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PUBLIC SECONDARY SCHOOLS IN THE SPANISH REGION OF MADRID

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**BILINGUAL EDUCATION AND SCHOOL CHOICE: A CASE STUDY OF
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ABSTRACT: In the academic year of 2004-2005 the Spanish region of Madrid began to implement a bilingual educational programme in public schools. Currently, 45% of the public educational system (primary and secondary) participates in the bilingual programme of the Community of Madrid (hereinafter MBP). One of the objectives sought by this programme, but not the only one, is to make the study of a foreign language accessible to students from economically less favoured families (who have greater difficulty in meeting the cost of private language tutoring). Consequently, our study aims to analyse whether, as proposed, students from disadvantaged socioeconomic backgrounds effectively participate in the MBP. To comply with this objective, we estimate a model directed at identifying which factors influence the selection of a bilingual public school by families. The results obtained reveal that the MBP has led to the sorting of students by socioeconomic and cultural status, causing cream skimming within the public education sector in Madrid. This is due to the influence in the choice of a bilingual public school of factors such as the educational level and the mother's immigrant status, the occupational level of the parents and the cultural capital of the household.

JEL Codes: I24, I28

Keywords: Bilingual education, school choice, cream skimming, PISA 2015, Regional Assessment of Educational Competences, Spanish region of Madrid

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1. Introduction

There is no doubt that Spain is one of the European countries with greatest deficiencies with regard to foreign language skills. This has been historically constant and doubtless has its roots in the lengthy isolation experienced during the forty years of the Francoist dictatorship. Yet despite the time evolved from then on, and the notable internationalisation of Spanish society following its entry into the European Union, the linguistic gifts of Spaniards are far from satisfactory. This is made clear by European reports on the subject and, in particular, the first European Survey on Language Competences (ESLC) of 2011. This was conceived with the aim of establishing a European indicator of linguistic competence and providing member states with comparable information on the foreign language skills of European students when completing Compulsory Secondary Education (ISCED 2) or the second year of Post-compulsory Secondary Education (ISCED 3)¹. The results of this survey clearly showed the weakness of Spain in the three linguistic competencies evaluated in the English language (oral, reading and written comprehension). In all of these the position of Spanish students is below average. In particular, the percentage of students with a level of B in English ranges between 24% and 30%, depending on the skill. These percentages are far from 50%, which is the objective initially proposed by the European Commission as a possible point of reference for the European Indicator of Linguistic Competence. This is despite the fact that Spain (and Belgium) are the only countries among the participants in which the teaching of a foreign language is obligatory from infant education onwards. Spanish adolescents obtain their best results in reading comprehension and their worst in oral comprehension.

A variety of reasons may explain these results. Prominent among these is the teaching methodology employed for many years, which has insisted on grammatical content and reading and writing comprehension, and the scanty exposure to the use of English in the Spanish social context, among others (see INEE, 2012).

This conclusion, far from reflecting merely an educational deficit of the Spanish population, has highly negative consequences in economic terms, especially in an increasingly globalised financial-economic context, rising international mobility and

¹ 14 European countries participated in the study: Belgium, Bulgaria, Croatia, Estonia, France, Greece, Holland, Malta, Poland, Portugal, Slovenia, Spain, Sweden and the United Kingdom (England).

increasing migratory flows. This is evidenced by a study of the European Commission which demonstrates that Spain is one of the countries of the Union taking least advantage of export possibilities, due to the deficit in language training (Hagen *et al.*, 2006).

Against this background, in the last fifteen years there has been a significant about-turn in the position of the Spanish educational authorities, hitherto somewhat passive with regard to the linguistic shortcomings of the population,. The starting point of this new direction dates back to 1996, when the Ministry of Education and Science and the British Council signed an agreement whose objective was the implementation of a Bilingual Education Programme in public schools, to be developed from the first academic year of infant education onwards (Dobson *et al.*, 2010).

Another step forward in the generalisation of the study of a second language was made with the passing of the LOE (Organic Education Law) in 2006, this being the first Spanish educational legislation to introduce the compulsory study of a foreign language from infant education onwards.

Finally, the rapid extension of educational bilingualism programmes in schools financed with public funds (public and grant-maintained schools) in a considerable number of Spanish Autonomous Communities since the 2004/2005 academic year, clearly reflects the political will for future generations to overcome the linguistic barriers which seriously hinder the capacity to strengthen relationships, not only economic but also social, political and cultural, with Spain's immediate neighbours².

Consequently, Spain has come to form part of a European initiative aimed at enabling EU citizens to communicate in two community languages in addition to their mother tongue (European Council, 2002). Based on this objective, in the last two decades Content and Language Integrated Learning (hereinafter CLIL) courses have become commonplace throughout Europe. CLIL refers to the learning programmes in which the mother tongue (L1) and a foreign language (L2) are used within the same lesson, in order to foster both content and language learning (Eurydice, 2006). These programmes aim to increase the level of exposure to the foreign language without devoting excessive time to its teaching

² In 2017 eleven of the seventeen Spanish Autonomous Communities offered bilingual education programmes (Andalusia, Aragon, Asturias, the Canary Islands, Cantabria, Castile and León, Extremadura, Madrid, Murcia, Navarre, La Rioja). The calendar for implementation has been different in each territory, beginning in 2004 in Extremadura, Madrid and Murcia and finalising in 2017, when Ceuta and Melilla were incorporated to this trend (see <http://www.ebspain.es/index.php/observatorio-eb-2>).

(see the reports which since 2005, have been produced by the Eurydice network on the teaching of foreign languages in Europe³).

Here, the Autonomous Community of Madrid (Spain) is one of the undisputed leaders in this new stage. Its support for the implementation of programmes of educational bilingualism (Spanish/English) has been, as explained below, the most intensive in the country.

This radical change in the approach to language teaching gives rise to new concerns with regard to its possible effects in the field of the efficiency and equity of the education system itself. Some social collectives have shown concern for the consequences which these programmes may have in the increase of academic and socioeconomic segregation. Thus, in a recent report, the Spanish Teachers' Association *Acción Educativa* questions the MBP on the basis that it is diverting funds from the neediest students and directing them to a minority of students who, due to their social status, are capable of taking most advantage from the programme⁴.

Given this controversy, the objective of the present study is to identify which factors determine the selection of a bilingual school. The aim is to establish whether there exist individual characteristics of students or their background which decisively influence the choice of a bilingual school in the Community of Madrid. In our judgement this is a question of great importance when evaluating the functioning of this type of programme and, therefore, the suitability of its extension to more Communities and/or educational stages. To date, however, studies performed in this regard are practically non-existent in the Economics of Education field.

One of the purposes of this paper is to contribute to filling this gap. A second contribution of the study is offered by the possibility of employing two databases: PISA 2015 and the 2017 Regional Assessment of Educational Competences of Madrid, which will permit us to test the robustness of the estimations.

