Assessing regional performance against early school leaving in Spain

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A B S T R A C T

As early school leaving has been shown to have a substantial impact on later life outcomes, it has received considerable attention in policy debates. However, national and regional differences in early school leaving are not necessarily due to differences in policymaking but might be the consequence of underlying differences in the economic and social structure of a region. This paper develops a procedure to account for regional differences in assessing performance in regard to early school leaving. The application focusses on Spain, which has a high rate of early school leaving and significant differences between regions. The results show that most regional differences can be attributed to population composition. However, three regions perform better once population characteristics are accounted for.

1. Introduction

Early school leaving (ESL)[1] has been shown to have detrimental effects on wages, health, and social inclusion (Bridgeland, DiIulio, & Morrison, 2006; Brunello & Paola, 2014; Dickson & Harmon, 2011; Gitschthaler & Nairz-Wirth, 2018; Rumberger, 2011; Rumberger & Lim, 2008). The vast literature analysing the causes of ESL (Fernández Enguita, Mena Martínez, & Riviere Gómez, 2010; Rumberger & Lim, 2008) has hardly focussed on the role of regions (some exceptions are in Cabus, 2015; López Martínez, Marco Reverte, & Palacios Manzano, 2016, and Rambla, 2018), although in some countries they have the highest level of responsibility regarding the

implementation of educational policies and managing of the education budget.

This paper contributes to the literature by proposing an innovative way to disentangle whether regional differences in ESL are due to differences in population composition or due to policy implementation and institutional context, specifically in countries where regions are mostly responsible for the implementation of the educational policy. We expect that once differences in population have been controlled for, the remaining variation could be attributed to the regional performance in tackling ESL. Second, we propose a combination of quantitative methodologies in order to design a two-step matching procedure to assess regional performance against ESL. Our results show that regional differences in ESL can be mostly attributed to differences in population composition. However, three regions still perform better once population composition is accounted for. Lastly, a discussion is provided about the possible explanations of this performance, including the role of diverse policy priorities.

The methodology consists of a two-step matching procedure that combines cluster analysis and matching techniques. First, we make groups of comparable regions based on several variables related to their socio-economic contexts through a cluster analysis. Second, we match individuals from one region to individuals from another comparable region using the propensity score matching technique based on a set of individual and family characteristics. This allows us to answer the key question about what would have been the outcome if individuals lived in another region, i.e. if they were subject to the educational authorities of another region.

The application focusses on Spain, the country with the highest ESL rate among the European Union countries (18.3 % in 2017). In addition, Spain is the country with the largest differences at the regional level (European Commission, 2018). Indeed, the variability among Spanish regions is even larger than the existing variability between EU countries. For instance, some regions have already achieved the 10 % European objective while others are still far from it, with a percentage of early school leavers greater than 30 %. In this respect, Spain has been urged to reduce these disparities (Council of the European Union, 2018). Actually, regional inequalities in educational outcomes are quite common in Spain (Cabrera Rodríguez, 2013; López Martínez, Marco Reverte, & Palacios Manzano, 2016; Pérez-Esparrells & Morales, 2012; Sicilia & Simancas, 2018). These inequalities could be related to the population characteristics and/or to the policies implemented by each region (Mora, Escardíbul, & Espasa, 2010). Despite the focus on Spain, it should be highlighted that the high rate of ESL and the large regional differences are similar to other countries, although ESL is on average less prominent in other countries. Therefore, our results can be interpreted as upper-bound estimates.

In order to apply the two-step methodology, we select samples from the Spanish microdata of the Labour Force Survey (LFS), the main source to measure and compare the percentage of early school leavers across European countries. In particular, we make use of individual data from 2005 to 2014.

The remainder of the paper is organised as follows: Section 2 summarizes the educational context and the early school-leaving situation in Spain. Section 3 explains the methodology, including the identification strategy, and describes the data. Section 4

outlines the results and discusses the implication for policymaking. The paper ends with some concluding remarks in Section 5.

2. Background: educational context and early school leaving in Spain

This section provides an overview of the main institutional characteristics of the Spanish education system, including some remarks about policies and measures regarding the fight against ESL. Additionally, we show the recent evolution of ESL at the regional level.

2.1. Educational and institutional context

A better understanding of the Spanish regional differences on early school leaving requires a brief description of the current structure of the education system and a closer examination of some relevant policies addressed at national and regional level.

In relation to the structure of the education system, compulsory education has common curriculum that comprises two cycles: (a) six years of primary school (Educación Primaria) and, (b) four years of compulsory secondary education (known as ESO, Educación Secundaria Obligatoria). Then, students can formally leave school system at age 16. Those who continue education may choose between vocational tracks (Ciclos Formativos de Grado Medio) or academic tracks (Bachillerato). Traditionally, the academic track aims for university access, while vocational tracks are seen as a transition towards the labour market.

