4.129)
Community (<100,000 inh.)	2,219 (-3.991)	-6,732 (-4.354)	1,984 (-2.876)
Community (>1,000,000 inh.)	0,779 (-7.163)	8,397 (-7.423)	13.020** (-6.216)
School private public dependent	0,054 (-8.21)	5,643 (-7.836)	2,865 (-5.233)
School public	-0,51 (-9.501)	1,052 (-8.156)	-3,657 (-5.448)
Percentage females by school	3,931 (-3.044)	0,636 (-3.667)	1,09 (-3.162)
Immigrant ratio (over 30%)	-27.621** (-11.979)	-2,511 (-7.076)	-21.563*** (-5.718)

Table 4. Hierarchical Linear Regression: Effect of labor market, personal and school variables on the academic performance (continued)

	2006 HLR	2009 HLR	2012 HLR
	Coeff.	Coeff.	Coeff.
Student/teacher ratio	2,293 (-5.716)	-4,393 (-4.926)	6.613* (-3.421)
Autonomy on budget allocation	-5,483 (-16.895)	-7,497 (-6.6)	20.789*** (-5.313)
Autonomy on course content	3,129 (-3.347)	6.579* (-3.442)	3,331 (-2.815)
Observations	19.604	25.887	25.313

Note: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The base category is constructed around these characteristics: Personal and household variables: Being female; Living in a household where both parents are present; Being and only child; Living in a household where at least one of the parents is working; Being born in Spain. School variables: Schools with high incidence of employed fathers; Schools with high incidence of employed mothers; Community where the school is located has more than 100,000 inhabitants and less than 1,000,000; Schools privately owned; Percentage of girls in the school; Immigrant students ratio less than or equal to 29% of the school population; Student-teacher ratio; School without autonomy on budget allocation and course content.

Source: Based on OECD-PISA 2006, 2009 and 2012 databases.

Table 5. Interaction regression results – Linear regression random effects

	2006 HLR	2009 HLR	2012 HLR
Interactions	Coeff.	Coeff.	Coeff.
Average Labor Father * Male Student	-33,343 (-32.44)	-1,259 (-23.103)	1,378 (-18.81)
Average Labor Mother * Male Student	-2,002 (-11.461)	2,806 (-12.921)	-11,129 (-13.62)
Average Labor Father * 1st ESCS quartile	-57,846 (-41.506)	-37,729 (-28.704)	-18,894 (-22.703)
Average Labor Mother * 1st ESCS quartile	3,636 (9.183)	25.697* (-12.535)	15,115 (-13.552)
Household Unemployment * 1st ESCS quartile	-7,983 (-28.469)	-10,875 (-21.107)	-1,781 (-16.737)
Household Unemployment * 2nd ESCS quartile	4,443 (-33.094)	-15,09 (-20.115)	-12,769 (-16.25)
Household Unemployment * 3rd ESCS quartile	8,451 (-26.089)	-22,501 (-18.313)	-22,716 (-18.464)
Observations	19.604	25.887	25.313
Number of schools	686	889	902

Note: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The individual personal, school and household variables are included in the regression but not shown.

Source: Based on OECD-PISA 2006, 2009 and 2012 databases.

Table 6. Trends in mathematics performance before and after the economic downturn

Trends hypotheses	Period	Results difference	Stat. significant	Link error	Std. error	Standardized difference	Hypotheses testing
Change in the performance of the students	2006 - 2009	3	No	1,333	3,39	0,89	FALSE
	2009 - 2012	1	No	2,294	3,64	0,27	FALSE
Change in the performance of students with both parents unemployed	2006 - 2009	-19	Yes	1,333	6,15	-3,09	TRUE (-)
	2009 - 2012	6	No	2,294	4,47	1,34	FALSE
Change in the performance of students with father unemployed	2006 - 2009	-11	Yes	1,333	3,91	-2,82	TRUE (-)
	2009 - 2012	2	Yes	2,294	3,28	3,35	TRUE (+)
Change in the performance of students with mother unemployed	2006 - 2009	-13	Yes	1,333	2,05	-6,33	TRUE (-)
	2009 - 2012	17	Yes	2,294	3,28	5,18	TRUE (+)

Source: Calculations based on OECD-PISA, 2006, 2009 and 2012 databases.