³ Concretely, there exist four editions of the publication *Key data on teaching languages at school in Europe* the last of these published in 2017 (European Commission/EACEA/Eurydice, 2017). Their content provides a comprehensive panorama of the current systems of language teaching in 32 European countries. The study is concerned with diverse aspects of foreign language teaching, such as organisation, participation levels and the permanent training of foreign language teaching staff. As a whole, this publication supplies answers to a series of questions comprising the nucleus of European cooperation on the subject of education and training.

⁴ See <http://accioneducativa-mrp.org/el-programa-bilingue-a-examen>.

On a different point, our study focuses exclusively on public schools, providing us with a very homogenous sample in terms of teacher selection policies, student/teacher ratios and the regulation of the internal functioning of schools, among other aspects.

The results of our study indicate that the implementation of the MBP is leading to a socioeconomic stratification in the public education network of the Community of Madrid. This is due to the importance of factors which influence the choice of this type of school by families. Such factors include the immigration status of the mother, the occupational level of the progenitors and the cultural capital of the household.

The study is structured in the following way. After this introduction, section 2 reviews the studies of bilingual educational programmes, focusing attention on those which compare the profiles of students according to their participation in these programmes. Section 3 describes the MBP. Section 4 presents the databases employed, develops the descriptive analysis and explains the methodological approach. Section 5 details the results obtained and, finally, section 6 presents our conclusions.

2. Literature review

The concern for the effects of bilingual education programmes⁵, as occurs with other questions related to education, is shared by academics in different areas of knowledge (principally philologists, but also educational economists and even neurologists⁶). The

⁵ When reviewing the studies of educational bilingualism, various interpretations of the term educational bilingualism exist in the literature (Nikula and Marsh, 1998, Admiraal, Westhoff and De Bot, 2006. One of these is that which considers bilingual education to be the situation in which children belonging to linguistic minorities receive their education (or part of it) in their mother tongue (L1), which is different from the official language of the country (L2). These educational initiatives have taken place in countries which historically constituted the destination of significant volumes of an immigrant population with a language different to the official language of the host country (the case of the United States and the Hispanic community is the most representative), and countries inhabited by numerous native population groups, as is the case of some countries in Latin America and Africa. Other examples are those territories which are multilingual for historical reasons, such as the former European colonies or the states created following the dissolution of the USSR. In distinction to this meaning, another takes bilingualism to be the educational programmes in which some of the subjects of the school curriculum are taught in a foreign language (L2). This educational model is that implemented in Spain and various European countries in the last fifteen years.

⁶ The recent work by Spitzer (2016) analyses the implications of bilingualism for the development, functioning and cognitive deterioration of the brain. Within the academic sphere there exists a line of research, known as the Economics of Language, dedicated to the study of how economic processes interact with language. Some authors consider that the Economics of Language may shed light on certain linguistic aspects such as those concerning the evaluation of public policies related to languages. Concretely, the

multidimensional nature of bilingualism explains this multidisciplinary interest. In the case of educational economists, interest in the subject is related to the implications which the knowledge of a second language may have for the economic wellbeing of individuals and, consequently, for social welfare. This approach views the command of languages as an important part of the human capital of a society.

This is because these skills satisfy the three *Beckerian* requirements for human capital. These skills are embodied in the person, they are productive in the labour market and they are developed as the result of investment of time and monetary resources (Patrinos and Velez, 2009).

In other words, from the economic perspective the language skills of the population constitute a further component of the aggregate production of an economy. Empirical studies evidencing the influence of the knowledge of a foreign language, principally English, on the earnings of individuals (Williams, 2011; Wang *et al.*, 2017), on labour market opportunities (Kossoudji, 1988) or on international trade (Ku and Zussman, 2010, Lohmann, 2011) support this view⁷.

Studies of the effects of bilingual educational programmes in the international context have been stimulated by the extension of the CLIL approach which has gained force in Europe in recent decades. Most such work has concentrated on evaluating the effects of CLIL courses on the promotion of diverse educational competences (both those concerning the command of languages and those related to diverse subjects in the school curriculum). Examples of this literature are the works by Admiraal, Weshoff and De Bot (2006), Lorenzo, Casal and Moore (2010), Anghel, Cabrales and Carro (2013), Sotoca Sienes and Muñoz Hueso (2015), Dallinger *et al.* (2016), Ruiz (2016), Surmont *et al.* (2016), Tamariz and Blasi (2016) and Montalbán (2016), among others⁸.

analytical tools belonging to Economics may be very useful in the systematic identification and measurement of the advantages and disadvantages of alternative linguistic policies (see Grin, 2010).

⁷ Williams (2011) estimates that knowledge of a foreign language, principally English leads to a salary increase of between 3% and 5% in various European countries. Other studies which have demonstrated the economic value of languages, especially English, are those by Ginsburgh and Prieto-Rodríguez (2011), Grin (2001) and Casale and Posel (2011).

⁸ Additional to these studies is research analysing the effect of other programmes in which bilingualism takes concrete form in teaching partly in the mother tongue of the child (L1), when this differs from the official language of the country (L2). Some examples of studies of this type are those by Patrinos and Velez (2009), Adesope *et al.* (2010), Slavin *et al.* (2011), Chin *et al.* (2013), Ivlevs and King (2014), Hynsjö and

Nevertheless, there are very few studies of the effect of CLIL on the equity of access, that is to say on the opportunities that students from different socioeconomic backgrounds have of participating in bilingual programmes. This question, studied tangentially in some studies undertaken by philologists and alluded to below, has not so far constituted the subject of any of the studies of CLIL undertaken in the Economics of Education field.

One initial aspect must be taken into consideration when analysing the equality of access to bilingual schools; the CLIL programmes which have been introduced in Europe in the last fifteen years have been implemented in schools maintained by public funds, and thus, in principle, there exists no reason to believe that the system is selective in economic terms (these schools are free for families). All students, independently of their family background, may access a bilingual programme⁹ in equal conditions (Marsh, 2002).

However, it must be taken into account that, despite the fact that no economic barrier exist to accessing CLIL programmes, their pursuit is very demanding in academic terms, as they require the learning of some subjects (such as Sciences) in a foreign language (L2), at the same time as acquiring knowledge of the second language. This can lead to processes of self-selection on the part of families who, in the final analysis, are those who choose the educational centre in which they wish their children to be taught. Families of students with learning difficulties (usually from disadvantaged backgrounds¹⁰) may elect to send their children to monolingual schools, with the objective of reducing the probability of failure at school.

If this is the case, CLIL would be encouraging the creation of stratification within the public education system, as it contributes to creating an elite of bilingual youths (those who access the bilingual system and belong to more privileged socioeconomic backgrounds), compared to those unable to confront the greater academic demands of the

Damon (2016), Mohapatra (2016), Seid (2016), Taylor and von Fintel (2016) and Ramachandran (2017). To this research, undertaken by economists of education, should be added that by philologists and pedagogues, such as Lavoie (2008), Benson (2010a, 2010b), Truong (2012) and Walter and Dekker (2011). Such work forms part of a research line known as the literature of bilingual education.

⁹ This situation differs from that existing in the years prior to the implementation of CLIL in publicly financed schools, when bilingual education was only provided in independent private schools (accessible solely to students from more privileged economic backgrounds).