Despite the existence of a common national legislation in Spain, regional governments are almost fully responsible for the design and the implementation of educational policies since educational competencies were transferred from the central to regional governments between 1980 and 1999. In this highly decentralized system, the overall framework is defined at national level but many of the schooling and funding decisions are made at regional level, such as the expenditure on education, the number of students per teacher, the school infrastructure, as well as the implementation of programmes devoted to support disadvantaged students. For instance, the regional governments administered 91.1 % of the budget for non-tertiary education in 2014 (Ministerio de Educación, Cultura y Deporte, 2018). That means that regional governments are primarily responsible for both the education policymaking process and for its results.

With respect to policies at national level, two educational reforms have been carried out in the last years, which could have had effect on early school leaving: The Organic Law of Education (*Ley Orgánica de Educación*) in 2006 and the Organic Law for the Improvement of the Quality of Education (*Ley Orgánica para la Mejora de la Calidad Educativa,* LOMCE) in 2013. The former offered remedial courses to students at the last years of the compulsory education, and encouraged drop-out students to get back to education system through an alternative track named "initial vocational training programmes" (*Programas de Cualificación Profesional Inicial*, PCPI). This law also intended to coordinate central and regional policies against early school leaving but the crisis severely cut off the resources (Rambla, 2018). The LOMCE set out the reduction of early school leaving as one of the main objectives. In general, modifications were

allocated to provide more flexible and permeable learning pathways and to make vocational education more attractive, on the belief that flexibility would have positive effects on education and, in particular, on the reduction of ESL (Rambla & Fontdevila, 2015). An important measure was the substitution of the former initial vocational training programmes by basic voca- tional training (*Formación Profesional Básica*, FPB), that allows early school leavers to access vocational education after a two-year programme that substitutes a secondary education qualification.

The decentralised nature of education policies in Spain addresses some contextual challenges that requires strong coordination when measures are often established and implemented at regional level. In this line, the central government launched a plan to implement, coordinate and monitor policies against ESL (*Programa de Cooperación Territorial para la reducción del abandono temprano de la educación y la formación*) in 2007. The programme contained useful recommendations and proposals as a general guidance for policymaking. In particular, the plan promoted measures aimed at keeping students at risk of exclusion in the education system (prevention and intervention measures) and measures for those young people who have left education or training after the compulsory schooling stage (compensation measures). Some of these measures consisted on educational guidance and reinforcement classes, the establishment of individualized learning environments, specific measures focussing on the at-risk population, or alternative routes to re-entering the education system. In general, all regions agreed in developing best practices based on analysis, prevention, intervention, and compensation approaches (European Commission/EACEA/Eurydice/Cedefop, 2014) although some measures were not finally implemented due to the lack of resources (Donlevy, Day, Andriescu, & Downes, 2019).

A relevant issue in order to explain regional differences in ESL is the fact that the programme allowed each region to establish particular agreements with the central government in allocating the funding. Therefore, regional governments designed their own policies taking into account their education and socio-economic context, what implied that the programme took place in a differentiated way across regions.

The programme was relaunched in 2015 (Ministerio de Educación Cultura y Deporte, 2015) but it suffered from similar problems that made very difficult to evaluate its impact. It is possible to obtain general information about the measures implemented, but there was neither systematization nor information at regional level. Some authors claimed that despite all Spanish educational authorities apparently convey the European Commission frame of tackling ESL policies, they have discrepancies with regard to the theory of change that are likely to affect policy implementation and outcomes (Donlevy et al., 2019; Rambla, 2018).

In sum, there is still a lack of impact evaluation of the measures implemented to reduce ESL (Escudero Muñoz & Martínez Domínguez, 2012; European Commission, 2016). A first attempt to evaluate the national programme in coordination with regions to tackle ESL concluded that it had a small positive effect on the reduction of ESL, as well as that prevention measures could be more effective in the fight against ESL (Serrano & Soler, 2014). However, they also highlighted that the mixture of measures at different levels and the lack of reliable data makes evaluation a difficult task. Then,

it is relevant to have studies and analysis to understand and be able to address effective strategies to reduce early school leaving in Spain. Our proposal does not evaluate a particular measure, but identifies which regions have reduced the ESL in comparison to other regions once the conditions are set out at the same level.

2.2. *Evolution of early school leaving at regional level*

The Spanish application is interesting as it might yield upper-bound effects due to the high rate of ESL (18.3 % in 2017), very far from the EU average (10.6 %). There is still much progress to be made in order to achieve the national (15 %) and European target (10 %) in 2020. From 2000–2008, the ESL rate in Spain was near 30 %. Since then, the ESL rate declined notably, reaching 20 % in 2015. This change is mainly attributed to labour market performance and to the relationship between the economic cycle and school dropout decisions (Choi & Calero, 2018; Petrongolo & San Segundo, 2002). The number of school leavers increases during periods of economic growth and decreases when economic activity falls (Aparicio, 2010; Bernardi, 2012; Fernández-Mellizo & Martínez-García, 2017; Guio, Choi, & Escardíbul, 2018; Lacuesta, Puente, & Villanueva, 2012). The latter might be attributed to the higher opportunity costs for students in periods of high economic activity.