2012

- 2012/1, **Montolio, D.; Trujillo, E.:** "What drives investment in telecommunications? The role of regulation, firms' internationalization and market knowledge"
- 2012/2, **Giesen, K.; Suedekum, J.:** "The size distribution across all "cities": a unifying approach"
- 2012/3, **Foremny, D.; Riedel, N.:** "Business taxes and the electoral cycle"
- 2012/4, **García-Estévez, J.; Duch-Brown, N.:** "Student graduation: to what extent does university expenditure matter?"
- 2012/5, **Durán-Cabré, J.M.; Esteller-Moré, A.; Salvadori, L.:** "Empirical evidence on horizontal competition in tax enforcement"
- 2012/6, **Pickering, A.C.; Rockey, J.:** "Ideology and the growth of US state government"
- 2012/7, **Vergolini, L.; Zanini, N.:** "How does aid matter? The effect of financial aid on university enrolment decisions"
- 2012/8, **Backus, P.:** "Gibrat's law and legacy for non-profit organisations: a non-parametric analysis"
- 2012/9, **Jofre-Monseny, J.; Marín-López, R.; Viladecans-Marsal, E.:** "What underlies localization and urbanization economies? Evidence from the location of new firms"
- 2012/10, **Mantovani, A.; Vandekerckhove, J.:** "The strategic interplay between bundling and merging in complementary markets"
- 2012/11, **García-López, M.A.:** "Urban spatial structure, suburbanization and transportation in Barcelona"
- 2012/12, **Revelli, F.:** "Business taxation and economic performance in hierarchical government structures"
- 2012/13, **Arqué-Castells, P.; Mohnen, P.:** "Sunk costs, extensive R&D subsidies and permanent inducement effects"
- 2012/14, **Boffa, F.; Piolatto, A.; Ponzetto, G.:** "Centralization and accountability: theory and evidence from the Clean Air Act"
- 2012/15, **Cheshire, P.C.; Hilber, C.A.L.; Kaplanis, I.:** "Land use regulation and productivity – land matters: evidence from a UK supermarket chain"
- 2012/16, **Choi, A.; Calero, J.:** "The contribution of the disabled to the attainment of the Europe 2020 strategy headline targets"
- 2012/17, **Silva, J.I.; Vázquez-Grenno, J.:** "The ins and outs of unemployment in a two-tier labor market"
- 2012/18, **González-Val, R.; Lanaspa, L.; Sanz, F.:** "New evidence on Gibrat's law for cities"
- 2012/19, **Vázquez-Grenno, J.:** "Job search methods in times of crisis: native and immigrant strategies in Spain"
- 2012/20, **Lessmann, C.:** "Regional inequality and decentralization – an empirical analysis"
- 2012/21, **Nuevo-Chiquero, A.:** "Trends in shotgun marriages: the pill, the will or the cost?"
- 2012/22, **Piil Damm, A.:** "Neighborhood quality and labor market outcomes: evidence from quasi-random neighborhood assignment of immigrants"
- 2012/23, **Ploeckl, F.:** "Space, settlements, towns: the influence of geography and market access on settlement distribution and urbanization"
- 2012/24, **Algan, Y.; Hémet, C.; Laitin, D.:** "Diversity and local public goods: a natural experiment with exogenous residential allocation"
- 2012/25, **Martinez, D.; Sjögren, T.:** "Vertical externalities with lump-sum taxes: how much difference does unemployment make?"
- 2012/26, **Cubel, M.; Sanchez-Pages, S.:** "The effect of within-group inequality in a conflict against a unitary threat"
- 2012/27, **Andini, M.; De Blasio, G.; Duranton, G.; Strange, W.C.:** "Marshallian labor market pooling: evidence from Italy"
- 2012/28, **Solé-Ollé, A.; Viladecans-Marsal, E.:** "Do political parties matter for local land use policies?"
- 2012/29, **Buonanno, P.; Durante, R.; Prarolo, G.; Vanin, P.:** "Poor institutions, rich mines: resource curse and the origins of the Sicilian mafia"
- 2012/30, **Anghel, B.; Cabrales, A.; Carro, J.M.:** "Evaluating a bilingual education program in Spain: the impact beyond foreign language learning"
- 2012/31, **Curto-Grau, M.; Solé-Ollé, A.; Sorribas-Navarro, P.:** "Partisan targeting of inter-governmental transfers & state interference in local elections: evidence from Spain"
- 2012/32, **Kappeler, A.; Solé-Ollé, A.; Stephan, A.; Väililä, T.:** "Does fiscal decentralization foster regional investment in productive infrastructure?"
- 2012/33, **Rizzo, L.; Zanardi, A.:** "Single vs double ballot and party coalitions: the impact on fiscal policy. Evidence from Italy"
- 2012/34, **Ramachandran, R.:** "Language use in education and primary schooling attainment: evidence from a natural experiment in Ethiopia"
- 2012/35, **Rothstein, J.:** "Teacher quality policy when supply matters"
- 2012/36, **Ahlfeldt, G.M.:** "The hidden dimensions of urbanity"