¹⁰ There exists a prolific literature, headed by the seminal work of Coleman et al. (1966), which has demonstrated the close relationship between academic success and the sociocultural background of the student.

bilingual programme (those from the most disadvantaged economic and cultural strata) (Fernández Sanjurjo et al., 2018).

This would promote a process of *cream skimming*, similar to that evidenced by the literature on the choice of private schools financed with public funds (Levin, 1998; Lankford and Wycokff, 2001; Dee and Fu 2004, Böhlmark et al., 2016, among others).

This process could be developed yet further, to the extent to which, as various studies have demonstrated, students of a higher economic position attend extracurricular private language classes with greater frequency than students from lower economic strata (Alejo and Piquer-Píriz, 2016), thereby favouring their command of L2 and, consequently, the obtaining of good academic results in the bilingual stream.

The works by Bruton (2011 and 2013, which critically review various studies of the effects of the CLIL approach, have noted that in schools with optional CLIL streams, it was the parents of higher socioeconomic status who opted to place their children in CLIL programmes. In turn, Apsel (2012), argues that CLIL streams in Germany are in fact doubly selective: not only are pupils selected on entry but there are also exit doors for them to abandon their CLIL learning, as German students have the statutory right to leave the CLIL stream at the beginning of each school year, in order to follow their curriculum in German.

One aspect worthy of note is that the selection of students in bilingual schools is not the result of the education system but is linked instead to students and their families. In fact, there are no economic criteria for the exclusion of students from bilingual streams in the Spanish education system; students may choose to enter a bilingual stream as long as their school offers CLIL (Fernández Sanjurjo et al., 2018). Thus, some authors argue that there exists an implicit self-selection in the choice of a bilingual stream (Bruton, 2011).

A notable study, in that it is the only research explicitly directed at empirically analysing the composition of the student body in bilingual schools in Spain, is that by Broca (2016). This paper reports on a survey intended to profile CLIL and non-CLIL student cohorts on entry into secondary state schools in the Autonomous Community of Andalusia, in southern Spain. The key research question was whether the profile of students in the CLIL groups was significantly different from their non-CLIL counterparts at the start of their

programmes of study. Her analysis, based on descriptive statistics, led her to conclude that CLIL participants tend to obtain much higher marks at the start of their programme and to have higher expectations about their future use of English. Another result of this study is that CLIL students are far more strongly influenced by their parents when making the choice between CLIL or mainstream programmes and, like their non-CLIL counterparts, they tend to think that the CLIL programme is selective.

A final result to be emphasised is that in the CLIL group there are very few students who either failed the previous year or who only obtained a 'pass' overall, in English or in Spanish. The group with the highest percentage of 'excellent' grades is the CLIL in English grouping. The non-CLIL group is much more diverse, but 50 per cent fell within either the 'fail' or merely the 'pass' categories in English, with the largest group being 'fail'. However, there was also a significant percentage of students with high grades. This led the author to conclude that CLIL programmes appear to exclude less able students rather than select the most able, an interesting finding.

On the basis of this contextual framework, our study aims to research these questions in greater depth, attempting to identify empirically which factors determine participation in the MBP. The special characteristics of this programme are detailed below.

3. The Bilingual Programme of the Community of Madrid

The MBP was first implemented in the 2004-2005 academic year, in public schools providing primary education. The extension of this programme to all schools was performed gradually, beginning in the first year of primary education, to then extend to the remaining years, one academic year per year. Thus, the first twenty-six public bilingual primary schools, which began to teach the bilingual programme in the 2004-2005 academic year, completed bilingualism in the 2009-2010 academic year (when children reached the sixth year).

With regard to secondary schools, bilingualism was initiated in the 2010/2011 academic year. Following its progressive implementation during the four years of compulsory secondary education, the MBP was also extended in the 2014-2015 academic year to the two years of post-compulsory secondary education. Lastly, in the 2015-2016 academic year the second year of non-compulsory secondary education was reached by those

students who had embarked upon the bilingual programme twelve years earlier (in the 2004-2005 academic year); these youths were the first to have undertaken all their education (compulsory and non-compulsory) in a bilingual programme.

Currently, the MBP covers 521 public schools (369 primary schools and 152 secondary schools), in addition to 204 grant-maintained, 5 vocational schools and 35 early education schools. These represent 46.6% of public primary schools, 50.7% of public secondary schools and 48.5% of grant-maintained schools (see Table 1).

The number of students on the MBP exceeds 290,000, with 114,096 in public primary schools, 81,325 in grant-maintained primary schools, 74,796 in public secondary schools and 19,860 in secondary grant-maintained schools (see Figure 1). The financing of bilingual teaching in the Community of Madrid has enjoyed a consolidated and increasing budget which, in the 2016-2017 academic year, amounted to almost 36 million euros.

Currently, the regulation of bilingual public schools is determined by the 5958/2010 Regional Act. In line with this legislation, all primary education bilingual public schools must teach in English and, completely in that language, at least three subjects from the school curriculum (with the exception of Mathematics and Spanish, which can only be taught in Spanish). Furthermore, the teaching of English is reinforced, as this subject receives five hours of tuition per week (in monolingual schools only three hours a week are dedicated to English).

[Table 1 around here]

[Figure 1 around here]

With regard to compulsory secondary education, public schools follow the same structure as in primary education, concerning the selection of schools, the progressive implementation course by course and teacher training. Students from non-bilingual primary schools must accredit a B1 level (B2 if they access the third or fourth year of compulsory secondary education) of the CEFRL (Common European Framework of Reference for Languages) in order to enter a bilingual public secondary school.

For a public school to participate in a primary bilingual programme, it must present to the Regional Ministry of Education an educational programme which has the majority support of the Cloister of Teachers and of the Academic Council of the centre. A second requirement is that it must have a minimum number of teachers with the credentials necessary to teach subjects in English.

Those teachers wishing to give classes in MBP subjects must obtain the language credential in English by passing linguistic tests at the C1 level, according to the CEFRL. As a result, teachers qualified to teach subjects in English in bilingual programmes receive a productivity bonus¹¹.

Strong support for MBP staff is provided by conversation auxiliaries. These are young graduates from English-speaking countries who reinforce the learning of foreign languages, promote cultural values and complement the work of classroom teachers. Conversation auxiliaries dedicate 16 hours weekly to supporting foreign language teaching in the schools to which they are assigned.

Lastly, the school principal is responsible for supervising the correct development of the MBP. In addition, bilingual schools possess further resources, such as specific learning material, digital whiteboards, certificates of linguistic competence in English with international recognition for students and participation in European programmes.

4. Database, descriptive analysis and methodology

4.1 Databases: descriptive analysis

Two databases are employed in this study. On the one hand, the evaluation performed by PISA (Programme for International Student Assessment) and elaborated by the OECD, in its 2015 edition. On the other hand, our study uses the Regional Assessment of Competences of Madrid (hereinafter, RACM). The latter is undertaken by the Community of Madrid for students in the final year of compulsory schooling (in its 2017 edition).