At the regional level, Fig. 1 shows the evolution of ESL for the Spanish regions during the period 2000–2016. Fig. 1 suggests that a group of seven regions (Andalucía, Baleares, Canarias, Castilla-La Mancha, Cataluña, Extremadura, and Murcia) had ESL rates around 30 % from the year 2000 until 2011. Since then, they significantly reduced the ESL rates, although the rates were still notably high. Another group formed by Aragón, Asturias, Castilla y León, Galicia, Madrid, and Rioja present a more heterogeneous performance, although all of them lowered their ESL rates (between 15 % and 30 % for the most part of the period). Only three regions (Cantabria, Navarra, and País Vasco) had rates lower than 15 % in 2016. However, the most relevant fact is that regional differences have largely been maintained over the last two decades. That is, regions occupy similar positions throughout the period, both in the phase of very high and stable ESL rates and in the phase of reduction.

3. **Design: methodology and data**

To control for unobserved regional differences on ESL, we use insights from a matching analysis. For our purposes, matching is more appropriate than the standard approach of binary models such as binomial and multinomial models. The latter have been frequently used to quantify the determinants of ESL (Alegre & Benito, 2014; Cabus & De Witte, 2016; Calero, Choi, & Waisgrais, 2010; Casquero Tomás & Navarro Gómez, 2010; Choi de Mendizábal & Calero Martínez, 2013; Petrongolo & San Segundo, 2002); . The standard econometric techniques explain regional differences by including regional dummies in the estimation of the probability of leaving education early. Therefore, they describe how dropout rates differ between populations, whereas matching techniques allow us to answer the key question about what would have occurred in the case of living in another region.

Matching techniques are generally used to measure the impact of specific programmes or policies.[2] In our case, following De Witte and Van Klaveren (2012) and De Witte, Van Klaveren, and Smets (2015), we propose a two-step matching procedure that examines whether the outcome difference (ESL) is due to differences in underlying population characteristics or to the policy implementation and performance of the region regarding tackling ESL. In other words, having controlled for compositional differences in population, if regional differences persist, it could be supposed that some regions were more effective in tackling ESL in comparison to others.

3.1. Matching procedure

Matching methods are based on the comparison of two potential outcomes (Heckman, Ichimura, & Todd, 1998; Rubin, 1974). In our case, the dropout status when an individual lives in one region (y_{1i}) and the dropout status if the individual were to have lived in another region (y_{0i}). The comparison is made by using the average treatment effect on the treated (ATET), expressed as $E[Y_1 - Y_0 / D = 1, X]$, where E [.] is the expected difference between the two outcomes, over the population with $D = 1$. X denotes a set of observed covariates, and D is an indicator variable that equals one if the individual lives in the region treated and zero otherwise. Then, the ATET measures the average gain in outcome of individuals from one region relative to individuals from another region, as if they had lived in this region. To overcome the problem when matching is based on a vector X with a high number of covariates, the propensity score is used (Rosenbaum & Rubin, 1983). The propensity score is defined as the probability of being treated considering those variables included in the set of covariates. Individuals are then matched on the basis of this probability.

3.2. Data and identification strategy

The matching requires information on the characteristics X for the two groups (treatment and control groups) for each region.[3] We select samples from the Spanish microdata of the LFS, the basic source that is used to measure and compare the percentage of early school leavers across European countries.[4] In contrast to aggregate-level analysis, we make use of individual data for the analysis, specifically data corresponding to the second quarters from 2005 to 2014.[5] Following the Eurostat definition, the main variables to identify an early school leaver in the LFS are the age, the highest level of education completed, and the current status in relation to formal and non-formal education or training. Then, each treatment sample includes those individuals aged 18–24 years living in the treated region.

3.3. Matching at the regional level

To ensure that only comparable individuals are considered in the dropout comparison between region T (treated) and C (control), our research strategy consists

of two steps. First, we make groups of regions taking into account some regional characteristics in order to control regional heterogeneity regarding several characteristics.[6] Studies in the literature analysing what factors are relevant for explaining ESL help us to select these characteristics. Mostly, ESL depends on macroeconomic and social contexts (Guio et al., 2018). We take into account the regional youth unemployment rate as an approximation of the general economic context, as there is great evidence for the large impact of youth unemployment on enrolment in post-compulsory education during the last recession (Choi & Calero, 2018; Clark, 2011). In terms of social factors, we make use of the proportion of the population aged 25–64 with at least lower secondary education and the proportion of people 'At Risk of Poverty and Exclusion' (the AROPE index), since social and economic vulnerability increases the probability of dropping out of school (Freeman & Simonsen, 2015; Lavrijsen & Nicaise, 2015). Fernández- Macías, Antón, Braña, and Muñoz de Bustillo (2013) also notice the difficulties in integrating foreigners in the Spanish educational system. The last regional characteristic is the percentage of foreigners.

