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Migrant achievement penalties in Western Europe. What role for educational systems?

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Abstract

Internal and external migrations are a phenomenon of growing magnitude within the European continent. Most importantly, the last decades have once and for all destroyed the illusion of the transience of immigration settlement, raising concerns on the lack of integration of long term immigrants in host societies. In particular, migrant educational disadvantage is a serious issue in most European countries, as shown by international assessments on students' competencies. In the last years, public debates have called attention to the need of identifying institutional features able to endow children of migrants with equal chances to succeed in school compared to their native peers. However, empirical evidence on the role of educational systems in worsening or mitigating migrant learning disadvantage is still inconclusive.

In this dissertation, I conduct a systematic investigation of whether and why second-generation immigrants experience different achievement penalties in 17 Western European countries. The research design is based on a two-step, mixed methods approach. In the first step I provide a comparative assessment of migrant-specific penalties in educational achievement. The cross-country variability of migrant achievement penalties becomes the *explanandum* in the second step of analysis, when I assess the role of theoretically relevant characteristics of educational systems as potential *explanantes*. At each step of the analysis, I rely on methodological triangulation—by using variable-oriented and diversity-oriented methods—in order to improve the overall robustness of the empirical findings.

By using the 2006 and 2009 waves of the PISA survey, I analyze the relative disadvantage of 15-year-old students of immigrant *vs.* native origin in the literacy domains of mathematics, science, and reading. With a novel measure of migrant-specific penalty—revealing the relative of immigrant students within the achievement distribution of comparable natives—I show that second-generation immigrants dramatically lag behind their native peers, despite having been fully exposed to the same educational

system. This underachievement can only be partially explained by traditional mechanisms of stratification by social class broadly defined. On the contrary, migrant-specific penalties and socio-economic penalties come forth as two distinct dimensions of educational inequalities. Even if all Western European countries experience some degree of migrant penalties, sharp cross-country differences exist in their intensity. Moreover, as shown with additional analyses on Turkish second-generation immigrants, such cross-country differences cannot be reduced to the different origin compositions of immigrant populations.

Moving from four theoretical dimensions (school duration, stratification, standardization, and resources allocation), I identify as potentially relevant characteristics of the educational system: (i) the entry age in the (pre)school system; (ii) the age at which students are tracked into differentiated curricula; (iii) the degree to which second-generation immigrants are marginalized in low-quality schools. After investigating the relevance of these factors with several statistical and set-theoretic methods, I apply fuzzy-set Qualitative Comparative Analysis (fs-QCA) in order to systematically assess which kinds of educational systems—conceived as configurations of institutional elements embedded in national contexts—bring about severe migrant achievement penalties, and which do not. My findings indicate that several combinations of conditions can alternatively lead to equally severe penalties. In post-war immigration countries, early tracking into differentiated curricula produces severe penalties only when it marginalizes second-generation immigrants in second-tier tracks, and consequently low-quality schools. On the contrary, in new-immigration countries tracking by itself is sufficient to bring about severe penalties, while in Scandinavian countries—where most immigrants speak a language that is very distant from the national one—the decisive detrimental factor is the delayed entry of pupils into (pre)school. In order to avoid severe penalties, educational systems must be designed in a way to include children at a relatively young age. In post-war immigration countries where linguistic distance is low, this element is sufficient to avoid severe achievement penalties, but new immigration societies have more complex institutional pathways, since they combine a not-late entry in the (pre)school system with a late tracking into differentiated curricula and a low degree of marginalization of second-generation immigrants.

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Chapter 1

Framing the substantive and methodological questions

1.1 Educational opportunities for children of migrants in Western Europe

1.1.1 Policy relevance

In the last decades, the field of education has become an increasingly important element of social policy in Europe, as part of the new perspective of "social investment" (Ferrera, 2009; Van Kersbergen and Hemerijck, 2012; Nolan, 2013). The social investment strategy has been actively supported by international organizations like the OECD since the late 1990s (OECD, 1997) and has recently gained a renewed impetus with the adoption of a specific package by the European Commission (European Commission, 2013). The underlying idea is that welfare-state systems could be recalibrated giving a greater importance to the life course perspective, and focusing on the roots of social problems. Hence, social policies would shift from compensation towards prevention (Ferrera et al., 2000; Room, 2002; Allmendinger and Leibfried, 2003). In this sense, educational policy—including early child education and care, and support to lifelong learning—has a pivotal role in human capital investment, sustaining the development of individual skills to improve future life prospects and reducing social risks.

The social investment perspective also maintains a strong focus on inclusion and cohesion. As a consequence, international organizations have repeatedly called for reforms in European educational and training systems fostering quality *and* equity at the same

time (European Commission, 2006; OECD, 2012). School systems should provide equal learning opportunities to all students, including the more disadvantaged ones. Among the latter, students of immigrant background constitute a special focus of attention. They are often at risk of underachievement and early dropout, and are considered one of the most important categories to target in the next future (European Commission, 2008).

In effect, internal and external migrations are a social phenomenon of growing magnitude in the European continent. Most importantly, the last decades have once and for all destroyed the illusion of the transience of immigration settlement, raising the issue of new risks connected to the lack of integration of long-term immigrants in the host societies. New dividing lines in the stratification patterns of life chances have been uncovered, emerging as a problem of collective relevance to be targeted by public policy (Castles and Miller, 2003). In public debates, whether or not second-generation immigrants are well integrated in the school system is often pointed out as a crucial issue to be addressed. Indeed, endowing children of migrants with equal chances to succeed in school compared to their native peers could be a major step toward their economic and social integration.

But what kinds of educational systems are more effective in mitigating the educational disadvantage experienced by children of immigrants? Traditionally, research on the role of institutions in affecting the equality of educational opportunity has focused on stratification by social class and socio-economic resources. Some findings—like the detrimental role of tracking into differentiated curricula for students of lower social strata—are quite consolidated in the literature, to the point that they have already inspired policy reforms pursuing a greater equity of the school system (for instance in Germany, cf. Freitag and Schlicht, 2009). On the contrary, educational inequalities associated to migratory status are a much more recent concern. Up to this moment, literature has addressed this theme to a limited extent. Several policy briefs supported by the European Commission have reviewed empirical literature from educational science, psychology, labor economics, and sociology of education in an attempt to identify institutional aspects and teaching practices apt at reducing migrant learning disadvantage (EACEA, 2004; Christensen and Stanat, 2007; NESSE Network, 2008; Nusche, 2009). However, these works often focus on very specific interventions and lack a comprehensive theoretical framework necessary in order to generalize the effectiveness of a given policy instrument beyond the context it was designed for. At the same time, publications from the OECD have focused on some specific aspects of educational systems that are found to be positively associated with the performance of immigrant students in internationally standardized tests (OECD, 2006,

2010; OECD, 2010). These studies are praiseworthy in shedding light on some institutional features that might be especially beneficial for immigrant students. Nevertheless, they look at mere correlations between institutions and outcomes across a variety of countries that are very heterogeneous in several respects. In this work I argue that, so far, no established evidence indicates the direction that educational policy should take in order to enhance the educational opportunities of children of immigrants.

The present dissertation speaks to these debates by illuminating the central role of national education systems in influencing the school performance of second-generation immigrants in Western Europe. This work contributes to the existing knowledge first of all by providing a theoretical reflection on the dimensions of educational systems specifically relevant for children of immigrants. Secondly, it brings new empirical evidence in by systematically analyzing which kinds of educational systems, and under given contextual conditions, lead second-generation immigrants to severely underperform their native peers.

1.1.2 *Explanandum*: migrant achievement penalties

A first order of research questions addressed in this dissertation concerns the magnitude of migrant learning disadvantage in Western Europe: do students of immigrant origin lag behind their native peers everywhere? In which countries do they perform worst? Are cross-country differences merely driven by different demographics? Given the focus of interest of many scholars in the micro-level determinants of migrant learning disadvantage (Heath and Brinbaum, 2007), previous studies were prevalently conducted at a national rather than international level, with obvious implications for the lack of comparability of their results. With few exceptions (Schneeweis, 2011; Dustmann et al., 2012a), the limited number of studies carried out at an international level aimed at testing hypotheses on micro-level factors across different contexts, rather than at comparatively assessing the educational performance of immigrant students as such. As a consequence, the question of how large is migrant educational disadvantage in different European countries has remained largely unresolved.

Moving from Coleman (1968), I consider that a key element to understand equality of learning opportunities is given by structural differences in educational outcomes between distinct students' categories, defined according to family background. For this reason, migrant learning disadvantage is here conceptualized as the relative educational achievement of immigrant students, compared to their native peers. In order to be truly

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comparable, the two categories must have developed their educational careers within the same school system. Accordingly, I restrict my focus to second-generation immigrants strictly defined, i.e. individuals born in the destination country from parents born abroad, who have therefore been fully exposed to the same educational system as their native peers have. Educational outcomes involve two main dimensions: attainment (i.e. the formal progression through the school system) and achievement (i.e. the skills and knowledge actually acquired). Due to the different designs of educational systems, it is hard to compare educational attainment across countries. On the contrary, international assessments on students' performance offer a standardized framework for cross-country comparisons on educational achievement. Therefore, in this dissertation educational outcomes are restrictively conceived in terms of achievement. More specifically, I look at the educational skills achieved by the age of 15, encompassing the whole period spent by pupils in compulsory schooling.