¹¹ Infant and primary teachers (who provide over 15 teaching hours weekly) receive 131.13 euros monthly and secondary teachers (who provide over 10 teaching hours weekly) 167.84 euros monthly, or approximately 5-6% of their annual salary.

The PISA 2015 database we use is that of the Community of Madrid, with added administrative information supplied by the Regional Ministry of Madrid for the year of initiation of each school in the MBP. Given that for the year 2015 only public schools had the programme active for all the compulsory level, we shall work with the subsample of schools in public ownership. The final database of the study comprises 1,067 observations from 26 secondary schools, of which 10 were participants in the MBP¹².

With regard to the RACM database for 2017, of a census nature, the study uses only the part corresponding to schooling in the public network, for it to be comparable with the PISA database¹³. The final database comprised 29,012 observations from 303 schools (90 of which were implementing the MBP).

Given that the objective of this study is to determine the principal factors governing the choice of bilingual school, and considering that in Spain the principal decision regarding school choice is taken at the moment of access to infant education, we believe that the factors to be taken into account should not vary in time (or are relatively rigid over time). As a result, three groups were constituted: variables regarding the student (S), his or her progenitors (P) and the household (H) (see Table 2).

The descriptive analysis in Table 2 permits the conclusion that their values are very similar in the two databases employed (PISA and RACM), allowing us to compare the results obtained with the two databases, with the aim of testing the robustness of the conclusions. As Table 2 shows, approximately one third of public secondary schools implemented the MBP (36% in PISA and 39% in the RACM. With regard to the principal student characteristics, 24% were first- or second-generation immigrants and 14% had repeated one or more years at primary school. Finally, it is fitting to emphasise that the education of the mother exceeds, on average, that of the father, and that the cultural capital of the household is relatively high (2.43 out of 4 points).

¹² Of the sixteen monolingual schools, seven had begun to apply the programme recently and, consequently, the policy did not affect their students.

¹³ For more detailed information on the RACM test, see Annex 1.

[Table 2 around here]

Table 3, in turn, compares the characteristics of students from bilingual and monolingual public schools. It can be seen that the student body of bilingual schools is more select, in socioeconomic and academic terms, for all the variables studied. In these schools the percentage of students repeating an academic year and of immigrants is lower, the educational and occupational level of the parents is higher and the availability of cultural items in the household is greater. The results are the same whether the PISA or RACM database is used.

[Table 3 around here]

4.2 Databases: imputation of missing values

The exploratory analysis of the data revealed that there were a significant number of missing values in the two databases. Consequently, we decided to perform an imputation analysis. In the case of the PISA database 14% of the sample of students did not respond to the majority of the questions¹⁴. Thus, the real initial sample is 916 observations. After analysing the distribution of missing values and the application of the dichotomous correlations test recommended by Perez (2004) and Carpenter *et al.* (2007), among others, it can be stated that their generation has random characteristics (MAR - *Missing At Random* - , Rubin, 1976)¹⁵.

Consequently, we imputed, via the technique of multiple imputation, the three variables permitting a greater sample to be obtained: the age of starting infant education (6%); repetition at primary level (5%) and the maximum occupational level of the progenitors (2%). For the remaining variables, imputation generated marginal increases in the sample and we decided to maintain the original observations. The principal advantages of this stochastic technique are that it permits full use of the data, the obtaining of unbiased estimators, the reflection of the uncertainty which partial non-response introduces in the

¹⁴ The values of missing values for each variable is available to readers upon request.

¹⁵ Prior to the calculation of the correlation coefficients we tested for the absence of atypical values on the basis of boxplots. All this prior analysis is available to readers upon request.

estimation of the parameters and the preservation of the dispersion of the imputed variable (Rubin, 1996). Following the literature, we apply a multiple estimation using the MICE algorithm, systematised for the STATA programme (version 13), through the *mi impute chained*¹⁶ equation, which employs chained equations. The imputation applied here generates possible values from a series of univariant models in which a single variable is imputed on the basis of a group of variables (Royston and White, 2011)¹⁷.

In this case, and following the recommendation of Rubin (1996) and Acock (2005), we employed all the variables available in the model to estimate the non-observed data using two different empirical methods (OLS, logit and ordered logit), according to the particular characteristics of each variable (see Table 4).

[Table 4 around here]

Each missing observation generates 25 imputed observations ($m=25$) on the basis of the chosen estimation, taking into account that the maximum percentage of non-observed observations is 22.12% for the case of the “age of beginning infant education”. Finally, we calculated the test of differences of averages between the original variables and those imputed. No significant result was obtained and an analysis of the kernel density functions confirmed that the distribution of the imputed variables replicated the behaviour of the original variables.

In the case of the RACM database, there exists, approximately, a 50% total of non-response in the questionnaires for students and families. This result advises against the application of an imputation technique. Consequently, we decided not to impute and to perform the estimations using the original database.

¹⁶ The command allows other approximations to be applied. For example, *mi impute mvn* which assumes a normal distribution of all the variables to be imputed and can additionally be estimated as the robustness of the proposed estimate. In this case it was not possible, given the non-normal distribution of some of the variables to be imputed.

¹⁷ For a practical review of how to apply this methodology, see Mediavilla (in press).

4.3 Estimation methodology

The estimations of our study were performed taking into consideration that our dependent variable (participation in the MBP) is a dummy (0/1). Thus, logit models were applied. These (non-linear) regression models required the adoption of a formulation which obliges the estimated values to be between 0 and 1 and the employment of a logistic density function such as the following:

$$P_i = \frac{1}{1 + e^{-z}}$$

where Z takes into account the independent variables (X). The results presented in section 5, for the case of the PISA 2015 database, are the average values, of both the coefficients and the standard error, which were calculated applying the rules established by Rubin (1987) for the combination of the estimations of the 25 bases.

5. Results

Table 5 presents the results of four models which attempt to explain the factors guiding the choice of a bilingual education school in the Community of Madrid (four models applied to the PISA database and a further four using the RACM database). It should be remembered that our data only include public schools, and consequently the dichotomy proposed is a bilingual public school in relation to a non-bilingual public school. The exclusion of private schools from our analysis has in its favour the fact that other elements guiding school choice (such as their religious orientation, their model of school management or their prices, for example) do not need to be taken into consideration in our estimations. This prior selection makes the construction of the database more homogeneous. In turn, it also means a reduction of the total working observations.

The specification of the models is based on the contributions of earlier literature with regard to the variables which may influence school choice (student, progenitors and

household)¹⁸. Furthermore, it must be underlined that the models only incorporate variables which approximate factors invariable over time (see Table 5).

The results in Table 5 indicate that the variables approximating household characteristics display a clear influence on the choice of a bilingual school. Thus, the immigrant status of the mother shows a negative influence, independently of the variables introduced into the model. Likewise, the educational and occupational level of the parents is always positive. Moreover, the children of immigrant mothers are less likely to choose a bilingual school.