Several types of cluster analysis techniques may be employed to identify groups of regions based on similarities in macroeconomics and social factors. The selected one, the Ward method, is a hierarchical cluster analysis. Based on the dendrogram and the Calinski-Harabasz index, a three-cluster solution is revealed as the most appropriate.[7]

To delineate and label the three clusters, the value for the variables used to make groups and the corresponding mean for each group are computed (Table 1). Cluster 1 has the highest mean value for the youth unemployment rate and the AROPE index and the lowest value for the other two factors that measure social context. Cluster 3 includes the poorest regions in terms of the youth unemployment rate and the AROPE index, just the opposite of the previous cluster. The regions in cluster 2 are in a middle position.

3.4. Matching at the individual level

A second step in the analysis consists of matching students within regions. Therefore, we apply a propensity score matching technique, which is a method of equating groups on a large number of potential confounders, to isolate the effect of regional policies on dropping out of school. In our analysis, the propensity score is estimated using a logit regression model, resulting in a single propensity score for each individual.[8] The propensity score is estimated based on a total of seven individual and family characteristics as well as a control variable for the period of time. The set of variables included in X was chosen according to the differences in mean in the covariates.

In the case of individual variables, we use a dummy variable to capture the gender of the individual. As several research studies point out, gender has a crucial role in schooling decisions, expectations, and outcomes (Borgna & Struffolino, 2017; Ingram, 2018; Theunissen, De Man, Verdonk, Bosma, & Feron, 2015). Nationality is also included as a dummy variable, as generally those who have a non-native status usually perform worse in education (Hao & Bonstead-Bruns, 1998; Portes, Aparicio, Haller, & Vickstrom,

2010). Literature has also covered the relation between family structure and education (Astone & McLanahan, 1991). Then, we use the type of family to differentiate between nuclear families, that correspond to families with two parents, and mononuclear families, with only one parent. A consequence of the inclusion of this variable is that the analysis is restricted to young people still living with their parents at the home of origin. Initially, this issue is not so relevant because in Spain the majority of young people are still living with their families (Observatorio de la Juventud, 2008).

The literature has comprehensively covered the relation between educational performance and family background in terms of social class and social and cultural capital (Bereményi & Carrasco, 2018; Davis-Kean, 2005; Reay, 2018). In this paper, we use three variables at the family level. First, we use a variable that captures the level of education of the parents, which equals one if the maximum level of education is upper secondary or more, and zero otherwise. With respect to the labour status of parents, there are two situations: 1. both parents unemployed or inactive (or one of them inactive or unemployed in the case of single-parent families); and 2. at least the mother or father (or both) employed. Third, we include a variable to capture the occupational status of the parents as a proxy of the social class of the household. This variable takes the maximum status of the parents (in the case of a nuclear family) according to three situations: 1. managers and professionals, technicians and associate professionals, clerical support workers, and armed forces occupations; 2. service and sales workers, skilled agricultural, forestry, and fishery workers, craft and related trade workers, plant and machine operators and assemblers, and elementary occupations; and 3. inactive or unemployed.

Finally, we include a time variable to capture the heterogeneity between the two periods (2005–2009 and 2010–2014), as the evolution of ESL rates as well as macroeconomic and social indicators also shows different patterns in these periods. Table 2 shows the summary statistics of variables at individual and family level.

The following step consists of matching individuals in the treatment group with individuals in the control group based on the predicted propensity score calculated above. Then, each individual in the region treated is linked to the best look-alike individual in the control region, given the set of characteristics that presumably influences the dropout probability based on some distance measure. The results presented in this study are based on neighbour matching, where the closest control observation in terms of propensity score is selected.[9] In the last step, the ATET is calculated, comparing the outcome between matched treated and control individuals.

4. Results and discussion

Table 3 presents the ATET for every pair of regions that are comparable, according to the results of the cluster analysis. Each value in this table represents the effect of belonging to a certain region on the probability of leaving education early in comparison to the control region (the effect is only displayed when the balancing property is proved[10]). For instance, considering the value of 0.021 reported in the seventh row and third column, it means that bearing in mind the characteristics of individuals from Asturias, the look- alike individuals from Castilla y León have a

0.021 percentage point higher probability of suffering ESL than those from Asturias.

Looking at the significance, the results suggest that the regional effect is only relevant for some comparisons. In this sense, Asturias, Navarra, and País Vasco account for all of the significant effects observed, as the effect of living in these three regions is negative and statistically significant compared to many regions that are comparable. For instance, living in Navarra decreases the probability of leaving education early by 0.089 points compared to Cataluña, 0.077 points compared to Madrid, and 0.083 points compared to Rioja. Hence, results evidence that: 1) most of the differences in ESL rates are related to differences in socio-economic and demographic characteristics of the population and 2) three regions (Asturias, Navarra and País Vasco) occupy a better position in ESL numbers that cannot only be attributed to population composition.