In order to identify the educational disadvantage actually stemming from the migratory status of students, it is essential to consider other individual characteristics that might influence the educational achievement of both natives and immigrants. Indeed, as documented by previous research, the reasons why children of immigrants tend to underperform natives can be partially ascribed to their lower socio-economic resources (Kristen and Granato, 2007; Van De Werfhorst and Van Tubergen, 2007). Still, after controlling for socio-economic differentials, a residual educational disadvantage of migrants persists (Rothon, 2007; Heath et al., 2008). The focus of interest of the present dissertation lies precisely on this migrant-specific disadvantage, which some scholars labeled "migrant penalty" (Heath and Cheung, 2007; Heath et al., 2008). Accordingly, I propose a measure of migrant penalty in educational achievement revealing the relative position of second-generation immigrants within the achievement distribution of native students sharing the same socio-economic background.

The scope of this dissertation is limited to Western Europe, which provides the framework for a meaningful comparison of receiving societies. Beyond the societal and institutional similarities, these countries share a history of post-war labor immigration, prevalently composed by individuals coming for economic and family reasons, as opposed to traditional settlement countries like the US or Australia. Yet, immigrant populations across Western Europe are diverse in terms of origin. In order to deal with this remaining composition issue, I check the robustness of my findings with additional analyses on second-generation immigrants of Turkish origin only, an immigrant group that is often considered as well comparable across destination societies(Schneider and Crul, 2009).

To sum up, in the first part of this dissertation I analyze individual student achievement near the end of compulsory schooling in 17 Western European countries, with the aim of quantifying migrant achievement penalties, i.e. the relative disadvantage experienced by second-generation immigrants, specifically in reason of their migratory status. Migrant achievement penalties constitute my *explanandum.* The second part of the dissertation is dedicated to explain the variability of migrant achievement penalties: why do second-generation immigrants experience severe penalties in some Western European educational systems, but not in others?

1.1.3 *Explanantes*: potentially relevant dimensions of educational systems

The empirical evidence collected in the first part of the dissertation raises a second order of questions: do educational systems play any role in explaining the cross-country variability of migrant achievement penalties in Western Europe? Which structural features are particularly detrimental (and which beneficial) for children of immigrants? How do they combine in the different institutional structures of educational systems? Do these features matter in all the countries considered, or does their relevance depend on contextual elements? Although some works have already tried to address similar questions (Levels et al., 2008; Schneeweis, 2011; Fossati, 2011; Cobb-Clark et al., 2012; Dronkers et al., 2012b), empirical evidence on the role of educational systems in worsening or mitigating migrant learning disadvantage is still inconclusive.

In order to derive my hypotheses on the role of specific institutional features—my *explanantes*—I draw on the work of Turner (1960) on the manifest functions of educational systems, and on the typologies proposed by Sorensen (1970) and Allmendinger (1989), resting on the key dimensions of school stratification (i.e. the structural differentiation of students within given grades), and standardization (i.e. homogeneity in the quality of education provided nationwide). Nevertheless, this literature was developed having in mind educational inequalities occurring along more traditional lines of stratification, notably social class and socio-economic background. Given the specificity of educational inequalities stemming from migratory status, I have to adapt my theoretical framework to make it more coherent with the micro-foundations of migrant learning disadvantage. In some Western European countries, second-generation immigrants certainly face the risk of marginalization in low-quality schools, which might be harmful to their educational careers. Hence, I retain standardization and stratification as potentially relevant dimen-

sions, because they affect students' sorting into schools, as well as the heterogeneity of curricula and the allocation of human and financial resources. My theoretical framework is then enriched by an additional dimension that is likely to be specifically relevant for second-generation immigrants. This is the duration of schooling, and in particular the starting age of (pre)school: an early inclusion of children of immigrants in the educational system could promote their cognitive, linguistic, and social development, with positive spillovers on future educational outcomes.

Along with the institutional dimensions, I consider the role played by the national context in setting the conditions under which the aforementioned dimensions of educational systems may worsen or reduce migrant achievement penalties. In particular, I take into consideration the linguistic distance between the host country language and those of the immigrant population. By including this dimension in my theoretical model, I acknowledge that the linguistic composition of immigrant populations can affect a country's capability to integrate their children in the school system. For instance, countries where immigrants prevalently speak a close relative of the host language, or coming from former colonies where the host language is still broadly spoken, most probably have an easier job than countries where the host language is very different from those of most immigrants, no matter the structure of the educational system. At the same time, some features of educational systems—notably an early inclusion of children in (pre)school—are likely to be particularly salient in countries where linguistic distance is high. A second contextual element that I consider as potentially affecting a country's capability to tackle migrant penalties is the history of immigration. Despite the fundamental comparability of Western European countries, it is important to differentiate among them according to the moment immigration became massive. Indeed, irrespective of the formal structure of educational systems, in countries where immigration started already in the post-war period, effective teaching practices to deal with immigrant students might have informally been developed.

From this theoretical framework, I derive several working hypotheses on the role of educational systems, which I subsequently test with a variety of methods based both on variable-oriented and diversity-oriented approaches. More specifically, I first explore how explanatory variables are correlated to different degrees of migrant penalties. Next, I investigate the asymmetrical relations between different configurations of institutional and contextual conditions on the one hand, and the occurrence of severe migrant penalties on the other hand. This exploration helps me to refine the theoretical framework making it more sound for the specific contexts of Western European countries.

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In a nutshell, the second part of my dissertation is dedicated to develop a theoretical framework for the explanation of migrant penalties and then to examine its empirical relevance in Western Europe. First, I identify dimensions of educational systems and contextual conditions that could be specifically relevant for the educational achievement of second-generation immigrants. Second, I investigate which kinds of educational systems—conceived as complex entities of interconnected elements—produce severe migrant penalties, and which do not.

1.2 Methodological issues in comparative educational research

A third order of research questions at stake is of methodological nature and relates to the explanatory phase of the dissertation in particular: to what extent are mainstream statistical analyses helpful to scholars interested in the cross-country comparison of educational systems? What is the added value of diversity-oriented methods? Can methodological triangulation provide a better understanding of the complex causal patterns leading from the institutional structure of educational systems to students' outcomes? With its mixed-methods research design, this dissertation provides an excellent framework to address these questions.

1.2.1 Limitations of mainstream statistical analysis

The field of comparative studies on educational systems, especially when focused on policy outcomes, is dominated by quantitative scholars (Busemeyer and Trampusch, 2011). The quantitative approach to comparative educational research incurs in a number of issues that I will briefly discuss in what follows.

In the first place, these studies are typically based on cross-country regression models aimed at identifying the net effects of single institutional features on educational outcomes. Therefore, they implicitly assume that educational systems are simply a sum of independent features, whose effect on students' outcomes is nothing but additive: the impact of each institutional characteristic is assumed to be homogeneous across contexts, and the combination of two or more constitutive aspects of educational systems is not taken into consideration. This is a common implicit assumption in most variable-oriented studies, and even more so if they are cross-country comparisons. Indeed, the limited number of countries results in small sample sizes, which make it impossible to

estimate significant interaction terms.

More generally, it is usually difficult for mainstream statistical analysis to detect patterns of complex causation (Braummoeller, 2003). By assuming additivity, one rules out for the possibility of several explanatory factors to act in combination—what John Stuart Mill called "chemical causation" (Mill, 1868). Another homogenizing assumption typically hidden in regression analysis is that there is a single model applicable across all observations. In a search for generalizable causal explanations, context and country specificities are reduced to the status of noise. Finally, like all other techniques fundamentally based on correlation, regression analysis looks for association patterns, and thus assumes that causal relations are always symmetrical: in other words, if a given cause generally produces a given outcome, then that outcome is to be generally explained by the same cause.

A final shortcoming of variable-oriented approaches derives from limited diversity, i.e. the fact that the universe of relevant cases is typically too small to cover the property space entailed by the interplay of potential explanatory factors (Lazarsfeld, 1937). This is an inherent (but overlooked) issue in comparative social science, regardless of the methodological approach chosen. However, in order to deal with it, quantitative scholars typically make restrictive assumptions that—although invisible to most readers—rely on "extreme counterfactuals" (King and Zeng, 2006). The few studies that have so far investigated the role of educational systems to explain migrant learning disadvantage incur in problematic issues when trying to deal with limited diversity (Levels et al., 2008; Schneeweis, 2011; Fossati, 2011; Cobb-Clark et al., 2012; Dronkers et al., 2012b). On the one hand, in order to increase the number of observations, they group together very heterogeneous countries. On the other hand, in order to reduce the number of parameters to be estimated, they make restrictive—and often hardly tenable—assumptions on the effects of individual-level and country-level independent variables.

1.2.2 The promise of configurational comparative methods

Since their introduction more than two decades ago (Ragin, 1987), configurational comparative methods have been increasingly viewed as a powerful analytical framework in order to address the problematic issues of variable-oriented comparative research (**?**). These methods permit a systematic analysis of statements of necessity and sufficiency, which pervade social sciences, although in a not obvious way (Schneider and Wagemann, 2012). Therefore, causal relations are here conceived in terms of subset/superset re-

lations, rather than as symmetrical associations. Besides asymmetry, configurational comparative methods are able to detect other forms of causal complexity, notably equifinality and chemical causation. As for the first, through the use of the set union logical operator, it is recognized that different causal paths may lead to the same outcome. Secondly, causal conditions are allowed to operate in combination with each other by set intersection. It is important to note that these methods do not assume causal complexity, but simply allow for it, by relaxing the restrictive assumptions of additivity, unit homogeneity, and uniformity of causal effects typically made by mainstream statistical analysis.