In turn, students from families in which the progenitors are more highly qualified are more likely to attend a bilingual public school. Finally, both the number of books and the index which attempts to capture the cultural capital of the family and the ESCS index (which approximates the socioeconomic level of the family) positively influence the preference for a bilingual public school. With regard to the variables of individuals, only repetition in primary school proves to be significant and negative.

[Table 5 around here]

The previous results, analysed together, permit us to highlight the importance of the general socioeconomic situation of students in their access to the MBP. Adolescents from more privileged socioeconomic and cultural backgrounds are more likely to study in a bilingual public school than those belonging to less favoured socioeconomic strata. In summary, the analysis of the influence of family socioeconomic level on school choice suggests that there is no equalisation of opportunities in access to the MBP or, alternatively, that these opportunities are considerably reduced for poorer families.

This last result makes clear that the extension of the programmes of educational bilingualism which have been implemented in the Community of Madrid in the last fifteen years, far from favouring participation in these programmes by students who cannot afford private language classes (one of the objectives sought in their

¹⁸ This literature is abundant in the context of the choice between public and private schools (grant-maintained private schools and independent private schools). See, for example, Lankford and Wyckoff (1992), Escardíbul and Villarroya (2009), Dearden, Ryan and Sibieta (2011), Chakrabarti, R. (2013) and Mancebón-Torrubia and Ximénez-de-Embún (2014), among others.

implementation), are contributing to *cream skimming* within the network of public schools providing compulsory education: the most socioeconomically select students have abandoned monolingual public schools, to mostly concentrate in bilingual schools. It is important to emphasise, however, that this segmentation is not due to the design of the MBP, since this does not incorporate any criterion of economic or cultural selection of the participants. It is instead family preference which appears to cause this self-selection.

Finally, we must underline that although these results only express an association among variables and by no means causality, the study performed provides us with some patterns regarding possible self-exclusion from the MBP by disadvantaged students. This should be researched in greater depth in the future, in order to mitigate the negative effects which may be produced in the field of equity.

6. Conclusions

In recent years the Community of Madrid has implemented one of the most important educational innovations to have taken place in Spain in the last fifteen years, namely the introduction of bilingual educational programmes in schools maintained with public funds. The intensity with which this has been performed is unquestionable. In only a few years the programme of Spanish-English bilingualism has been extended to reach almost 50% of all publicly financed primary and secondary schools in Madrid.

A process of these characteristics necessarily generates numerous doubts concerning the consequences it may have in terms of both the efficiency and the equity of the education system. This study has analysed whether a bilingual education programme implemented in public schools promotes equal opportunities in access to the potential benefits provided by the knowledge of a foreign language (principally English).

A concern surrounding the implementation of these programmes is that they may contribute to the generation of student sorting. This means the creation, within the public education sector, of schools of first and secondary category concerning the composition of their student bodies. The greater difficulty some students have in studying certain subjects in a second language may lead to the families of such children excluding

themselves from the potential benefits of studying in a widely used international language, namely English.

Given that many studies have demonstrated that academic difficulties are associated with less favoured socioeconomic backgrounds¹⁹, the self-exclusion of these collectives from bilingual programmes would only perpetuate, and even widen, initial educational inequalities. This would be reinforced by peer effects, that is to say the concentration of more academically select students in bilingual public schools would deprive educationally disadvantaged students (grouped in monolingual schools) from the positive externalities generated by the best students.

The present study has examined this question from an empirical perspective. To this end we have analysed the factors determining the choice of a bilingual educational school in distinction to a traditional centre. The models estimated show that the probability of attending a bilingual school is higher for students with a more advantaged socioeconomic and cultural position.

These results show that the free supply of bilingual education is not in itself sufficient to equalise opportunities of accessing knowledge of a foreign language. The non-monetary costs associated with the study of a second language appear to mostly influence children from a disadvantaged socioeconomic background and who are, in turn, most likely to suffer school failure. Given that the choice of school (monolingual or bilingual) is made by the progenitors, our results appear to support the hypothesis that families from a more impoverished socioeconomic background are not aware of the benefits (economic and non-economic) which knowledge of a second language, especially English, may have for the future of their children.

Households in the highest positions on the economic scale do appear, however, to correctly appreciate those benefits and award assign them, in addition, a greater value than the non-monetary costs associated with the learning of a foreign language. If this hypothesis is correct, the implementation of bilingual education programmes, such as the MBP, should be accompanied by a commitment to raising awareness of those benefits in the most vulnerable segments of the population and of additional incentives which would

¹⁹ Two excellent reviews of the causes of school dropout are those by Rumberger and Lim (2008) and Hunt (2008),

permit the demand from such groups to be stimulated. Thus, what appears important to us is to emphasise that actions must be directed at the demand for, and not only the supply of, bilingual education. The socioeconomic and cultural sorting which these programmes introduce within the public education system can only be inverted in this way. Finally, we believe it is important to underline that such interventions should be accompanied by other policies permitting the minimisation of the risk of school failure imposed by study in a non-maternal language (reduction in class size and programmes of academic support aimed at educationally disadvantaged children, among others).

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Table 1. Evolution of number of schools in the MBP

Bilingual schools in the Community of Madrid	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Primary schools *	26	80	122	147	180	206	242	276	298	318	336	353	360	369
Secondary schools *	2						32	64	81	91	98	110	134	152
Vocational training centres *													4	5
Infant schools *														35
Grant-maintained schools					25	45	71	96	122	141	163	181	193	204

(*) Public schools.

Source: Regional Ministry of Education and Research. Madrid.

Table 2. Descriptive analysis (only public schools)

Variables	Average (PISA)	Min-Max	Average (RACM)	Min-Max
Dependent				
Bilingual public school ^a	0.39	0 – 1	0.36	0 – 1
Independent				
A1. Gender (Female=1)	0.48	0 – 1	0.49	0 – 1
A2. Immigrant ^b	0.24	0 – 1	0.30	0 – 1
A3. Repetition in primary school	0.14	0 – 1	0.09	0 – 1
A4. Age when starting infant education ^c	1.86	1 – 3	1.55	1 – 3
P1. Immigrant father	0.28	0 – 1	0.25	0 – 1
P2. Immigrant mother	0.29	0 – 1	0.26	0 – 1
P3. Education father ^d	2.11	1 – 3	2.06	1 – 3
P4. Education mother ^d	2,15	1 – 3	2.11	1 – 3
P5. Maximum educational level of parents ^d	2.38	1 – 3	2.31	1 – 3
P6. Maximum occupational level of parents ^e	49.11	12 – 89	8.01	1 – 12
H1. Educational resources	-0.05	-4.37 – 1.15	n.a	-
H2. Books in household ^e	3.41	1 – 6	3.31	1 – 5
H3. Cultural capital of household ^f	2.43	0 – 4	n.a	-
H4. ICT resources of household ^e	-0.03	-3.27 – 3.49	8.11	0 – 40
H5. ESCS index of household	-0.45	-7.18 – 2.51	n.a	-
H6. Language spoken at home (not Spanish=1)	0.08	0 – 1	0.04	0 – 1
N	1,087		29,012	

a. Schools implementing the MBP. This distinction cannot be made in the database.

b. Immigrant: these are considered to be those of first and second generation.

c. Variable constituted by three values: 1 "Prior to 3" 2 "At 3" 3 "After 3".

d. Variable constituted by three values: 1 "Secondary education or lower" 2 "Post-secondary education" 3 "Higher education".

e. The classification employed in the two databases is different, but it is incorporated as its ordinal characteristic permits them to be compared.

f. This variable is constructed on the basis of four variables (*dummy*) which indicate household possession of: classical literature; poetry books; works of art and books on art, music and design.

n.a: not available.