- 2012/37, **Mora, T.; Gil, J.; Sicras-Mainar, A.:** "The influence of BMI, obesity and overweight on medical costs: a panel data approach"
- 2012/38, **Pelegrín, A.; García-Quevedo, J.:** "Which firms are involved in foreign vertical integration?"
- 2012/39, **Agasisti, T.; Longobardi, S.:** "Inequality in education: can Italian disadvantaged students close the gap? A focus on resilience in the Italian school system"

2013

- 2013/1, **Sánchez-Vidal, M.; González-Val, R.; Viladecans-Marsal, E.:** "Sequential city growth in the US: does age matter?"
- 2013/2, **Hortas Rico, M.:** "Sprawl, blight and the role of urban containment policies. Evidence from US cities"
- 2013/3, **Lampón, J.F.; Cabanelas-Lorenzo, P.; Lago-Peñas, S.:** "Why firms relocate their production overseas? The answer lies inside: corporate, logistic and technological determinants"
- 2013/4, **Montolio, D.; Planells, S.:** "Does tourism boost criminal activity? Evidence from a top touristic country"
- 2013/5, **García-López, M.A.; Holl, A.; Viladecans-Marsal, E.:** "Suburbanization and highways: when the Romans, the Bourbons and the first cars still shape Spanish cities"
- 2013/6, **Bosch, N.; Espasa, M.; Montolio, D.:** "Should large Spanish municipalities be financially compensated? Costs and benefits of being a capital/central municipality"
- 2013/7, **Escardíbul, J.O.; Mora, T.:** "Teacher gender and student performance in mathematics. Evidence from Catalonia"
- 2013/8, **Arqué-Castells, P.; Viladecans-Marsal, E.:** "Banking towards development: evidence from the Spanish banking expansion plan"
- 2013/9, **Asensio, J.; Gómez-Lobo, A.; Matas, A.:** "How effective are policies to reduce gasoline consumption? Evaluating a quasi-natural experiment in Spain"
- 2013/10, **Jofre-Monseny, J.:** "The effects of unemployment benefits on migration in lagging regions"
- 2013/11, **Segarra, A.; García-Quevedo, J.; Teruel, M.:** "Financial constraints and the failure of innovation projects"
- 2013/12, **Jerrim, J.; Choi, A.:** "The mathematics skills of school children: How does England compare to the high performing East Asian jurisdictions?"
- 2013/13, **González-Val, R.; Tirado-Fabregat, D.A.; Viladecans-Marsal, E.:** "Market potential and city growth: Spain 1860-1960"
- 2013/14, **Lundqvist, H.:** "Is it worth it? On the returns to holding political office"
- 2013/15, **Ahlfeldt, G.M.; Maennig, W.:** "Homevoters vs. leasevoters: a spatial analysis of airport effects"
- 2013/16, **Lampón, J.F.; Lago-Peñas, S.:** "Factors behind international relocation and changes in production geography in the European automobile components industry"