Another reason why comparative configurational methods are attractive to comparative scholars is that they are suitable to conduct research with a limited number of cases, unlike statistical inferential techniques. This is possible for two reasons. First of all, they openly address the issue of limited diversity with the use of counterfactual thinking. Researchers are asked to reflect upon the assumptions they make and to justify their plausibility (Schneider and Wagemann, 2012). Theoretical and case knowledge are not disregarded, but can be called in to produce more parsimonious explanatory models (Ragin and Sonnett, 2004). A second reason why comparative configurational methods are able to deal with small-N research designs is that—as made clear by their creator, Charles C. Ragin—their goal is not straight causal inference, but rather "to aid causal interpretation, in concert with knowledge of cases" (Ragin, 2008, 141). Through the systematic analysis of set relations, we can identify possible triggering and enabling conditions for the phenomenon of interest (Befani et al., 2007), but the framework is more exploratory than confirmatory. After all, the fact that scholars engage in research in order to test preexisting theories is nothing but "a folklore" (Ragin, 1987, 164). In most cases, the investigation of social phenomena is somehow empirically grounded, and research processes are to some extent inductive. Scholars using comparative configurational methods make this "dialogue between ideas and evidence" explicit: concepts and hypotheses are open to reformulation during the research process. As a consequence, the resulting findings are not law-like regularities, but provide a deeper understanding of the processes underway for the cases of interest.

Conducting analyses on a limited number of cases is not only possible, but also recommended when adopting this methodological framework, which has a strong focus on cases and is diversity-oriented. Indeed, a good knowledge of single cases is needed since configurational comparative methods combine an analytical strategy with a holistic conception of social phenomena: cases are seen as configurations of constitutive properties.

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Moreover, such properties are carefully operationalized based on their qualitative meaning.

Despite the sharp increase in the use of configurational comparative methods experienced in the last years (Rihoux et al., 2011), empirical applications in the field of comparative educational research are lacking (with the exception of Freitag and Schlicht, 2009). The explanatory part of this dissertation relies to a large extent on such methods, and in this way contributes to the assessment of their added value in this field of research.

1.2.3 A two-step, mixed-methods research design

The overarching research question of this dissertation is why Western European countries display different degrees of migrant achievement penalties. This corresponds to a "causes-of-effects" research design, an approach to explanation that is more common among qualitative than quantitative scholars (Goertz and Mahoney, 2012). However, my methodological approach is neither strictly qualitative nor quantitative. On the contrary, I deliberately adopt a pluralistic strategy in order to explore potential explanations of the phenomenon of interest. I do so because I believe that—especially in the field of public policies, where the multiplicity of interpretative accounts often prevents the cumulation of established evidence—mixed-methods designs are better equipped than single-method designs to validate collective knowledge. Through methodological triangulation, scholars not only improve the overall confidence of their empirical findings, but are forced to pursue a greater precision in conceptualization, measurement, hypothesis formulation, and interpretation.

In particular, my research design is based on a two-step, mixed-methods approach: in the first step I construct the *explanandum*, i.e. the variability of migrant achievement penalties in Western Europe; the second step is instead devoted to the investigation of potential *explanantes*, i.e. characteristics of educational systems as well as contextual conditions. In the first step, I mainly rely on statistical methods, in order to measure migrant penalties as the achievement disparity between natives and second-generation immigrants *net of* socio-economic background. However, a parallel investigation using the novel technique of fuzzy-set coincidence analysis allows to enrich the understanding of migrant learning disadvantage in relation to the disproportionate cumulation of factors of disadvantage existing among immigrant parents. In the second-step, I investigate the institutional determinants of cross-country differences in migrant penalties. In order to mitigate the issue of limited diversity, I develop a theoretical reflection that allows me

to identify a reduced number of *explanantes*. Next, I systematically assess how these explanatory factors combine in influencing the emergence of migrant penalties in Western Europe. Again, my analytical strategy is based on both variable-oriented and diversity-oriented methods, though the latter play a more important role in this phase. I use configurational comparative methods—and notably fuzzy-set Qualitative Comparative Analysis (fs-QCA)—to explore which kinds of educational systems systematically lead to severe penalties, and which on the contrary are able to avoid them. In this framework, educational systems are conceived as configurations of institutional characteristics embedded in national contexts. Yet, in this phase I also use variable-oriented methods, to explore the association patterns between institutional variables and the outcome. In particular, I rely on regression-tree analysis, a recursive partitioning technique able to detect complex interaction patterns between explanatory variables.

1.2.4 Outline

The remaining chapters of this dissertation are structured as follows. Chapter 2 describes the conceptual framework, relying on a multi-disciplinary perspective on sociology, economics and political science. More precisely, in Section 2.1 I define the main concepts concerning educational outcomes and opportunities used throughout the dissertation and discuss them in the light of the theoretical debate on the process of intergenerational transmission of educational inequality. This leads to the question of how educational institutions interact with individual factors in this process and whether the structure of educational systems makes the difference. Hence, in Section 2.2, I review institutionalist accounts of the historical development of educational systems, as well as contributions that highlight the impact of partisan politics on this development. I then consider several classifications of educational systems and call attention to four institutional dimensions that are particularly relevant for the purposes of this dissertation. In Section 2.3, I discuss the concepts of "children of immigrants" and "second-generation immigrants", and clarify the definitions adopted in this thesis. I also present two rival perspectives on the assimilation paths of immigrants' descendants. Finally, Section 2.4 is devoted to give an account of political-science standpoint on migration studies. This offers a theoretical framework for the definition of my scope conditions and my case selection.

Chapter 3 is devoted to the *explanandum*. In the first part of the chapter, I extensively review previous studies looking for micro- and meso-level determinants of migrant learning disadvantage. In particular, in Section 3.1.1 I report empirical evi-

dence—mainly stemming from single-country studies—on the role of socio-economic resources and migrant-specific resources, including their possible interactions. In doing so, I differentiate studies according to their emphasis on educational attainment, achievement, or choices. Next, in Section 3.1.2, I examine empirical contributions focusing on meso-level determinants of migrant learning disadvantage, specifically on the role of teachers, classrooms, and schools. Section 3.1.3 reviews studies of comparative nature, by highlighting cross-country differences in migrant-learning disadvantage. In the second part of the chapter, I present my own empirical analyses on migrant achievement penalties in Western Europe. In Section 3.2.1, my research questions and hypotheses are laid out. Section 3.2.2 specifies my analytical strategy, including a novel measure of migrant-specific penalties. Section 3.2.3 describes the data used, as well as the construction of the variables and the models. In Section 3.2.4 I present and discuss my results, while in Section 3.2.5 I test the robustness of my findings against alternative model specifications. Finally, in the third part of the chapter, I present additional analyses further exploring the differential accumulation of factors of advantage and disadvantage for native and immigrant students. In 3.3.1 I spell out my research questions, while in 3.3.2 I describe by analytical strategy and in particular the original method of fuzzy-set coincidence analysis. Sections 3.3.3 and 3.3.4 present the operationalization of fuzzy sets and the empirical results.

In Chapter 4, I shift my focus towards institutional *explanantes*. In Section 4.1, I examine previous works looking for macro-level determinants of educational inequalities. While most literature has focused on inequalities driven by socio-economic differentials, other lines of stratification, like gender, and, notably, migratory status have remained unexplored to a large extent. The few works attempting to relate cross-country variability in migrant learning disadvantage to institutional aspects incur in a number of limitations, which I discuss in Section 4.1.3. Next, in Section 4.2 I develop a theoretical framework of the institutional and contextual dimensions that are specifically liable to affect migrant achievement penalties, from which I derive four working hypotheses. In Section 4.3 I delineate my analytical strategy, which is based on methodological triangulation. With variable-oriented and diversity-oriented approaches I explore how theoretically relevant dimensions of educational systems are related to more or less severe migrant penalties. The construction of country-level indicators and their calibration into fuzzy sets are documented in Section 4.4. Section 4.5 reports results from the variable-oriented approach, including bivariate correlations, exploratory OLS regressions and regression-tree analysis. Section 4.6 reports results from the diversity-oriented approach, in particular the tests for

individual necessity and sufficiency of single institutional conditions, the exploration of institutional configurations, and results from fuzzy-set Qualitative Comparative Analysis (fs-QCA). I document in detail the "dialogue of ideas and evidence"(Ragin, 1987, 164-71) through which I developed my fs-QCA. Final results of fs-QCA are presented in Section 4.6.4.

Chapter 5 offers a comprehensive framework for discussing the main findings of this dissertation. I put forward the substantive (Section 5.1) and methodological (Section 5.2) contributions of this dissertation for the study of educational inequalities and their institutional determinants. In the concluding sections, I discuss the implications of my findings from a policy-oriented perspective (Section 5.3) and sketch possible directions for future research (Section 5.4).

Chapter 2

Conceptual framework and case selection

In this chapter, I offer a broad overview of the theoretical arguments and concepts employed in this dissertation. By presenting the state of the art of the theoretical debates on educational inequalities and migrant integration, this chapter provides the grounds to discuss how educational systems mediate the reproduction of educational inequalities for natives and migrants. Given the two-step nature of the research design of this dissertation, in this phase I do not develop structured hypotheses on the micro- and macro-level mechanisms behind migrant achievement penalties. They will be discussed in greater detail in Chapter 3 and Chapter 4, respectively.

2.1   Inequalities in educational opportunities

In an accompanying note to his renowned 1966 report, James Coleman illustrates the historical evolution of the concept of Equality of Educational Opportunity (Coleman, 1968). In particular, he highlights how, over time, the emphasis shifted from the equal access to schooling towards its actual outcomes. In the United States of the early 19th century, Equality of Educational Opportunity (EEO) implied the public provision of free and compulsory education in the form of standardized curricula, regardless of children's background. By the time Coleman was writing, however, EEO had evolved towards a more progressive conception which encompassed "not merely the equality of educational inputs, but also the intensity of the school's influences, relative to the external divergent influences. That is, equality of output is not so much determined by equality of resource

inputs, but by the power of these resources in bringing about achievement" (Coleman, 1968, 22). A perfect EEO would then imply that, as children progress in their educational career, the school system is able to compensate—also by means of differential treatment—for any initial disparity. Clearly, this does not entail equality of educational outcomes across all individuals, but only *between groups* defined according to some ascribed characteristic such as social background, gender, or race (Coleman, 1968, 21).