Table 3. Descriptive analysis: bilingual and non-bilingual public schools in Madrid

Variables	PISA		RACM	
	Bilingual average	Non-bilingual average	Bilingual average	Non-bilingual average
Independent				
A1. Gender (female=1)	0.47	0.48	0.50	0.49
A2. Immigrant	0.18	0.27	0.27	0.31
A3. Repetition in primary school	0.09	0.16	0.07	0.10
A4. Age when starting infant school	1.86	1.86	1.51	1.58
P1. Immigrant father	0.23	0.31	0.21	0.26
P2. Immigrant mother	0.22	0.33	0.23	0.27
P3. Education father	2.19	2.06	2.18	1.99
P4. Education mother	2.24	2.09	2.23	2.04
P5. Maximum educational level of parents	2.45	2.33	2.41	2.24
P6. Maximum occupational level of parents	53.18	46.27	8.47	7.74
H1. Educational resources	0.04	-0.12	n.a	n.a
H2. Books in household	3.66	3.24	3.48	3.21
H3. Cultural capital of household	2.64	2.28	n.a	n.a
H4. ICT resources of household	0.07	-0.10	8.32	7.99
H5. ESCS index of household	-0.21	-0.61	n.a	n.a
H6. Language spoken at home (not Spanish=1)	0.07	0.09	0.04	0.05

n.a.: not available.

Bold type indicates that the average difference test is significant (t-test).

Table 4. Empirical approximations employed for the imputation of missing values

Variable to impute	Characteristic	Empirical approximation
Age at starting infant education	Discreet (1-3)	Ordered logit
Repetition primary school	Dummy (0-1)	Logit
Maximum occupational level of progenitors	Continuous	OLS

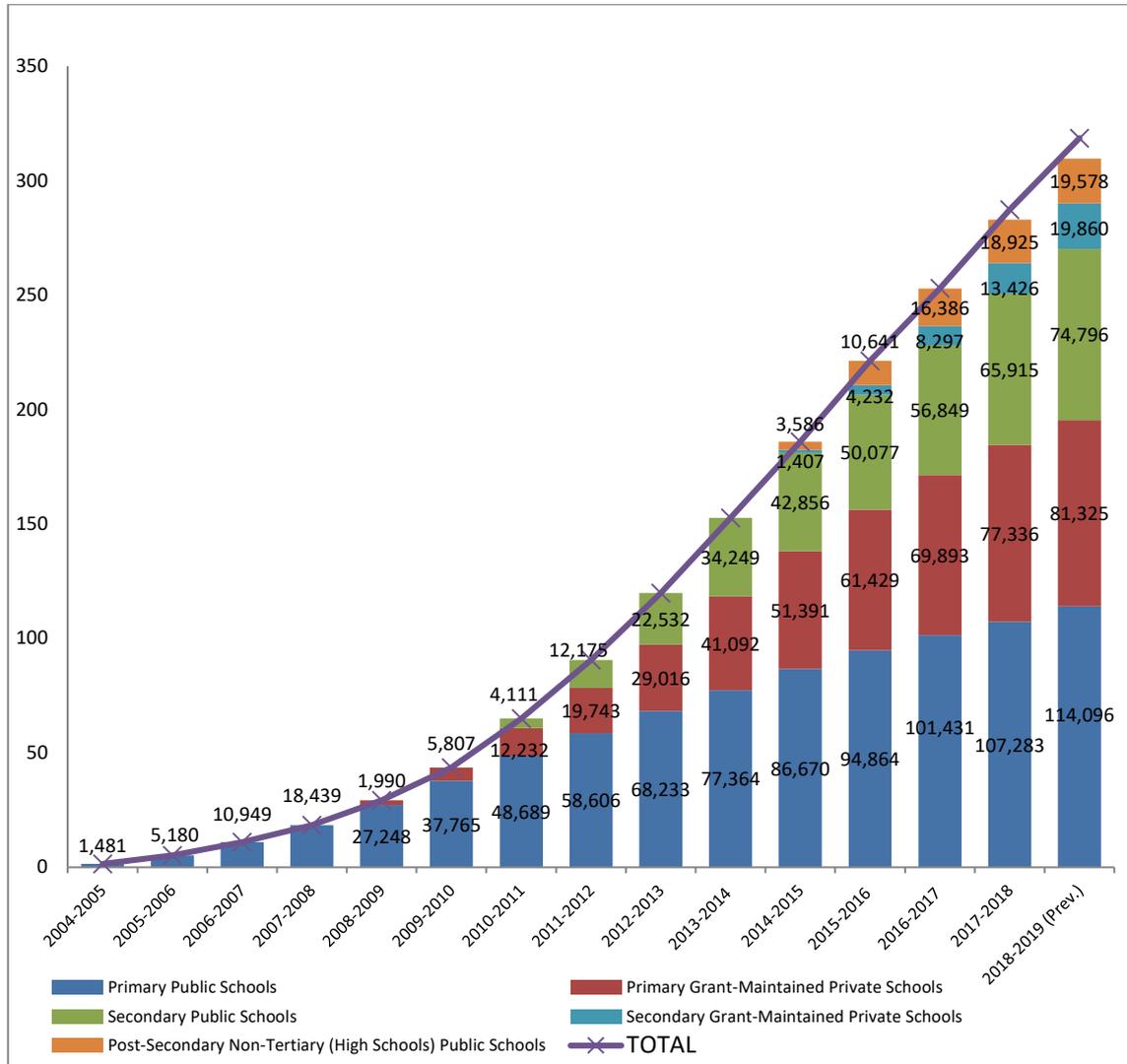
Table 5. Determinants of the choice of bilingual public centre. Binomial logit estimation