To test the robustness of the results, we replicate the analysis using other different measures for ESL only in the case of regions that displayed a significant effect. The use of these alternative measures provides us with complementary information and contributes to overcome some of the flaws of the official definition of ESL (Fernández Macías, Muñoz de Bustillo Llorente, Braña Pino, & Antón Pérez, 2010). Hence, we use a modified version named 'ESL2' (second column of Table 4), in which we remove the condition of not attending non-formal education in the last four weeks. Usually the ESL rate is higher when this condition is excluded. According to Fernández Macías, Muñoz de Bustillo Llorente, Braña Pino, & Antón Pérez, 2010, this should be born in mind in order to set a broader approach toward ESL, as the success of non-formal education or training does not permit getting the minimum level required for not being part of the ESL rate. We also use a third type of indicator in order to capture the educational participation of youth, named ESL3, because it allows us to have a wider and more realistic view of ESL. Therefore, and similarly to Alegre and Benito (2014), we use the level of non-participation of youth in education or training at the age of 18, regardless of the level of education completed before that point.

In general, the effect of living in Asturias, Navarra, and País Vasco is consistent along the three measures of ESL. Using the ESL2 definition, the ATET is substantially higher (and negative) for País Vasco and Navarra, which means that if we do not take into account the participation in non-formal education or training, the effect of living in these regions compared to others is even greater in terms of ESL. The ESL3 definition, that includes the condition of non-participation in education or training goes in the same direction. For both regions, the regional effect is even significant in one more comparison. However, the results for Asturias are less conclusive, as comparing to Galicia, the effect of living in Asturias is negative in terms of the second indicator, but positive in terms of the third one.

Nevertheless, these three regions show a better response to the ESL problem, as we have obtained consistent effects regarding different definitions of ESL for the majority of regions that are comparable. Thus, although the main objective of this article is to disentangle whether regional differences in ESL are due to differences in population composition or due to policy implementation and institutional context, it is interesting to explore the possible underlying mechanisms by identifying the policies and

measures that could give these regions a differential position.

In regard to educational policy, we find that Asturias, Navarra, and País Vasco pay special attention to equity and management of student heterogeneity in education from different perspectives. In this sense, Tarabini, Curran, Montes, and Parcerisa (2018) state that the mechanisms for managing student diversity play a crucial role in student success. These mechanisms include several possibilities regarding educational measures, such as lowering size classes, personalised learning methodologies and heterogeneous grouping, among others.

País Vasco has a long tradition of managing student diversity (Mendizabal & Uribe-Echevarria, 2015), as they have implemented specific measures with the aim of promoting engagement and providing support for the needs of all students. For instance, they have measures devoted to cover student's specific needs, such as implementation of personalised reinforcement and educational inter- vention programmes. In addition, País Vasco implemented a wide range of measures and policies focussed on tackling ESL based on solid coordination within institutions. For instance, the Complementary Education Programme (Programa de Escolarización Com- plementaria) implemented in the late 1990s aims to provide an alternative track for those students at risk of social exclusion, with specific content adapted to their needs. Therefore, these authors attribute to these measures the excellent results of País Vasco in terms of suitability and ESL rates. As Mendizabal, Uribe-Echevarria, and Luna (2015) state, it seems that inclusive education has become a stable strategic priority in recent decades, despite having several governments with different tendencies. Indeed, the mechanisms for managing student heterogeneity have been proven to play a crucial role in student success (Tarabini et al., 2018). Despite other regions having similar measures of prevention, intervention, and compensation to tackle ESL, it is conceivable that the more solid institutional context of País Vasco—also a probable consequence of a longer exposition to a more heterogeneous and diverse population—has a deep impact on the effectiveness of policies devoted to this problem.

In the case of Navarra, the PISA results show that this region has a very good score in science, but the standard deviation of the scores is one of the lowest (Sicilia & Simancas, 2018). Prieto, 2015a, Prieto, 2015b) points out the same issue for the case of Asturias, as she attributes lower levels of ESL to the focus of educational policy on equity. In particular, Asturias has put a strong focus on prevention policies based on accompaniment and support measures for students with low socio-economic status and from socially excluded families (Prieto, 2015a); additionally, Asturias has a specific programme that aims to promote the social and linguistic inclusion of immigrants (*Programa para la acogida sociolingüística de inmigrantes*).

Thus, it seems that the policies of these regions have been devoted to offset the students' inequalities either by more direct support or by a more solid institutional coordination focussed on diversity. This is in line with PISA results (OECD, 2016) stating that there is a positive correlation between the performance of a country and its equity in educational outcomes. Nonetheless, more comparable data and studies are needed in order to identify and analyse the differences in the implementation of educational policies based on equity in general, and policies devoted to tackle ESL in

particular.

With respect to education funding, Asturias, Navarra, and País Vasco are the regions with the greatest education expenditure. For instance, in 2002, when the decentralization process of education competences was completed, Navarra and País Vasco invested 745€ and 830€ per capita in education, respectively, compared to the 636€ per capita average of Spanish regions (Pérez Esparrells & Morales Sequera, 2006). Another study shows that these regions have the highest level of public funding of education in terms of expenditure in non-tertiary education per student in the period 2001–2011 (Bayón-Calvo, Corrales-Herrero, & Ogando Canabal, 2017). The better funding policy for education can be attributed to the social and political awareness of these regions regarding education, but it is also possible to be due to the special tax regime in the case of Navarra and País Vasco, which permits them to have a relatively better flexibility for managing public budgets.