Educational outcomes, in turn, comprise two dimensions: on the one hand, *educational attainment*, i.e. the progression of students through the schooling system; on the other hand, *educational achievement*, i.e. the skills and knowledge they actually acquire. Common indicators of attainment are school completion, level of qualifications, grade retention, school delay, and dropout risks. Conversely, achievement is usually operationalized in terms of marks or standardized test scores.

Empirical evidence undoubtedly shows that EEO is subject to violations in all industrialized societies (Shavit and Blossfeld, 1993; Breen et al., 2009). But how does the process of intergenerational transmission of inequality work? According to the seminal work of Boudon: "Inequality of educational opportunity is generated by a two-component process. One component is related mainly to the cultural effects of the stratification system. The other introduces the assumption that even with other factors being equal, people will make different choices according to their position in the stratification system" (Boudon, 1974, 36). Under the first component, that he labels "primary effects", lie all the influences that family background exert on pupils' cognitive skills and, through them, on their educational attainment. Vice versa, "secondary effects", which relate to the latter component, represent the direct effects of family background on students' progression through the school system, irrespective of their cognitive skills. From this framework, aside the dimensions of achievement and attainment, emerges the importance of *educational choices* at crucial transitions.

Except for genetic endowments, human capital is not directly transferable across generations. Therefore, primary and secondary effects operate via more or less aware parental behaviors. First of all, as suggested by the economics of education, families make rational investment choices in the education of their offspring, in terms of financial aid, but also of personal involvement, encouragement, affective and material support in coping with school difficulties (Becker, 1964). Choices are partially driven by perceived direct and indirect costs and by the value attached to each educational choice (Breen and Goldthorpe, 1997).

Clearly, since resources are unevenly distributed across families, these behaviors repro-

duce educational inequality through primary effects: children of advantaged background benefit of a favorable home learning environment, which parallels and often precedes the school environment. Moreover, highly educated parents possess the necessary information to navigate the school system and therefore to support their children in crucial educational transitions. Hence, the intergenerational transmission of human capital can also be produced by secondary effects, i.e. irrespectively of students' actual ability.

Nevertheless, parents of different background may have different perceptions of the utility derived from investing in their children's human capital. In effect, a theory of agency based on pure rational choice is not able to account for the fact that, despite their children are those who benefit most of the exposure to schooling, low educated parents generally invest considerably less in their human capital, as opposed to highly educated ones, even when financial costs are contained. Indeed, as pointed out by Coleman (1988), human and social capital interact in affecting the cognitive development of children, as well as the formation of educational aspirations. The complementarity of social capital (both within and outside the family) in producing more or less successful educational outcomes involves rational choice components, but also obligations and expectations, which in turn depend "on trustworthiness of the social environment, information-flow capability of the social structure, and norms accompanied by sanctions" (Coleman, 1988, S119). Here again, it is clear that the combined influence of human and social capital on educational attainment can be direct or indirect. On the one hand, it can operate independently of previous ability; on the other hand, it also operate through the creation of higher cognitive performance. When analyzing the educational outcomes of children of immigrants, Coleman's framework is particularly useful in the sense that ethnic communities could be used as a source of human and social capital or, in other words, could constitute a form of "ethnic capital" (Borjas, 1992). Therefore, ethnic networks characterized by strong ties, access to capital and openness might play an important role in boosting educational opportunities for children of migrants (Borjas, 1992; Portes and Zhou, 1993; Portes and Rumbaut, 2001; Zhou, 1997; Hatton and Leigh, 2011).

Finally, the intergenerational transmission of educational inequality can also work through the more subtle mechanism of inherited "cultural capital" (Bourdieu and Passeron, 1977, 1979). According to this framework, the school system operates in order to reproduce the existing social stratification. On the one hand, the values, attitudes and behaviors—constituting the *habitus*—acquired during socialization have a direct influence on educational success. Indeed, children from high and middle classes are more likely to master the cultural codes underlying the educational system and find it easier to cope

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with its implicit expectations. Hence, cultural capital has an impact on educational achievement and, through primary effects, on final attainment. Secondly, irrespective of students' educational performances, teachers are more inclined to reward cultural capital since they are themselves part of the dominant classes. By raising teachers' expectations towards children of advantaged background, cultural capital can therefore have an impact on educational choices of students and then, through secondary effects, on their attainment. Moreover, also students' achievement can be affected by the way the educational system rewards cultural capital, because teachers may spend more energy in motivating and supporting those who they perceive as gifted students.

The empirical analyses of this dissertation are based on the educational achievement of two groups of students (natives *vs.* migrants) near the end of compulsory education. As a consequence, against the theoretical framework just outlined, my main interest lies in the intergenerational transmission of cognitive abilities through primary effects and in the role of educational systems in mediating this process. However, in some countries examined in this dissertation, the achievement of 15-year-old students is also partially affected by previous educational choices. In turn, choices are affected by family background through both primary and secondary effects.

2.2 The structure of educational systems

Educational systems set the opportunity structure where students with different backgrounds have access to school, develop their cognitive skills and proceed through grades. Unfortunately, theoretical reflections on the structure of educational systems and on their implications for individual educational outcomes are limited. Within political science, the study of education has always been a neglected field (Jakobi et al., 2009). For a long time, welfare state research disregarded education as a subject of study. Only in the UK education policy was viewed as a constitutive component of social policy (Finch, 1984). More generally, as lamented by Busemeyer and Trampusch (2011, 432), even within disciplines where empirical educational research is more developed, "there is an enormous disproportion between investments in data analysis and in theories" which can partially explain the inconsistency of results on the role of specific institutional features in shaping educational outcomes. The studies reviewed in the following paragraphs are, nevertheless, helpful in setting a suitable theoretical framework for the empirical questions addressed in this thesis.

When approaching this field, one should first of all recognize that the different insti-

tutional designs of educational systems have specific historical roots. From a perspective of historical institutionalism, several scholars from political science and macro-sociology have traced the development and expansion of higher education systems in Europe and in other industrialized countries. Heidenheimer (1973, 1981) opened up the field by exploring the social and political determinants of educational expansion in the United States, Britain, Sweden, and Germany. His work shows how differences in interest group powers have shaped divergent educational policies on the two sides of the Atlantic. Other scholars have expanded this line of research by looking at specific sectors of the school system, such as higher education (Heidenheimer, 1997; Windolf, 1997) and vocational training (Thelen and Ikuo, 1999; Thelen, 2004).

The way an educational system is organized depends not only on its historical development, but also on present-day choices of policy-makers. In this perspective, an important concern is how the partisan politics of educational reform takes place. Several studies focus on the role of political actors in promoting or opposing reforms to increase choice in general education (Ball, 1993; Lundahl, 2002; Klitgaard, 2007, 2008), while others concentrate on the development of the system for vocational education and training (Ahier and Esland, 1999; Flude and Sieminksi, 1999). Moreover, several studies investigated the determinants of recent changes in the governance of higher education in a comparative framework (Braun and Merriem, 1999; Kogan et al., 2006). Generally speaking, the privatization and the internationalization of higher educational systems are privileged topics for political scientists who adopt a governance perspective (Jakobi et al., 2009). Beyond educational reform, another subject of investigation is the distributive politics of education. A number of studies have investigated the importance of partisan politics on educational spending (Castles, 1982; Boix, 1997, 1998; Busemeyer, 2007; Schmidt, 2007; Iversen and Stephens, 2008; Ansell, 2008). In particular, a popular subject of analysis is whether the political preferences of social-democratic parties in the field of education reflect those in other domains of social policy. Indeed, the redistributive consequences of educational expansion are not obvious. Hence, especially as far as investments in higher education are concerned, left-wing parties may not push for expansive policies (Ansell, 2007, 2008; Jensen, 2011). However, when considering overall educational spending, there seem to be a positive correlation with the presence of social-democrats in government cabinets (Busemeyer, 2009). According to Boix (1997, 1998), investments in human capital are appealing to social-democrats because they are increasingly seen as a supply-side instrument to promote economic growth.

A similar perspective on human capital investment is provided by a recent strand

of literature focused on the "recalibration" of the welfare state (Ferrera et al., 2000; Room, 2002; Allmendinger and Leibfried, 2003). According to these authors, the policy reforms implemented in Europe in the last decades envisage a shift of the welfare system from "compensatory" to "preventing" policies. Education is the privileged field of action for this policy strategy, because—by investing in the early life stages of individuals—it is expected to prevent social risks associated to health, employability, and poverty in the long-run. Given that educational and training systems differ among industrialized countries, Allmendinger and Leibfried (2003) and Iversen and Stephens (2008) follow Esping-Andersen (1990) and talk about "different worlds" of competence production or human capital formation. With an empirical exploration, Peter et al. (2010) find support for the application of the original "three worlds" distinction made by Esping-Andersen to the field of education. Indeed, between-school educational inequality is highest in conservative welfare states and lowest in social democratic countries. Willemse and de Beer (2012) develop the theoretical framework initiated by these authors and construct a typology of higher educational systems in Western Europe based on the two central concepts of welfare state identified by Esping-Andersen: decommodification—referred to the market structure—and stratification—referred to the status hierarchy produced by the system. In a recent contribution, Beblavý et al. (2013) show that while generally each European state has a single "policy culture" on education and pensions with regard to decommodification, there is much less consistency between these two policy sectors in the stratification produced. Overall, these authors call for an integration of the study of education systems into comparative welfare state research.