Variables	Model A	Model A	Model B	Model B	Model C	Modelo C	Modelo D	Modelo D
	PISA	RACM	PISA	RACM	PISA	RACM	PISA	RACM
A1. Gender (female=1)	-0.275 (0.844)	0.048 (0.199)	-0.002 (0.989)	0.049 (0.188)	0.015 (0.913)	0.061 (0.102)	-0.008 (0.952)	0.062 (0.095)
A2. Immigrant	-0.308 (0.442)	0.444 (0.592)	0.390 (0.305)	0.015 (0.870)	0.318 (0.399)	0.045 (0.614)	0.323 (0.394)	0.027 (0.764)
A3. Repetition in primary school	-0.332 (0.168)	-0.202 (0.007)	-0.293 (0.220)	-0.216 (0.004)	-0.237 (0.328)	-0.240 (0.001)	-0.267 (0.266)	-0.241 (0.001)
A4. Age when starting infant school	0.092 (0.477)	-0.043 (0.185)	0.098 (0.451)	-0.044 (0.176)	0.123 (0.340)	-0.056 (0.076)	0.119 (0.352)	-0.054 (0.092)
P1. Immigrant father	-0.017 (0.962)	-0.066 (0.470)						
P2. Immigrant mother			-0.785 (0.026)	-0.019 (0.848)	-0.756 (0.031)	-0.091 (0.347)	-0.700 (0.046)	-0.065 (0.505)
P3. Education of mother					-0.105 (0.357)	0.186 (0.000)	0.080 (0.358)	0.185 (0.000)
P4. Maximum education level progenitors	-0.081 (0.450)	0.133 (0.000)	-0.067 (0.531)	0.133 (0.000)				
P5. Maximum occupational level progenitors	0.011 (0.003)	0.299 (0.000)	0.011 (0.002)	0.030 (0.000)				
H1. Educational resources in the household					0.067 (0.438)	-		
H2. Books in the household		0.114 (0.000)		0.118 (0.000)		0.124 (0.000)	0.158 (0.012)	0.123 (0.000)
H3. Cultural capital of the household	0.121 (0.027)	-	0.125 (0.023)	-				
H4. ICT resources in the household							0.115 (0.202)	0.001 (0.839)
H5. ESCS of the household					0.313 (0.001)			
H6. Language spoken at home (Not Spanish=1)	0.093 (0.743)	(**)	0.174 (0.542)	(**)	0.191 (0.505)	(**)	0.151 (0.598)	(**)
N	876	12,172	878	12,258	878	12,538	878	12,337
% Correct predictions	59.55%	61.44%	59.07%	61.46%	60.59%	61.45%	59.92%	61.32%

P-value in parentheses. (*) In the case of PISA, the imputed value stems from the average of the values obtained in the 25 complete databases generated by the imputation process.

(**) This variable was withdrawn, due to the high non-response rate (66%).

Figure 1. Evolution of MBP students



Source: Authors' compilation, on the basis of the Regional Ministry of Education and Research.

Annex 1. Test of competences in the Spanish region of Madrid: principal characteristics

The Community of Madrid has for many years contracted external evaluations as a way of analysing the education system. In 2005 a test of Indispensable Knowledge and Skills was introduced to students in the sixth year of primary education and the third year of compulsory secondary education. The objective was determine the knowledge level of students at the end of primary and secondary education, respectively. The test consisted of a common and external assessment applied to all students in public and private schools in Madrid. These assessments were performed for 10 years (the last in 2015).

In 2016 the evaluations established in the national LOMCE (Organic Law on the Improvement of the Quality of Education) began to be applied in Madrid. The evaluations in the third and sixth years of primary education were performed in the 2015-2016 academic year, and from the 2016-2017 academic year the evaluation of the fourth year of ESO (the last year of compulsory secondary education) was added. These tests, as in the earlier Indispensable Knowledge and Skills tests, maintain their census character, and thus all schools and students of those educational levels participate in them.

The data analysed in our study correspond to the first LOMCE evaluation of students in their tenth year of education. Four tests were performed, aimed at testing the degree of acquisition of linguistic competence (written expression and oral and written comprehension, in both Spanish and a foreign language: English, French or German), of mathematical competence and of social and civic competence. These tests take as a guide the assessments undertaken in the principal international evaluations, such as that of PISA. The questions in these tests are given a real-life context and their elaboration, entrusted to teaching professionals from the Madrid education system, is based on a matrix of technical specifications in which the content blocks are related to processes of cognition and competence.

The average score obtained by each student was obtained by the Item Response Theory (IRT). This analysis permits the determination of a relationship between the behaviour of a subject (in this case the student) and an item and the characteristic responsible for that behaviour (in this case the competences evaluated). The principal feature of this method

is the invariance of the parameters, meaning the properties of the items (difficulty and discrimination) do not change when applied to different samples of subjects or students. In turn, this ensures that the parameters of individuals are constant, independently of the sample of items included in the test.

Thus, the level of competence of a student can be obtained from different samples of items, or distinct versions of the test. Consequently, only IRT methods permit invariant measurements at the level of parameters and guarantee the equity of scores. The results by student of this test have an average of 500 and a standard deviation of 100, identical to that used in the PISA international evaluation.

The evaluation consists of a series of surveys of all students, families, directors and teachers. This permits an analysis of the differences in educational performance existing due to the social and family background of students.

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 mode"
- 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"
- 2013/29, **Revelli, F.:** "Tax limits and local democracy"
- 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.; Martinez, 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.; Garcia 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, **García-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.; Giulletti, 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)"
- 2016/9, Guio, J.; Choi, A.; Escardíbul, J.O.: "Labor markets, academic performance and the risk of school dropout: evidence for Spain"
- 2016/10, Bianchini, S.; Pellegrino, G.; Tamagni, F.: "Innovation strategies and firm growth"
- 2016/11, Jofre-Monseny, J.; Silva, J.I.; Vázquez-Grenno, J.: "Local labor market effects of public employment"
- 2016/12, Sanchez-Vidal, M.: "Small shops for sale! The effects of big-box openings on grocery stores"
- 2016/13, Costa-Campi, M.T.; García-Quevedo, J.; Martínez-Ros, E.: "What are the determinants of investment in environmental R&D?"
- 2016/14, García-López, M.A.; Hémet, C.; Viladecans-Marsal, E.: "Next train to the polycentric city: The effect of railroads on subcenter formation"
- 2016/15, Matas, A.; Raymond, J.L.; Dominguez, A.: "Changes in fuel economy: An analysis of the Spanish car market"
- 2016/16, Leme, A.; Escardíbul, J.O.: "The effect of a specialized versus a general upper secondary school curriculum on students' performance and inequality. A difference-in-differences cross country comparison"
- 2016/17, Scandurra, R.I.; Calero, J.: "Modelling adult skills in OECD countries"
- 2016/18, Fernández-Gutiérrez, M.; Calero, J.: "Leisure and education: insights from a time-use analysis"
- 2016/19, Del Rio, P.; Mir-Artigues, P.; Trujillo-Baute, E.: "Analysing the impact of renewable energy regulation on retail electricity prices"
- 2016/20, Taltavull de la Paz, P.; Juárez, F.; Monllor, P.: "Fuel Poverty: Evidence from housing perspective"
- 2016/21, Ferraresi, M.; Galmarini, U.; Rizzo, L.; Zanardi, A.: "Switch towards tax centralization in Italy: A wake up for the local political budget cycle"
- 2016/22, Ferraresi, M.; Migali, G.; Nordi, F.; Rizzo, L.: "Spatial interaction in local expenditures among Italian municipalities: evidence from Italy 2001–2011"
- 2016/23, Daví-Arderius, D.; Sanin, M.E.; Trujillo-Baute, E.: "CO2 content of electricity losses"
- 2016/24, Arqué-Castells, P.; Viladecans-Marsal, E.: "Banking the unbanked: Evidence from the Spanish banking expansion plan"
- 2016/25 Choi, Á.; Gil, M.; Mediavilla, M.; Valbuena, J.: "The evolution of educational inequalities in Spain: Dynamic evidence from repeated cross-sections"
- 2016/26, Brutti, Z.: "Cities drifting apart: Heterogeneous outcomes of decentralizing public education"
- 2016/27, Backus, P.; Cubel, M.; Guid, M.; Sánchez-Pages, S.; Lopez Manas, E.: "Gender, competition and performance: evidence from real tournaments"
- 2016/28, Costa-Campi, M.T.; Duch-Brown, N.; García-Quevedo, J.: "Innovation strategies of energy firms"
- 2016/29, Daniele, G.; Dipoppa, G.: "Mafia, elections and violence against politicians"