Nevertheless, the reader should bear in mind that these reasons are just possibilities that could explain these differences in ESL, but more in-depth and systematic analysis are needed in order to test the results found in this study.

5. Conclusions

In the comparison of policy targets, the influence of regional and institutional contexts is often ignored. This paper provided a framework to assess regional performance in ESL numbers. Applying a two-step matching procedure, we control for socio-economic and demographic characteristics in order to detect the effect of living in specific regions. The method is applied to the Labour Force Survey data of Spain, which has a relatively high number of early school leavers and a significant heterogeneity among its regions.

The results suggest that the profound differences of ESL between regions can be largely attributed to the differences in population characteristics. However, the matching procedure identified that three regions (Asturias, Navarra, and País Vasco) present positive effects in terms of a lower probability of becoming an early school leaver. This implies that ESL differences in these regions cannot be attributed only to population characteristics, but also to the institutional context, that includes several aspects related to educational policy. In the case of Spain, regions are mostly responsible for the implementation of educational policy, including measures devoted to tackle early school leaving. Hence, although the quantitative methodology applied cannot analyse the specific policies and measures that can work in the fight against ESL, it can identify the differential results of the regions mentioned, promoting a discussion about the features of the policies in these regions. On the one hand, it seems that the three regions have positioned equity as a priority in the implementation of their educational policies. In this regard, inequalities are confronted by specific measures of intervention for disadvantaged students, providing a more homogenous context with respect to educational outcomes. On the other hand, educational expenditure can play an important role, as these are precisely the regions where the level of public education funding is higher in terms of expenditure on non-tertiary education per student. Moreover, this indicator reveals that educational funding is a political and social concern in these regions.

Our findings have some relevant conclusions for policymakers, especially in the case of countries with large regional inequalities and high rates of ESL, as is the case for most southern European countries. The results indicate that most of the regional disparities are due to differences in socio-economic and demographic characteristics.

As a consequence, the design of policies and measures should be based on the different contexts where this social problem is seen. The differential performance of Asturias, Navarra and País Vasco gives room for discussing how these regions have been able to better tackle ESL. The possible influence of policies based on equity and management of student diversity is part of the current debate about inclusion and flexibility in educational pathways (Keskiner & Crul, 2018) and questions the emphasis on flexibility among educational pathways given in the last years in Spain.

Our results also seem to stress the importance of public funding. In this respect, the austerity-based policy implemented in many European countries, including Spain, could have been harmful in the fight against ESL (Donlevy et al., 2019; Rambla, 2018).

However, it should be noted that the analysis has some limitations. The data used do not include information about the specific educational policies applied at regional level, making difficult to strictly disentangle the effect of particular measures. However, our procedure permits to assess the global performance of a region regarding policy implementation. Also, our results correspond to the Spanish case. Hence, they cannot be generalized to other countries without having understood the particularities of this case.

Finally, we observe diverse routes for future research. There is a lack of studies that analyse the implementation of educational policies to tackle ESL at regional level from a comparative and systematic point of view. In this regard, the literature also states that there is still room for studying how socio-demographic and educational characteristics influence processes like early school leaving or school engagement (Nouwen & Clycq, 2019). Future research is also needed in order to disentangle the impact of implementation of specific educational policies. Moreover, there are slight differences in the estimations when different definitions of ESL are incorporated. Although the results are consistent, there is a need to use new indicators that could overcome the limitations of the official definition of ESL. As a final consideration, the existence of regional differences is very common when analysing policy measures, and is not exclusive to the area of education. Then, in order to evaluate other policies and their effects on different outcomes, the proposed methodology provides an innovative way to disentangle the differences due to policymaking or to the underlying differences related to the economic and social structure of regions. In this line, future research should go further in the mechanisms used to isolate the real effects of a policy.

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[1] Following the Eurostat definition, the ESL rate measures the share of the population aged 18–24 with at most lower secondary education who were not involved in any education or training in the four weeks preceding the LFS.

[2] Impact evaluation is quite common in other areas such as the evaluation of active labour market policies (for instance, see Card, Kluve, & Weber, 2018). In the context of education, we find some research evaluating the effectiveness of some particular policies aimed at reducing school dropout (Cabus & De Witte, 2015; Mazrekaj & De Witte, 2019). However, as Cabus (2017) points out, there is still too much to consider in terms of what works in the fight against school dropout.

[3] Note that multiple comparisons are made between regions. Then, the treatment group changes depending on the region that is compared. Therefore, individuals who take part in the treatment group when they live in the treated region may belong to the comparison group when they do not live in this region.

[4] This survey is representative at the regional level.

[5] Casquero Tomás and Navarro Gómez (2010), Serrano and Soler (2014), and Felgueroso, Gutiérrez-Domènech, and Jiménez-Martín, (2014) also use individual data to analyse school dropout.