- 2013/17, **Guío, J.M.; Choi, A.:** "Evolution of the school failure risk during the 2000 decade in Spain: analysis of Pisa results with a two-level logistic model"
- 2013/18, **Dahlby, B.; Rodden, J.:** "A political economy model of the vertical fiscal gap and vertical fiscal imbalances in a federation"
- 2013/19, **Acacia, F.; Cubel, M.:** "Strategic voting and happiness"
- 2013/20, **Hellerstein, J.K.; Kutzbach, M.J.; Neumark, D.:** "Do labor market networks have an important spatial dimension?"
- 2013/21, **Pellegrino, G.; Savona, M.:** "Is money all? Financing versus knowledge and demand constraints to innovation"
- 2013/22, **Lin, J.:** "Regional resilience"
- 2013/23, **Costa-Campi, M.T.; Duch-Brown, N.; García-Quevedo, J.:** "R&D drivers and obstacles to innovation in the energy industry"
- 2013/24, **Huisman, R.; Stradnic, V.; Westgaard, S.:** "Renewable energy and electricity prices: indirect empirical evidence from hydro power"
- 2013/25, **Dargaud, E.; Mantovani, A.; Reggiani, C.:** "The fight against cartels: a transatlantic perspective"
- 2013/26, **Lambertini, L.; Mantovani, A.:** "Feedback equilibria in a dynamic renewable resource oligopoly: pre-emption, voracity and exhaustion"
- 2013/27, **Feld, L.P.; Kalb, A.; Moessinger, M.D.; Osterloh, S.:** "Sovereign bond market reactions to fiscal rules and no-bailout clauses – the Swiss experience"
- 2013/28, **Hilber, C.A.L.; Vermeulen, W.:** "The impact of supply constraints on house prices in England"
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- 2013/30, **Wang, R.; Wang, W.:** "Dress-up contest: a dark side of fiscal decentralization"
- 2013/31, **Dargaud, E.; Mantovani, A.; Reggiani, C.:** "The fight against cartels: a transatlantic perspective"

- 2013/32, Saarimaa, T.; Tukiainen, J.: "Local representation and strategic voting: evidence from electoral boundary reforms"
- 2013/33, Agasisti, T.; Murtinu, S.: "Are we wasting public money? No! The effects of grants on Italian university students' performances"
- 2013/34, Flacher, D.; Harari-Kermadec, H.; Moulin, L.: "Financing higher education: a contributory scheme"
- 2013/35, Carozzi, F.; Repetto, L.: "Sending the pork home: birth town bias in transfers to Italian municipalities"
- 2013/36, Coad, A.; Frankish, J.S.; Roberts, R.G.; Storey, D.J.: "New venture survival and growth: Does the fog lift?"
- 2013/37, Giulietti, M.; Grossi, L.; Waterson, M.: "Revenues from storage in a competitive electricity market: Empirical evidence from Great Britain"