The structure of educational systems has been studied not only in terms of its historical and political determinants, but also from the perspective of its potential consequences on equality of educational opportunities. Turner (1960) postulated two idealtypical kinds of systems, based on the normative views on upward social mobility prevalent in a given country. On the one hand, views of upward mobility as a "contest" lead to competence-based educational systems, best exemplified by the case of United States; on the other hand, credentialist systems like the English one stem from "sponsored" conceptions of upward mobility. Hopper (1968) further developed Turner's intuition by putting forward a typology of educational systems based on two normative dimensions underlying school selection processes: on the one hand, their overall individualistic *vs.* collectivistic ideology; on the other hand, particularistic views on learning—generating diffuse skills—as opposed to universalistic views—generating more technical skills. The intersection of these two dimensions produces four idealtypical kinds of educational systems:

aristocratic, paternalistic, meritocratic and communistic. Sorensen (1970) argued that the extent of organizational differentiation of students is a constitutive feature of educational systems. In particular, he distinguished between vertical differentiation, that takes place within schools among different ability groups, from horizontal differentiation, that on the contrary concerns the division of student cohorts into different kinds of school curricula. Allmendinger (1989) stressed that beyond the dimension of differentiation—or, as she defines it, stratification—another one is important if one is interested in the intergenerational transmission of inequality. This is the degree of standardization of quality standards nationwide: curricula, school leaving examinations, teachers' training and financial resources may differ between areas of the country or from school to school. In a recent contribution, Nelson (2008) further extends these conceptualizations by adding up two institutional dimensions relevant to understand the relationship between education policy and labor market integration: on the one hand, the importance of vocational training, and on the other hand the kind of credentials certification.

The various classifications of educational systems presented in the previous paragraph explicitly or implicitly refer to the three manifest functions of educational systems identified by Hopper (1968, 30): (i) the selection of students, i.e. their sorting according to ability; (ii) their instruction according to national standards and (iii) their allocation into occupational roles. Figure 2.1 summarizes the relations between institutional dimensions and functions by means of a Venn diagram. Some dimensions refer to one function only; for instance, the importance of vocational training is mostly relevant for the allocative function. Most of them, however, refer to multiple functions at the same time; for instance, the degrees of standardization and differentiation are important for the three functions altogether, while the credentials certifications are important for both the selection and the allocation of pupils, but not so much for their instruction.

In the diagram, I highlighted the set corresponding to instruction, because this is the most relevant function when studying educational achievement. Hence, four dimensions pertain to the theoretical framework of my empirical analyses: (i) the *duration* of schooling, i.e. the amount of time pupils spend in the educational system; (ii) its degree of *stratification*, i.e. the structural differentiation of students within given grades; (iii) the allocation of human and financial *resources*; (iv) the degree of *standardization* in the quality of education provided nationwide. I will elaborate more on them in chapter 4, where I will outline specific hypotheses on the importance of educational systems to explain cross-country variation in migrant achievement penalties.
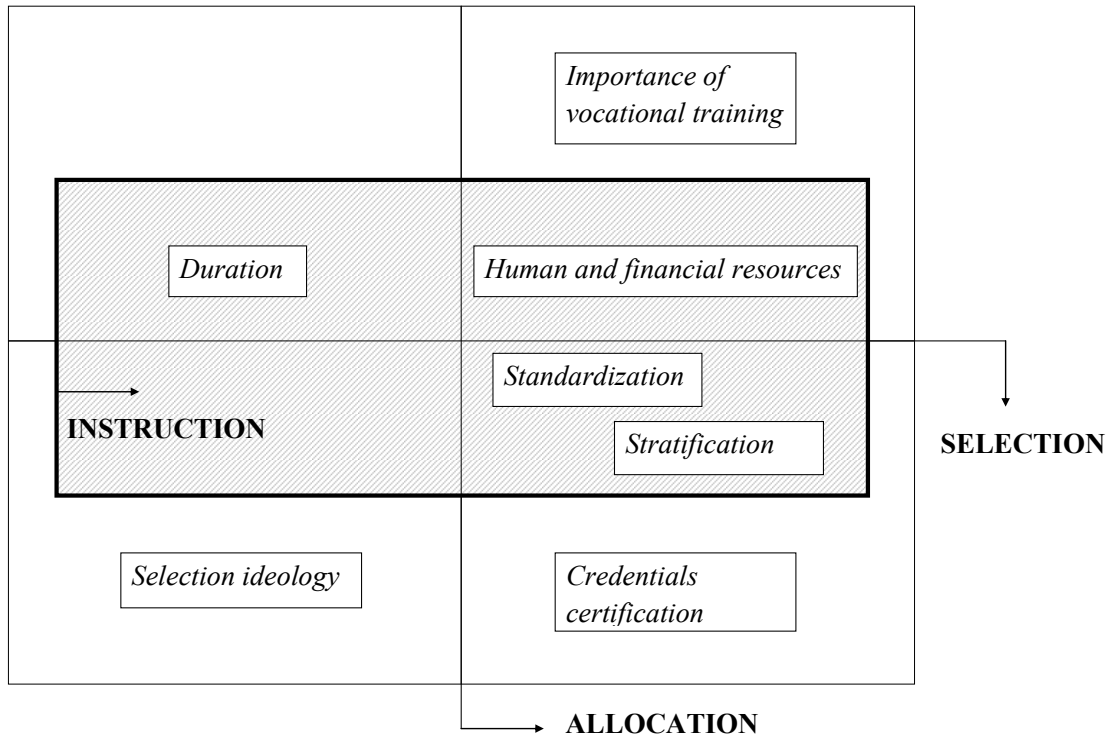
Figure 2.1: Venn diagram depicting the institutional dimensions (in textboxs) theoretically relevant for one or more manifest functions of educational systems (Hopper, 1968). The inner set pertains to the instruction function, the right-side set to the allocation function, and the lower-side set to the selection function. Set intersections correspond to the joint relevance of multiple functions (ex. lower-right corner, outer set: selection *and* allocation, but *not* instruction). Own elaboration.

2.3 Children of immigrants' categories and their integration in the host society

Another important aspect of my theoretical background concerns the definition of children of immigrants (or second-generation immigrants) and the hypotheses on their assimilation with respect to the reference group in the host society.

In order to designate individuals of immigrant origin, one could rely on several criteria, such as nationality, ethnic origin, descent, place of birth, or self-assessment. Nevertheless, the self-assessment of national, ethnic, or generically migration origin is often taken as a proxy of identity rather than an an objective criterion to define immigrant status (Schneider et al., 2012). Ethnic origin is sometimes used as a defining criterion, especially in the American or British literature, irrespective of the disciplinary affilia-

tion (Abbas, 2007; Dustmann et al., 2010; Strand, 2011). Nationality is a widely used concept to define immigrant status, but it is problematic when referred to children of immigrants, because if individuals of immigrant origin gain the right to citizenship—by birth, residence or marriage—they cannot be distinguished anymore from the reference group. Moreover, when interested in comparing the experience of children of immigrants across countries with different citizenship regimes, the use of nationality poses a second challenge to the identification of children of immigrants, because the same concept has different meanings according to the host society considered. The most common defining criteria used in comparative studies are descent and place of birth: an individual is considered of immigrant origin if she was born abroad of if her parents were.

In turn, children of immigrants are usually differentiated according to their generational status. Strictly speaking, first-generation immigrants (*G1*) are those who actually moved from the origin- to the destination-country, while second-generation immigrants (*G2*) were born in the destination-country from immigrant parents. There are good theoretical reasons to keep these two categories as distinct when studying their integration within the school system: while *G1* have directly undergone the migration experience and the ineluctable trauma connected to it, *G2* can only experience it through the memories of their parents; *G1* are likely to suffer from greater linguistic and cultural difficulties than *G2*, not only because they have been exposed to the receiving society for a shorter period, but also because—in most cases—so have their parents; finally, *G1* may put more effort in schooling than *G2*, because newly arrived migrants generally have high expectations about their children's upward mobility (Portes and Zhou, 1993; Zhou, 1997; Portes and Rumbaut, 2001; Rumbaut and Portes, 2001). Indeed, as we will see in Chapter 3, their educational outcomes (in terms of achievement, attainment and choices) differ considerably. When studying children and adolescents, some adopt a broader definition of *G2* including those who migrated at very early age (Portes and Rumbaut, 2001; Farley and Alba, 2002; Heath et al., 2008; Alba and Waters, 2011). As an alternative, other scholars opt for a more fine-grained distinction of first-generation immigrants according to time spent in the receiving society, following the framework proposed by Rumbaut (2004): immigrants of "generation 1.75" arrived in the destination-country when aged 0-5 years; "generation 1.5" when aged 6-12, "generation 1.25" when aged 13-17 and the proper "generation 1" when aged 18 o more. Accounting for age at arrival of first-generation migrants—be it in a categorical framework like the one just outlined or in a metric framework like many econometric studies do (see Section 3.1.1)—is important because early socialization with native peers is crucial for the development of cognitive and non-cognitive skills of mi-

grant students (Schofield, 2006) and difficulties in foreign language acquisition increase harshly with age (Johnson and Newport, 1989; Larsen-Freeman and Long, 1991; Hakuta et al., 2003; Birdsong, 2006; Chiswick and Miller, 2008). *In this dissertation, I define children of immigrants as individuals whose parents were both born abroad. My empirical analyses are based on second-generation immigrants strictly defined, i.e. those children of immigrants who were born in the host society.*

The question of whether and how children of immigrants integrate in the host society can be framed according to two competing theoretical frameworks. On the one hand, according to the assimilation perspective, second- and especially third-generation migrants are subject to a long-run process that makes them increasingly similar to natives in terms of values, behaviors, statuses and even identities. Moreover, according to the framework provided by Gordon (1964), an important facet of this process is structural assimilation, which implies a gradual equalization of migrant descendants with respect to core institutions of the receiving society, including the educational system. This vision of straight-line assimilation fell into disrepute after the spread of non-White immigrants in the US. However, during the 1990s, some scholars claimed the continuity of long-run patterns of integration between traditional and contemporary immigrants to the US (Alba and Nee, 1997; Perlmann and Waldinger, 1997; Farley and Alba, 2002; Esser, 2004). According to this "new assimilation theory", children of immigrants become increasingly similar to natives, since (i) they invest on human capital via language acquisition and schooling, (ii) they gain access to social networks and (iii) they build cultural capital specific to the host society. Differences in the distribution of characteristics consist more and more of individual within-group variances, while between-group variances tend to disappear. From the perspective of this dissertation, it is worth noticing that the long-term situation envisaged by new-assimilation theorists corresponds to a perfect equality of opportunity of the kind advanced by Coleman (1968).