2016/30, Di Cosmo, V.; Malaguzzi Valeri, L.: “Wind, storage, interconnection and the cost of electricity”

2017

2017/1, González Pampillón, N.; Jofre-Monseny, J.; Viladecans-Marsal, E.: “Can urban renewal policies reverse neighborhood ethnic dynamics?”

2017/2, Gómez San Román, T.: “Integration of DERs on power systems: challenges and opportunities”

2017/3, Bianchini, S.; Pellegrino, G.: “Innovation persistence and employment dynamics”

2017/4, Curto-Grau, M.; Solé-Ollé, A.; Sorribas-Navarro, P.: “Does electoral competition curb party favoritism?”

2017/5, Solé-Ollé, A.; Viladecans-Marsal, E.: “Housing booms and busts and local fiscal policy”

2017/6, Esteller, A.; Piolatto, A.; Rablen, M.D.: “Taxing high-income earners: Tax avoidance and mobility”

2017/7, Combes, P.P.; Duranton, G.; Gobillon, L.: “The production function for housing: Evidence from France”

2017/8, Nepal, R.; Cram, L.; Jamasb, T.; Sen, A.: “Small systems, big targets: power sector reforms and renewable energy development in small electricity systems”

2017/9, Carozzi, F.; Repetto, L.: “Distributive politics inside the city? The political economy of Spain’s plan E”

2017/10, Neisser, C.: “The elasticity of taxable income: A meta-regression analysis”

2017/11, Baker, E.; Bosetti, V.; Salo, A.: “Finding common ground when experts disagree: robust portfolio decision analysis”

2017/12, Murillo, I.P.; Raymond, J.L.; Calero, J.: “Efficiency in the transformation of schooling into competences: A cross-country analysis using PIAAC data”

2017/13, Ferrer-Esteban, G.; Mediavilla, M.: “The more educated, the more engaged? An analysis of social capital and education”

2017/14, Sanchis-Guarner, R.: “Decomposing the impact of immigration on house prices”

2017/15, Schwab, T.; Todtenhaupt, M.: “Spillover from the haven: Cross-border externalities of patent box regimes within multinational firms”

2017/16, Chacón, M.; Jensen, J.: “The institutional determinants of Southern secession”

2017/17, Gancia, G.; Ponzetto, G.A.M.; Ventura, J.: “Globalization and political structure”

2017/18, González-Val, R.: “City size distribution and space”

2017/19, García-Quevedo, J.; Mas-Verdú, F.; Pellegrino, G.: “What firms don’t know can hurt them: Overcoming a lack of information on technology”

2017/20, Costa-Campi, M.T.; García-Quevedo, J.: “Why do manufacturing industries invest in energy R&D?”

2017/21, Costa-Campi, M.T.; García-Quevedo, J.; Trujillo-Baute, E.: “Electricity regulation and economic growth”

2018

2018/1, Boadway, R.; Pestieau, P.: “The tenuous case for an annual wealth tax”

2018/2, García-López, M.Á.: “All roads lead to Rome ... and to sprawl? Evidence from European cities”

2018/3, Daniele, G.; Galletta, S.; Geys, B.: “Abandon ship? Party brands and politicians’ responses to a political scandal”

2018/4, Cavalcanti, F.; Daniele, G.; Galletta, S.: “Popularity shocks and political selection”

2018/5, Naval, J.; Silva, J. I.; Vázquez-Grenno, J.: “Employment effects of on-the-job human capital acquisition”

2018/6, Agrawal, D. R.; Foremny, D.: “Relocation of the rich: migration in response to top tax rate changes from spanish reforms”

2018/7, García-Quevedo, J.; Kesidou, E.; Martínez-Ros, E.: “Inter-industry differences in organisational eco-innovation: a panel data study”

2018/8, Aastveit, K. A.; Anundsen, A. K.: “Asymmetric effects of monetary policy in regional housing markets”

2018/9, Curci, F.; Masera, F.: “Flight from urban blight: lead poisoning, crime and suburbanization”

2018/10, Grossi, L.; Nan, F.: “The influence of renewables on electricity price forecasting: a robust approach”

2018/11, Fleckinger, P.; Glachant, M.; Tamokoué Kamga, P.-H.: “Energy performance certificates and investments in building energy efficiency: a theoretical analysis”

2018/12, van den Bergh, J. C.J.M.; Angelsen, A.; Baranzini, A.; Botzen, W.J. W.; Carattini, S.; Drews, S.; Dunlop, T.; Galbraith, E.; Gsottbauer, E.; Howarth, R. B.; Padilla, E.; Roca, J.; Schmidt, R.: “Parallel tracks towards a global treaty on carbon pricing”

2018/13, Ayllón, S.; Nollenberger, N.: “The unequal opportunity for skills acquisition during the Great Recession in Europe”

2018/14, Firmino, J.: “Class composition effects and school welfare: evidence from Portugal using panel data”

2018/15, Durán-Cabré, J. M.; Esteller-Moré, A.; Mas-Montserrat, M.; Salvadori, L.: “La brecha fiscal: estudio y aplicación a los impuestos sobre la riqueza”

2018/16, Montolio, D.; Tur-Prats, A.: “Long-lasting social capital and its impact on economic development: the legacy of the commons”

2018/17, Garcia-López, M. À.; Moreno-Monroy, A. I.: “Income segregation in monocentric and polycentric cities: does urban form really matter?”

2018/18, Di Cosmo, V.; Trujillo-Baute, E.: “From forward to spot prices: producers, retailers and loss averse consumers in electricity markets”

2018/19, Brachowicz Quintanilla, N.; Vall Castelló, J.: “Is changing the minimum legal drinking age an effective policy tool?”

2018/20, Nerea Gómez-Fernández, Mauro Mediavilla: “Do information and communication technologies (ICT) improve educational outcomes? Evidence for Spain in PISA 2015”

2018/21, Montolio, D.; Taberner, P. A.: “Gender differences under test pressure and their impact on academic performance: a quasi-experimental design”

2018/22, Rice, C.; Vall Castelló, J.: “Hit where it hurts – healthcare access and intimate partner violence”

2018/23, Ramos, R.; Sanromá, E.; Simón, H.: “Wage differentials by bargaining regime in Spain (2002-2014). An analysis using matched employer-employee data”