2014

- 2014/1, Montolio, D.; Planells-Struse, S.: "When police patrols matter. The effect of police proximity on citizens' crime risk perception"
- 2014/2, García-López, M.A.; Solé-Ollé, A.; Viladecans-Marsal, E.: "Do land use policies follow road construction?"
- 2014/3, Piolatto, A.; Rablen, M.D.: "Prospect theory and tax evasion: a reconsideration of the Yitzhaki puzzle"
- 2014/4, Cuberes, D.; González-Val, R.: "The effect of the Spanish Reconquest on Iberian Cities"
- 2014/5, Durán-Cabré, J.M.; Esteller-Moré, E.: "Tax professionals' view of the Spanish tax system: efficiency, equity and tax planning"
- 2014/6, Cubel, M.; Sanchez-Pages, S.: "Difference-form group contests"
- 2014/7, Del Rey, E.; Racionero, M.: "Choosing the type of income-contingent loan: risk-sharing versus risk-pooling"
- 2014/8, Torregrosa Hetland, S.: "A fiscal revolution? Progressivity in the Spanish tax system, 1960-1990"
- 2014/9, Piolatto, A.: "Itemised deductions: a device to reduce tax evasion"
- 2014/10, Costa, M.T.; García-Quevedo, J.; Segarra, A.: "Energy efficiency determinants: an empirical analysis of Spanish innovative firms"
- 2014/11, García-Quevedo, J.; Pellegrino, G.; Savona, M.: "Reviving demand-pull perspectives: the effect of demand uncertainty and stagnancy on R&D strategy"
- 2014/12, Calero, J.; Escardíbul, J.O.: "Barriers to non-formal professional training in Spain in periods of economic growth and crisis. An analysis with special attention to the effect of the previous human capital of workers"
- 2014/13, Cubel, M.; Sanchez-Pages, S.: "Gender differences and stereotypes in the beauty"
- 2014/14, Piolatto, A.; Schuett, F.: "Media competition and electoral politics"
- 2014/15, Montolio, D.; Trillas, F.; Trujillo-Baute, E.: "Regulatory environment and firm performance in EU telecommunications services"
- 2014/16, Lopez-Rodriguez, J.; Martínez, D.: "Beyond the R&D effects on innovation: the contribution of non-R&D activities to TFP growth in the EU"
- 2014/17, González-Val, R.: "Cross-sectional growth in US cities from 1990 to 2000"
- 2014/18, Vona, F.; Nicolli, F.: "Energy market liberalization and renewable energy policies in OECD countries"
- 2014/19, Curto-Grau, M.: "Voters' responsiveness to public employment policies"
- 2014/20, Duro, J.A.; Teixidó-Figueras, J.; Padilla, E.: "The causal factors of international inequality in co2 emissions per capita: a regression-based inequality decomposition analysis"
- 2014/21, Fleten, S.E.; Huisman, R.; Kilic, M.; Pennings, E.; Westgaard, S.: "Electricity futures prices: time varying sensitivity to fundamentals"
- 2014/22, Afcha, S.; García-Quevedo, J.: "The impact of R&D subsidies on R&D employment composition"
- 2014/23, Mir-Artigues, P.; del Río, P.: "Combining tariffs, investment subsidies and soft loans in a renewable electricity deployment policy"
- 2014/24, Romero-Jordán, D.; del Río, P.; Peñasco, C.: "Household electricity demand in Spanish regions. Public policy implications"
- 2014/25, Salinas, P.: "The effect of decentralization on educational outcomes: real autonomy matters!"
- 2014/26, Solé-Ollé, A.; Sorribas-Navarro, P.: "Does corruption erode trust in government? Evidence from a recent surge of local scandals in Spain"
- 2014/27, Costas-Pérez, E.: "Political corruption and voter turnout: mobilization or disaffection?"
- 2014/28, Cubel, M.; Nuevo-Chiquero, A.; Sanchez-Pages, S.; Vidal-Fernandez, M.: "Do personality traits affect productivity? Evidence from the LAB"
- 2014/29, Teresa Costa, M.T.; Trujillo-Baute, E.: "Retail price effects of feed-in tariff regulation"
- 2014/30, Kilic, M.; Trujillo-Baute, E.: "The stabilizing effect of hydro reservoir levels on intraday power prices under wind forecast errors"