On the other hand, according to the theorists of segmented assimilation (Portes and Zhou, 1993; Zhou, 1997; Portes and Rumbaut, 2001; Rumbaut and Portes, 2001), structural factors penalizing immigrants tend to persist over time. According to these scholars, second-generation immigrants can face three different paths of assimilation: (i) growing acculturation and parallel integration into the white middle class, i.e. "upward assimilation"; (ii) permanent poverty and assimilation into the underclass, i.e. "downward assimilation"; (iii) rapid economic advancement with deliberate preservation of the immigrant community's values and tight solidarity, i.e. "selective acculturation". However, socio-economically disadvantaged offspring of immigrants are most likely to get trapped

in the pathway of downward assimilation. Whether children of migrants will follow a path or another depends on three key factors: parental educational and occupational level, family structure, and society modes of incorporation. It is interesting to point out that—while the first two aspects closely remind of human and social capital as Coleman's mechanisms for the intergenerational transmission of educational inequality—the third aspect is specific to the experience of students of immigrant origin. By including modes of incorporation as a potential explanatory factor behind different paths of assimilation, these scholars explicitly account for the importance of the institutional, societal, and community context in mediating the reproduction of inequalities by migratory status.

2.4   Case selection: comparing immigration countries

The integration of immigrants in the host societies has been studied from a variety of disciplines and perspectives, but most of the times the focus in on single countries rather than on international comparisons. A considerable contribution to the comparability of immigration countries comes from political scientists and, more specifically, from scholars who adopt a historical institutional perspective.

Freeman (1995) first distinguished traditional settlement countries (Australia, New Zealand, Canada, and USA) from states with post-war labor recruitment (continental Europe, the UK, and—to a lesser extent—Nordic countries) and new immigration countries, which have turned from emigration- into immigration-societies in the 1980s (Italy, Spain) or even late 1990s (Greece, Ireland, Portugal). While for the first group of countries immigration has been a fundamental factor of development, in Europe mass immigration has occurred within fully developed economies. Partly overlapping categorizations are based on citizenship regimes, like the one proposed by Safran (1997), contrasting *ius sanguinis* and *ius soli* as deriving from the historical conception of the nation state as "ethnic" or "civic", with Germany and France being the obvious antithetic ideal types. Still other categorizations of immigration states consider not only citizenship and naturalization rules, but also the political, social, and economic incorporation of immigrants. Soysal (1994) defined four incorporation regimes: the corporatist one, exemplified by Sweden and the Netherlands, the individualist one (Switzerland and Great Britain), the state-centralised one (France) and the mixed statist-corporatist one (Germany). However, probably the most well-known classification of integration modes is the one proposed by Castles and Miller (2003), who distinguished between assimilationism (prevalent in former colonial countries and especially in France), differential exclusion (characteristic of guestworkers

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countries), multiculturalism (typical of the USA and Canada and subsequently imported by the UK, Netherlands, and Sweden).

However, as pointed out by several authors, since the 1990s European regimes are converging both in citizenship (Koopmans and Statham, 2001; Brochmann, 2002; Castles and Miller, 2003) and incorporation (Favell, 2002, 2005; Castles and Miller, 2003; Joppke and Morawska, 2003; Freeman, 2004; Oloski, 2012) regimes. Public policies in these domains are converging partially due to a "thin Europeanization" occurring in in EU-promoted free movement agendas, inclusion measures and anti-discrimination programs (Geddes, 2000). On the contrary, the divide with non-European countries has grown deeper, with the latter still encouraging immigration for permanent settlement on a significant scale, while European countries have been focusing on restraining not only undocumented, but also labor, family-reunification and humanitarian immigration (Geddes, 2000; Favell, 2005).

As a consequence, within migration studies, rigid classifications of immigration countries have been criticized for their limited heuristic value by scholars of public policy. The latter have opened up the ground to other subfields of research, investigating (i) which policy mixes are actually implemented in the domains of immigration and incorporation policies; (ii) how liberal democracies deal with the tension between immigration and welfare, which challenges traditional notions of territoriality, citizenship and solidarity; (iii) how interests, ideas, and institutions shape immigration and incorporation policies at a national and supranational level; and finally (iv) which are the outcomes of such policies.

Although these questions delineate a field which is largely unexplored, it is worthwhile mentioning the work of Bommes and Geddes (2000), who collected contributions by several scholars from political science, government and political economy and provided an articulate reflection on whether migration constitutes a threat to the survival of national welfare states. In particular, Halfmann (2000) argues that the fundamental reason why migration poses a challenge to the sovereignty of nation states is that it violates the univocity of the relation between the state and the people residing in its territory. This tension has generally brought to an ambivalent movement in immigration policies: on the one hand, chances for social inclusion in national welfare states have progressively been extended to non-national legal residents, providing a partial membership denoted with the status of "denizenship". On the other hand, restrictive policies for the control of immigration flows have been put in place. Nevertheless, as made clear throughout the volume, national welfare states have put in action different strategies to face this challenge, depending on the historical, social and political contexts and, more specifically, on

the role of territoriality and the institutional configuration of welfare regimes. Moreover, as argued by Banting (2000), the depiction of migration as a threat to welfare systems is far too simplistic, and should be framed within broader debates on welfare state development, such as the pressures of subnational and supranational actors who contribute to the transformation of the notion of social citizenship. On the one hand, regionalistic claims in countries like Belgium, Canada, Spain, and the UK emerged as powerful forces able to redefine the conception of political community within which redistribution should take place. On the other hand, EU Member States have yielded part of their sovereignty in a number of policy domains which are likely to influence to a great extent the way nationals and immigrants benefit of their social rights. Similarly, Brochmann (2002) developed the case for an interplay among the process of European integration, migration, and welfare state transformation, by pointing out that—in the absence of a common social policy regime—the role of the EU has ambiguous consequences on the broader issues of citizenship and inclusion in European welfare states. On the one hand, the realization of the single market and the creation of the European citizenship have led to a growing importance of the supranational level to the detriment of national contexts of belonging. On the other hand—since social rights are dispensed mainly at a national level—for immigrants, membership in nation-states is still a political theme.

The acknowledgment that immigrant and incorporation policies have strong distributive implications raises another kind of question: what are their political determinants? Unfortunately, this point has raised little interest among political scientists, with the praiseworthy exception of Hollifield (2008), who has studied the relations between policy inputs, outputs and outcomes in traditional and new immigration countries. Hollifield moved from the work of Freeman (1995), who argued that the typical mode of immigration politics in the liberal democracies is client politics, because the benefits of immigration tend to be concentrated, while its costs are diffuse. However, he extended this framework, by claiming that not only interests, but also rights and ideas matter in explaining incorporation regimes. Countries of liberal and republican tradition, like the United States, France, and Germany, have seen an expansion of political and social rights of immigrants, allegedly due to institutional and judiciary processes, limiting the ability of executive and legislative authorities to restrict such individual rights. Indeed, "rights have a very long life in liberal democracies. Once they are extended and institutionalized, it is extremely difficult to roll them back" (Hollifield, 2008, 163). However, his framework is not a historical deterministic one, since the pressures of political actors can become so compelling to overcome the stickiness of institutional mechanisms.

This is especially the case when the lack of socio-economic assimilation of immigrants unambiguously highlights that, within the majority ethnic group, some win and some lose from the progression of the immigration phenomenon. Finally, the role of ideas in shaping immigration and incorporation policies and their consequences is not trivial, since: "Migration policy (...) is heavily influenced by national or founding myths, which are codified in citizenship and nationality laws. These myths about the national identity are fungible, subject to manipulation, and involve strong elements of symbolic politics" (Hollifield, 2008, 162).

From my perspective, the main contribution of political science to migration studies has been to provide a theoretical framework for the comparison of immigration countries, based on the one hand on the historical development of immigration flows and the policies governing them, and on the other hand on the institutional settings designed to incorporate immigrants in the political, cultural and socio-economic spheres. Regrettably, so far the study of the consequences of public policies in terms of incorporation of immigrants in the host society is still underdeveloped.