[6] Other combinations of variables were tried. Our final selection was based both on the literature

and on the further steps of the matching procedure.

[7] See Fig. A.1 (dendogram) and Table A.1 (Calinski-Harabasz index) in the Appendix.

[8] Other more recent matching techniques such as CEM matching were discarded because they work better when variables are continuous, that is not our case.

[9] Similar results apply when stratification and kernel matching are used. Results are included in the Appendix (Table A.2).

[10] The balance checks consist of evaluating the effectiveness of the propensity score on reducing differences between treatment and control groups.

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Table 1
Summary statistics of macroeconomic and social factors by region, 2000.

	Region	Early school leaving	% foreigners	% with at least lower secondary education	AROPE index	Youth unemployment rate
Cluster 1	Andalucía	38.0	5.0	40.7	31.6	24.6
	Canarias	30.8	10.1	46.0	32.2	24.4
	Castilla-La Mancha	36.8	5.8	37.5	31.4	18.2
	Extremadura	36.8	2.0	34.4	38.7	28.6
		35.6	**5.7**	**39.7**	**33.5**	**23.95**
Cluster 2	Asturias	20.5	2.3	50.2	22.8	23.7
	Baleares	39.7	14.9	44.6	20.9	18.2
	Castilla-León	25.4	3.5	48.0	28.5	19.4
	C. Valenciana	32.2	11.4	47.0	24.5	19.6
	Galicia	22.9	2.3	44.1	26.2	20.8
	Murcia	39.8	11.6	43.0	29.1	15.4
		30.1	**7.7**	**46.1**	**25.3**	**19.5**
Cluster 3	Aragón	23.4	7.2	53.3	20.3	13.0
	Cantabria	21.9	3.5	53.1	18.3	17.9
	Cataluña	33.1	10.9	51.3	18.1	15.8
	Madrid	26.4	12.2	61.3	16.7	16.7
	Navarra	17.9	7.6	56.9	12.5	14.7
	País Vasco	14.7	3.6	59.9	16.5	18.9
	Rioja	29.7	10.1	52.3	23.6	14.4
		23.9	**7.9**	**55.4**	**18.0**	**15.9**

Source: Own compilation based on Eurostat.

Table 2
Summary statistics of individual and family factors by region for the total sample.[a]

	AND	ARG	AST	BAL	CAN	CANT	CYL	CLM	CAT	CVAL	EXT	GAL	MAD	MUR	NAV	PV	RIO
Individual characteristics																	
Gender																	
Male	52.0	52.0	52.2	54.0	50.5	53.4	52.0	53.0	53.5	52.9	52.0	53.0	53.3	52.4	52.5	51.5	54.3
Female	48.0	48.0	47.8	46.0	49.5	46.6	48.0	47.0	46.5	47.1	48.0	47.0	46.7	47.6	47.5	48.5	45.7
Nationality																	
Spanish	98.0	94.1	98.1	91.6	96.4	96.8	96.3	96.0	90.4	93.1	98.6	98.5	93.0	93.0	95.1	96.9	92.3
Foreign/ Not Spanish	2.0	5.9	1.9	8.4	3.6	3.2	3.7	4.0	9.6	6.9	1.4	1.5	7.0	7.0	4.9	3.1	7.7
Family type																	
Nuclear	81.9	83.9	78.7	73.1	71.5	79.3	84.8	86.4	77.6	79.3	85.1	79.3	75.0	81.6	80.9	80.3	81.8
Only mother	15.6	12.9	18.3	22.5	24.4	17.8	12.9	11.2	18.1	17.8	12.8	17.9	20.3	15.6	15.8	16.0	15.1
Only father	2.5	3.2	2.9	4.4	4.1	2.9	2.3	2.4	4.2	2.9	2.1	2.8	4.7	2.8	3.3	3.7	3.1
Labour status																	
Inactive	48.4	50.8	58.9	40.9	49.5	56.6	55.4	46.0	41.2	44.6	50.9	56.8	47.9	45.2	53.5	56.0	51.0
Unemployed	22.0	13.3	13.5	18.8	22.2	13.0	13.9	19.2	17.9	19.8	19.4	15.1	15.6	17.3	12.2	12.5	14.2
Employed	29.6	35.9	27.6	40.3	28.3	30.4	30.7	34.8	40.9	35.6	29.7	28.1	36.5	37.5	34.3	31.5	34.8
Familiar/Parents characteristics																	
Max. education																	
Lower secondary or less	58.0	42.2	40.1	53.3	57.7	39.4	43.9	58.6	45.5	52.5	63.7	49.6	36.8	54.1	34.6	30.9	43.2
Upper secondary or more	42.0	57.8	59.9	46.7	42.3	60.6	56.1	41.4	54.5	47.5	36.3	50.4	63.2	45.9	65.4	69.1	56.8
Labour situation																	
At least father/mother working	75.2	87.7	76.4	85.3	75.2	83.6	85.5	82.8	86.0	82.7	78.7	82.7	86.8	81.4	88.7	88.6	87.8
Other situation	24.8	12.3	23.7	14.7	24.8	16.4	14.5	17.2	14.0	17.3	21.2	17.3	13.2	18.6	11.3	11.4	12.2
Occupation																	
Managers and Professionals, Technicians and associate professionals, Clerical support workers	30.1	41.3	34.6	35.4	29.5	38.2	36.1	30.9	41.0	34.9	27.1	33.1	46.9	34.6	44.8	43.9	38.3
Service and sales workers, Skilled agricultural, forestry and fish, Elementary occupations	45.0	46.3	41.7	49.9	45.8	45.4	49.4	51.9	45.0	47.8	51.7	49.6	39.9	46.8	43.8	44.7	49.5
Unemployed or Inactive	24.9	12.4	23.7	14.7	24.7	16.4	14.5	17.2	14.0	17.3	21.2	17.3	13.2	18.6	11.4	11.4	12.2
Temporal																	
2005-2009	53.0	53.7	53.3	50.5	53.3	55.3	52.5	52.1	50.2	53.3	54.1	37.4	55.0	50.9	51.1	54.7	52.3
2010-2014	47.0	46.3	46.7	49.5	46.7	44.7	47.5	47.9	49.8	46.7	45.9	62.6	45.0	49.1	48.9	45.3	47.7
Treated	23522	4525	2874	2579	6771	2861	11080	9587	10672	9244	5105	10178	5844	4360	2614	4696	1821