- 2014/31, **Costa-Campi, M.T.; Duch-Brown, N.:** "The diffusion of patented oil and gas technology with environmental uses: a forward patent citation analysis"
- 2014/32, **Ramos, R.; Sanromá, E.; Simón, H.:** "Public-private sector wage differentials by type of contract: evidence from Spain"
- 2014/33, **Backus, P.; Esteller-Moré, A.:** "Is income redistribution a form of insurance, a public good or both?"
- 2014/34, **Huisman, R.; Trujillo-Baute, E.:** "Costs of power supply flexibility: the indirect impact of a Spanish policy change"
- 2014/35, **Jerrim, J.; Choi, A.; Simancas Rodríguez, R.:** "Two-sample two-stage least squares (TSTSLs) estimates of earnings mobility: how consistent are they?"
- 2014/36, **Mantovani, A.; Tarola, O.; Vergari, C.:** "Hedonic quality, social norms, and environmental campaigns"
- 2014/37, **Ferraresi, M.; Galmarini, U.; Rizzo, L.:** "Local infrastructures and externalities: Does the size matter?"
- 2014/38, **Ferraresi, M.; Rizzo, L.; Zanardi, A.:** "Policy outcomes of single and double-ballot elections"

2015

- 2015/1, **Foremny, D.; Freier, R.; Moessinger, M-D.; Yeter, M.:** "Overlapping political budget cycles in the legislative and the executive"
- 2015/2, **Colombo, L.; Galmarini, U.:** "Optimality and distortionary lobbying: regulating tobacco consumption"
- 2015/3, **Pellegrino, G.:** "Barriers to innovation: Can firm age help lower them?"
- 2015/4, **Hémet, C.:** "Diversity and employment prospects: neighbors matter!"
- 2015/5, **Cubel, M.; Sanchez-Pages, S.:** "An axiomatization of difference-form contest success functions"
- 2015/6, **Choi, A.; Jerrim, J.:** "The use (and misuse) of Pisa in guiding policy reform: the case of Spain"
- 2015/7, **Durán-Cabré, J.M.; Esteller-Moré, A.; Salvadori, L.:** "Empirical evidence on tax cooperation between sub-central administrations"
- 2015/8, **Batalla-Bejerano, J.; Trujillo-Baute, E.:** "Analysing the sensitivity of electricity system operational costs to deviations in supply and demand"
- 2015/9, **Salvadori, L.:** "Does tax enforcement counteract the negative effects of terrorism? A case study of the Basque Country"
- 2015/10, **Montolio, D.; Planells-Struse, S.:** "How time shapes crime: the temporal impacts of football matches on crime"
- 2015/11, **Piolatto, A.:** "Online booking and information: competition and welfare consequences of review aggregators"
- 2015/12, **Boffa, F.; Pingali, V.; Sala, F.:** "Strategic investment in merchant transmission: the impact of capacity utilization rules"
- 2015/13, **Slemrod, J.:** "Tax administration and tax systems"
- 2015/14, **Arqué-Castells, P.; Cartaxo, R.M.; García-Quevedo, J.; Mira Godinho, M.:** "How inventor royalty shares affect patenting and income in Portugal and Spain"
- 2015/15, **Montolio, D.; Planells-Struse, S.:** "Measuring the negative externalities of a private leisure activity: hooligans and pickpockets around the stadium"
- 2015/16, **Batalla-Bejerano, J.; Costa-Campi, M.T.; Trujillo-Baute, E.:** "Unexpected consequences of liberalisation: metering, losses, load profiles and cost settlement in Spain's electricity system"
- 2015/17, **Batalla-Bejerano, J.; Trujillo-Baute, E.:** "Impacts of intermittent renewable generation on electricity system costs"
- 2015/18, **Costa-Campi, M.T.; Paniagua, J.; Trujillo-Baute, E.:** "Are energy market integrations a green light for FDI?"
- 2015/19, **Jofre-Monseny, J.; Sánchez-Vidal, M.; Viladecans-Marsal, E.:** "Big plant closures and agglomeration economies"
- 2015/20, **García-López, M.A.; Hémet, C.; Viladecans-Marsal, E.:** "How does transportation shape intrametropolitan growth? An answer from the regional express rail"
- 2015/21, **Esteller-Moré, A.; Galmarini, U.; Rizzo, L.:** "Fiscal equalization under political pressures"
- 2015/22, **Escardíbul, J.O.; Afcha, S.:** "Determinants of doctorate holders' job satisfaction. An analysis by employment sector and type of satisfaction in Spain"
- 2015/23, **Aidt, T.; Asatryan, Z.; Badalyan, L.; Heinemann, F.:** "Vote buying or (political) business (cycles) as usual?"
- 2015/24, **Albæk, K.:** "A test of the 'lose it or use it' hypothesis in labour markets around the world"
- 2015/25, **Angelucci, C.; Russo, A.:** "Petty corruption and citizen feedback"
- 2015/26, **Moriconi, S.; Picard, P.M.; Zanaj, S.:** "Commodity taxation and regulatory competition"
- 2015/27, **Brekke, K.R.; García Pires, A.J.; Schindler, D.; Schjelderup, G.:** "Capital taxation and imperfect competition: ACE vs. CBIT"