The theoretical framework just outlined guided me in the definition of my scope conditions and case selection. By embracing the idea of a "thin Europeanization" in the domain of immigration and incorporation policies, I argue in favor of the fundamental comparability of immigration societies in Western Europe, as opposed to Eastern and Central European countries and traditional settlement societies (Australia, New Zealand, Canada, and USA). *Hence, my dissertation can be seen as a bounded regional comparison. In other words, the generalizability of my empirical analyses is not meant to go beyond the scope of Western European countries. In the phase of case selection, I have tried to include the whole set of Western European countries. However, in order to ensure a sufficient degree of precision of the estimates, I excluded those countries where the sample sizes for second-generation immigrants are too small.* My final case selection includes: Austria, Belgium (split into Belgium-Flanders and Belgium-Wallonia, in reason of their different educational systems), Switzerland, Germany, Denmark, Spain, Finland, France, Greece, Italy[1], Luxembourg, the Netherlands, Norway, Portugal, Sweden and England

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[1]As for Italy, the sample was split in North and Center on the one hand, and South on the other hand. This choice was made because of the well known territorial divide (students from the South perform much more poorly) and the limited presence of second-generation migrants in the South. An accurate measure of relative disadvantage must contrast second generation migrants with their native peers (therefore, natives in Northern and Central Italy). Since Southern Italy displayed too few $G2$, it was excluded from the analyses. Consequently, results for Italy refer exclusively to Northern and Central Italy.

and Wales. Iceland, Ireland, Scotland and Northern Ireland were excluded because of the small sizes for second-generation migrants. In order to make the case selection process more transparent, I anticipate here part of the data used in Chapter 3. As can be seen in Table 2.1, which displays the sample sizes of *G2* in all Western European countries, I selected only those countries with more than 50 observations.

selected countries	N	excluded countries	N
Austria	869	Iceland	21
Belgium Flanders	380	Italy (South)	42
Belgium Wallonia	683	Northern Ireland	28
Switzerland	3066	Scotland	46
Germany	763		
Denmark	1109		
England and Wales	556		
Spain	396		
Finland	69		
France	831		
Greece	194		
Italy (North and Center)	306		
Luxembourg	1910		
Netherlands	764		
Norway	307		
Portugal	247		
Sweden	609		

Table 2.1: Source: PISA 2006-2009, unweighted. Sample sizes of of *G2* in all Western European countries.

Chapter 3

The educational achievement of second-generation immigrants in Western Europe

What is the situation of students of immigrant origin in Western Europe? What are their outcomes, with respect to educational attainment, achievement and choices? How do they perform when compared to their native peers? Do they fare similarly across countries, or rather their educational outcomes change when considering international comparisons? The present chapter addresses these questions (i) by reviewing the state-of-the-art literature from the sociology and the economics of education and (ii) by presenting original analyses focused on the relative disadvantage in educational achievement experienced by second-generation immigrants when compared to their native peers. In doing so, I lay bare the *explanandum* of my thesis: migrant achievement penalties, which differ considerably across Western European countries. This raises the question of why this variation occurs and whether it can be traced back to different kinds of educational systems. Throughout the chapter, I refer to educational systems as potential *explanantes*. However, the explanation of cross-country variation in migrant penalties is addressed in a more systematic way in Chapter 4.

3.1   Previous studies

The learning disadvantage of children of immigrants has been extensively studied by sociologists as well as by economists of education. The literature review presented in

this section is organized by topic rather than by discipline. In other words, I try to highlight commonalities and divergences in the empirical findings of both sociological and econometric studies addressing similar research questions. However, it should be noted that—though really interested in the same empirical phenomenon—scholars from the two disciplines frame it differently.

Within sociology, asymmetries in the educational outcomes of students of native and immigrant origin are conceptualized as the result of a stratification process. To start with, stratification underlies one of the key questions of the current integration debate, that we can think of as part of a general resources framework (Kristen et al., 2011): can the resources and opportunities available within the immigrant group provide favorable conditions for educational success? While segmented assimilation theory predicts that ethnic resources, in terms of relationships, networks, orientations, identities, and language use, compensate for structural disadvantages (Portes and Zhou, 1993; Zhou, 1997; Portes and Rumbaut, 2001; Rumbaut and Portes, 2001), assimilation and new assimilation theories predict that the lack of linguistic, cultural, relational, and informational resources relevant to the host society is disruptive in hindering the educational opportunities of children of immigrants (Alba and Nee, 1997; Perlmann and Waldinger, 1997; Farley and Alba, 2002; Esser, 2004). Hence, a special attention is reserved to differences in educational outcomes between ethnic groups, in so far as they can be traced back to resources available to the different communities. Beyond its relevance for the integration debate, the perspective of stratification is important because the education system is fundamentally conceived by sociologists as a mediating factor in the process of intergenerational reproduction of inequalities. While sociologists recognize that competences acquired during schooling are important for future life chances, they generally focus more on the benefits associated to educational qualifications and certificates. Accordingly, when studying the educational careers of children of immigrants, sociologists privilege the dimensions of educational attainment and choices as opposed to the one of achievement.

On the contrary, within economics, education is understood in terms of human capital production. In this process, families invest monetary and non-monetary resources in order to build up their children's human capital (Becker, 1964). Empirical studies are based on educational production functions relating various inputs affecting students' human capital to measured outputs such as educational achievement, attainment or even subsequent labor market outcomes. Inputs generally include individual attributes, such as measures of previous ability, gender, family background, parental behavior and, clearly,

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migratory status, but also characteristics of peers, neighborhoods and schools. Estimated marginal effects provide the size of different channels of intergenerational transmission of inequality. Given the importance of human capital formation in this perspective, economists chiefly study migrant/native achievement gaps, while the study of differences in attainment or school choice is far less common within this discipline.

Though moving from different theoretical frameworks, these two streams of research share broad common interests in the study of the sources of migrant learning disadvantage. More precisely, when investigating its individual-level determinants, they aim at disentangling what stems from: (i) less favorable endowments in conventional socio-economic resources, (ii) differential returns to such resources, and (iii) counterproductive migrant-specific resources. This implies looking at the effects of socio-economic background and migratory status both independently and in interaction with each other. Moreover, scholars from both disciplines are interested in the institutional determinants of migrant learning disadvantage. While studies specifically aimed at understanding the role of educational systems will be discussed in Chapter 4, in this section I present studies that—although mainly focused on individual-level processes and determinants—take into account what happens in the educational system, most notably the relevance of interactions with teachers and peers. Since educational systems are fairly stable across time, while they vary considerably across countries, these factors are best understood in a comparative framework. However, within economy of education natural experiments—as well as other counterfactual techniques for causal inference—are often used to estimate the impact of educational institutions on migrant achievement. Therefore, the role of specific features of educational system in mediating inequalities can also be assessed by single-country studies.

3.1.1 The double educational disadvantage of children of immigrants

A common finding of empirical works on the educational careers of children of immigrants is that the latter, when compared to their native peers, generally face a double disadvantage: the first one is associated with the lower socio-economic and cultural resources—since immigrant families are generally concentrated towards the bottom of the class structure—while the second one is specific of migrant status. Within this literature, social background is variously defined, emphasizing cultural and social, along with economic, resources. So, parental educational level is often used as a proxy for cultural capital, whereas status and wealth are typically operationalized by means of

socio-economic indexes and occupational class categorizations. These factors generally explain the lower educational attainment of immigrants to a great extent. However, a residual disadvantage persists even after controlling for such factors. In other words, an additional disadvantage is associated to the migratory status as such, sometimes referred to as "ethnic penalty" (Heath and Cheung, 2007; Heath et al., 2008). Therefore, empirical evidence partially confirms the pessimistic predictions of segmented assimilation theory. However, many works have documented that second-generation immigrants generally perform better than first-generations immigrants and that among the latter, early arrival in the host society acts as a mitigating factor of educational inequality. Hence, a partial and progressive assimilation process seems to be in place.

Two other peculiar findings are worth mentioning. First of all, a common subject of inquiry are the (differential) educational returns to parental socio-economic status (SES) for immigrant and natives. Several of these studies show that the former indeed benefit to a lesser extent than the latter of their endowments in economic, social, and cultural capital. Second, when studying track placement as a consequence of educational choices by students and their families, a number of scholars found that, although students of immigrant origin are overrepresented in vocational tracks, when they are compared to natives with similar academic performance, they generally opt for more prestigious tracks. However, as detailed in what follows, these two findings are not fully established yet, because they are only substantiated by studies conducted in some countries. Moreover, other studies fail to detect significant differences between natives and immigrants in the returns to SES or in their educational aspirations.

Educational attainment

By using national administrative data, Gang and Zimmermann (2000) and Riphahn (2003) show that in Germany the disadvantage of students of immigrant origin in educational attainment is a serious issue. Although the gaps are more pronounced for first-generation immigrants, also German-born children of immigrants substantially fall behind. However, Kristen and Granato (2007) showed that the attainment gap of second-generation immigrants results primarily from socio-economic rather than ethnic-specific inequalities. Indeed, second-generation young adults—in particular Turks and Italians—experience pronounced disadvantages in comparison to their German peers in terms of attending or completing the highest schooling track leading to the *Abitur*. However, initial differences in the chances of attaining the *Abitur* disappear after considering

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parental education and social class, with the exception of Italian young adults. These conclusions are partially supported by Kalter et al. (2007) who directly confronted the experiences of first- and second-generation immigrants in Germany with respect to educational and occupational outcomes. While it is confirmed that socio-economic resources explain migrant disadvantages to a significant extent, they find that ethnic specific penalties are in place, in particular for students of Turkish origin, and especially so for first-generation immigrants.

Analogous results emerge from research carried out in Belgium, where Timmerman et al. (2003) and Phalet et al. (2007) document a partial assimilation of second-generation immigrants, a growing proportion of whom is gaining access to higher secondary education and beyond. Here again, Turkish youngsters appear to lag behind other minority groups, such as Moroccans, in reason of their particularly deprived socio-economic background.

For Denmark, Colding (2006) finds that children of immigrants are more likely than natives to dropout from upper secondary education, even after accounting for parental educational, occupational and income situation, for family structure, and for neighborhood characteristics. Jakobsen and Smith (2003) trace the poor attainment rates of immigrants in Denmark precisely to high dropout rates, which in turn are found to depend on parental human capital, on age at first marriage and on the attitude of the parents towards education. This also explains the worse performance of students of Turkish origin as opposed to other minorities.