[a] List of Spanish regions: AND: Andalucía, ARG: Aragón, AST: Asturias, BAL: Baleares, CAN: Canarias, CANT: Cantabria, CYL: Castilla y León, CLM: Castilla-La Mancha, CAT: Cataluña, CVAL: Comunidad Valenciana, EXT: Extremadura, GAL: Galicia, MAD: Madrid, MUR: Murcia, NAV: Navarra, PV: País Vasco, RIO: La Rioja.

Source: Own compilation based on Spanish Labour Force Survey.

Table 3

Average treatment effects on the treated within Spanish regions using Nearest Neighbour technique.

Control / Treated	AND	ARG	AST	BAL	CAN	CANT	CYL	CLM	CAT	CVAL	EXT	GAL	MAD	MUR	NAV	PV	RIO
AND					-			-			-						
ARG						-			-				-		-	0.062* (0.007)	-
AST				-			-0.029* (0.008)			-		-0.009 (0.008)		-0.087* (0.01)			
BAL			-				-			-		-		-			
CAN	-							-			-						
CANT		-							-				-		-	0.069* (0.008)	-
CYL			0,021* (0,008)	-						-		-		-			
CLM	-				-						-						
CAT		-				-							-		0.09* (0.008)	-	-
CVAL			-	-			-					-		-			
EXT	-				-			-									
GAL			-0.002 (0.009)	-			-			-				-			
MAD		-				-			-						0.075* (0.008)	-	-0.007 (0.012)
MUR			0.086* (0.011)	-			-			-		-					
NAV		-				-			-0.089* (0.007)				-0.077* (0.008)			0.003 (0.007)	-0.083* (0.012)
PV		-0.062* (0.007)				-0.06* (0.009)			-				-		-0.006 (0.008)		-
RIO									-				0.009 (0.011)		0.093* (0.012)	-	

Standard errors in parenthesis; negative values represent that early school leaving in the treated region (rows) is lower than in the control region (columns).

* Statistically significant at the 5 % level.

Table 4
Average treatment effects on the treated, Asturias, Navarra and País Vasco.

Control	Treated								
	Asturias			Navarra			País Vasco		
	ESL	ESL2	ESL3	ESL	ESL2	ESL3	ESL	ESL2	ESL3
BAL	–	–	–						
CYL	−0.029* (0.008)	−0.03* (0.008)	−0.015* (0.007)						
CVAL	–	–	–						
GAL	−0.009 (0.008)	−0.016* (0.009)	0.016* (0.007)						
MUR	−0.087* (0.01)	−0.096* (0.011)	−0.095* (0.01)						
ARG				–	–	–	−0.062* (0.007)	−0.081* (0.008)	−0.08* (0.007)
CANT				–	–	–	−0.06* (0.009)	−0.068* (0.009)	−0.071* (0.008)
CAT				−0.089* (0.007)	−0.098* (0.008)	−0.112* (0.008)	–	–	–
MAD				−0.077* (0.008)	−0.09* (0.009)	−0.049* (0.008)	–	–	–
NAV							−0.006 (0.008)	−0.008 (0.008)	−0.038* (0.008)
PV				0.003 (0.007)	0.008 (0.008)	0.037* (0.007)			
RIO				0.083* (0.012)	0.085* (0.013)	0.056* (0.013)	–	–	–

Standard errors in parenthesis; negative values represent that result variable in the treated region (columns, Asturias/ Navarra/ País Vasco) is lower than in the control region (rows).
* Statistically significant at the 5 % level.

Fig. 1. Evolution of early school leaving rate in Spanish regions, 2000–2016 (%).