- 2015/28, Redonda, A.:** "Market structure, the functional form of demand and the sensitivity of the vertical reaction function"
- 2015/29, Ramos, R.; Sanromá, E.; Simón, H.:** "An analysis of wage differentials between full-and part-time workers in Spain"
- 2015/30, Garcia-López, M.A.; Pasidis, I.; Viladecans-Marsal, E.:** "Express delivery to the suburbs the effects of transportation in Europe's heterogeneous cities"
- 2015/31, Torregrosa, S.:** "Bypassing progressive taxation: fraud and base erosion in the Spanish income tax (1970-2001)"
- 2015/32, Choi, H.; Choi, A.:** "When one door closes: the impact of the hagwon curfew on the consumption of private tutoring in the republic of Korea"
- 2015/33, Escardíbul, J.O.; Helmy, N.:** "Decentralisation and school autonomy impact on the quality of education: the case of two MENA countries"
- 2015/34, González-Val, R.; Marcén, M.:** "Divorce and the business cycle: a cross-country analysis"
- 2015/35, Calero, J.; Choi, A.:** "The distribution of skills among the European adult population and unemployment: a comparative approach"
- 2015/36, Mediavilla, M.; Zancajo, A.:** "Is there real freedom of school choice? An analysis from Chile"
- 2015/37, Daniele, G.:** "Strike one to educate one hundred: organized crime, political selection and politicians' ability"
- 2015/38, González-Val, R.; Marcén, M.:** "Regional unemployment, marriage, and divorce"
- 2015/39, Foremny, D.; Jofre-Monseny, J.; Solé-Ollé, A.:** "'Hold that ghost': using notches to identify manipulation of population-based grants"
- 2015/40, Mancebón, M.J.; Ximénez-de-Embún, D.P.; Mediavilla, M.; Gómez-Sancho, J.M.:** "Does educational management model matter? New evidence for Spain by a quasiexperimental approach"
- 2015/41, Daniele, G.; Geys, B.:** "Exposing politicians' ties to criminal organizations: the effects of local government dissolutions on electoral outcomes in Southern Italian municipalities"
- 2015/42, Ooghe, E.:** "Wage policies, employment, and redistributive efficiency"

2016

- 2016/1, Galletta, S.:** "Law enforcement, municipal budgets and spillover effects: evidence from a quasi-experiment in Italy"
- 2016/2, Flatley, L.; Giuliatti, M.; Grossi, L.; Trujillo-Baute, E.; Waterson, M.:** "Analysing the potential economic value of energy storage"
- 2016/3, Calero, J.; Murillo Huertas, I.P.; Raymond Bara, J.L.:** "Education, age and skills: an analysis using the PIAAC survey"
- 2016/4, Costa-Campi, M.T.; Daví-Arderius, D.; Trujillo-Baute, E.:** "The economic impact of electricity losses"
- 2016/5, Falck, O.; Heimisch, A.; Wiederhold, S.:** "Returns to ICT skills"
- 2016/6, Halmenschlager, C.; Mantovani, A.:** "On the private and social desirability of mixed bundling in complementary markets with cost savings"
- 2016/7, Choi, A.; Gil, M.; Mediavilla, M.; Valbuena, J.:** "Double toil and trouble: grade retention and academic performance"
- 2016/8, González-Val, R.:** "Historical urban growth in Europe (1300–1800)"