Therefore, dropping out of secondary schooling can dramatically decrease immigrants' employability. In line with that, Laganà et al. (2013) found that, in Switzerland, children of immigrants are more likely than natives to be "Not in education, employment, or training" (NEET), and that the role of socio-economic background in explaining the transitions into NEET is not decisive since, especially for some minorities (Portuguese, former-Yugoslav, Albanian, and Turkish immigrants), a residual disadvantage persists. Bauer and Riphahn (2007) further investigated the educational disadvantage of children of immigrants in Switzerland by questioning the role of ethnic resources. According to Borjas (1992), ethnic capital acts as a positive externality in the human capital accumulation process and therefore can account for heterogeneity in the intergenerational transmission of educational inequality. By focusing on migrant/native attainment gaps, Bauer and Riphahn (2007) found only partial support for this hypothesis: costs of education and family size do affect educational mobility, but—even in situations of low costs and few siblings—the impact of parental education is still considerable. Moreover, they

find no effect of country-of-origin characteristics and ethnic capital in interaction with the parental educational level: the predicted probability of high educational attainment is higher for those with little ethnic capital, independent of parental education. On the contrary, Gang and Zimmermann (2000) had found that, in Germany, the size of the ethnic network has a positive effect on educational attainment.

Several studies from the sociology of education indicate that also in the Netherlands children of migrants suffer from a specific disadvantage that cannot be reduced to socio-economic background (Tolsma et al., 2007; van Niekerk, 2007; Crul, 2009). These results are backed up by econometric studies. In particular, Van Ours and Veenman studied the educational attainment of native and immigrant students aged between 15 and 29 and documented the existence of a specific disadvantage associated with migratory status, net of socio-economic background (van Ours and Veenman, 2003, 2006). Educational careers of migrant students are affected by their national origin, with Turkish-origin students emerging as a particularly problematic minority (Crul, 2009), while children of post-colonial immigrants, like Caribbeans, are less disadvantaged (van Niekerk, 2007). Moreover, in the Netherlands, migrant-specific disadvantage in educational attainment has not decreased over time, unlike other forms of educational inequality, notably class-based and gender-based (Tolsma et al., 2007).

In Austria too, students of Turkish origin experience the greatest difficulties in attaining educational qualifications beyond compulsory education (Herzog-Punzenberger, 2003). Not many studies focus on immigrant integration in Austria. Nevertheless, the situation of children of immigrants in the Austrian educational system is very poor, since three quarters of workers of immigrant origin have attained only the lowest qualifications (Fassmann and Reeger, 2007).

In Italy, research on educational disadvantage of children of immigrants is a relatively new field: recent studies (Canino, 2010; Azzolini and Barone, 2013) document a substantially higher risk for immigrant *vs.* native students to dropout from secondary school without attaining any diploma, while according to Casacchia et al. (2008) and Barban and White (2011), children of immigrants perform worse than native-Italian students also in terms of grades. In both cases, migrant educational disadvantage is higher for first-generation than for second-generation immigrants. Moreover, it is partially but not completely explained by poor socio-economic resources.

Conversely, in France the educational disadvantage of second-generation students seems to be fully traceable to resources differentials. Indeed, Vallet and Caille (1999) found that, given social background and family environment, immigrants are even more

successful than natives in the *baccalauréat*, i.e. the secondary school exit examination. The authors illustrate that strong educational aspirations of immigrant families have a mediating effect and partly explain the more favorable school trajectories of their children.

Also in the very selective educational system of England and Wales, aspirations—along with economic, social, and cultural capital—are found to be crucial to attain educational success for children of immigrants (Abbas, 2007). Furthermore, just like in the case of France, when taking into account social class belonging, migrant educational disadvantage disappears, even if not so for all minority groups (Connolly, 2006; Strand, 2011).

Therefore, with the partial exception of France and England and Wales, children of immigrants suffer from a double disadvantage in educational attainment, which cannot be explained by their lower socio-economic resources only. This "residual disadvantage", or "migrant penalty" could derive from deficits associated to their status of immigrants, for instance insufficient linguistic skills or a lack of cultural knowledges and codes specific to the host society. Additionally, it could derive from the existence of differential returns to socio-economic resources possessed by natives and immigrants. From a theoretical point of view, we should expect to find lower educational returns to socio-economic status (SES) for immigrants than for natives. Indeed, children of immigrants are likely to benefit less of their family background since in their case, parental education and social status do not necessarily imply the possession of cultural and social capital specific of the destination-country (Heath and Cheung, 2007). Moreover, educational qualifications acquired in the origin country may not have (or may be perceived not to have) the same value as those acquired in the destination country (Chiswick and Miller, 2009). Thus immigrant parents can have a higher human capital than native parents with the same occupational status. Human capital and high aspirations can compensate for the social downgrading, hence the effect of socio-economic status for migrant children could be underestimated. Several works have tested the existence of a significant interaction effect between resources and migratory status in affecting educational attainment. Many of these analyses support the hypothesis of lower returns to parental SES for immigrants. However, the evidence is not fully established. Wolbers and Driessen (1996), Fekjær and Birkelund (2007), Kristen and Granato (2007), and Leopold and Shavit (2013) find partial evidence in favor of a negative interaction effect between SES and migratory status (i.e., these resources are less less important for migrants than for natives in influencing educational attainment). On the contrary, Phalet et al. (2007), Rothon (2007), Brinbaum and Cebolla-Boado (2007), Van De Werfhorst and Van Tubergen (2007) and Azzolini and Barone (2013) fail to detect any significant interaction effect between the two. As noted

by Heath et al. (2008), this lack of consistency can be attributed to methodological differences in the way the relevant variables have been operationalized or to a lack of statistical power to detect interactions. However, they could also reflect actual differences among receiving societies in the way the processes of integration unravel.

Educational achievement

Just like parallel research on educational attainment, analyses of migrant/native achievement gaps indicate that children of migrants suffer from an educational disadvantage, and that this disadvantage is somehow more serious for first-generation than for second-generation immigrants (Hvistendahl and Roe, 2004; Van De Werfhorst and Van Tubergen, 2007; Rothon, 2007; Besozzi, 2011). They also show that it is partially, though not fully explained by different endowments in socio-economic resources (Van De Werfhorst and Van Tubergen, 2007; Rothon, 2007).

Additionally, many works from the economics of education address the question of whether the age children experience migration affects their academic performance. Generally, the younger is a child when he arrives in the destination country, the better is his academic performance (Ohinata and van Ours, 2012). Possible explanations of the negative effect of age at arrival include the intricacy of the integration process hindered by the trauma of the migrating experience (Schofield, 2006) as well as greater difficulties in second-language acquisition. Indeed, cognitive sciences have shown that the ability to learn a foreign language sharply decreases with age (Johnson and Newport, 1989; Larsen-Freeman and Long, 1991) even if it is unclear whether learning difficulty is linearly affected by age at arrival or if it is subject to a critical period (Hakuta et al., 2003; Birdsong, 2006; Chiswick and Miller, 2008). Böhlmark (2008) use Swedish register data on siblings to estimate the effect of age at arrival on grades in the last year of compulsory school. Their results point to the existence of a threshold effect: children who migrated before the age of nine are significantly and strongly more likely to get higher marks than their siblings who migrated at older age. The critical importance of age nine is confirmed by later studies on migrant educational attainment in Canada (Corak, 2011). However, van Ours and Veenman (2006) find that critical ages at arrival vary according to gender and country of origin.

In the previous subsection, I have mentioned some studies looking for possible interaction effects between socio-economic and migratory status in affecting educational attainment and I have concluded that this remains an open question. Some works have

addressed the same question with respect to educational achievement. Here again, there is not a strong evidence in favor or against the hypothesis of differential returns for children of migrants. In a comparative study with broader aims, Schneeweis (2011) incidentally finds that in some countries returns are negative, while in others they are not significant. Getting back to single-country studies, Ammermüller (2007) investigates whether children of immigrants in Germany perform poorly in the PISA tests because of their limited socio-economic resources, or rather because of their low returns to these resources. He finds no significant differences in the way natives and immigrants benefit of family background. Botezat (2011) also considers the issue of differential returns to achievement in PISA tests for immigrant students in Germany and finds partially contrasting results. By focusing on several dimensions of cultural capital, she finds that while the impact of parental education is similar for natives and immigrants, educational possessions are more important for the latter.

Educational choices

I now turn to discussing how research has investigated the processes and the outcomes of choice between generalist and vocational tracks on the part of immigrant families. Under this perspective, the structure of educational systems comes to light in setting opportunities and constraints to individual students in pursuing their aspirations. Most educational systems track students into vocational or generalist/academically-oriented curricula. European tracking systems differ in timing (targeting 10 to 16 years-old students), decision criteria (binding *vs.* non-binding recommendations, based on teachers' or external assessment) and rigidity (single or multiple decision points, bridging). Several sociological and econometric studies investigate what are the consequences of such institutional structures for the track placement of children of immigrants.

The literature consistently indicates that first- and second-generation immigrants are more likely to choose the less prestigious vocational tracks. Evidence in this sense is found for the early-tracking systems of Germany (Kristen et al., 2008), the Netherlands (Tolsma et al., 2007; Van De Werfhorst and Van Tubergen, 2007), Switzerland (Laganà et al., 2013) and Italy (Casacchia et al., 2008; Barban and White, 2011; Minello and Barban, 2012). Also in systems where choice is postponed to upper-secondary schooling, migrants appear to be under-represented in the most prestigious tracks, like the UK (Jackson et al., 2012), France (Brinbaum and Cebolla-Boado, 2007; Cebolla Boado, 2011) and Sweden (Jonsson and Rudolphi, 2011; Jackson et al., 2012).

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Why do children of immigrants tend to chose vocational over generalist tracks? A first explanation resides in their lower socio-economic status. Indeed, it is a well established fact that low-*SES* students are disproportionately represented in second-tier tracks, even after controlling for prior ability (Jackson, 2013). However, as it was the case for the disadvantage in educational attainment and achievement, the less ambitious educational choices cannot be reduced to differentials in socio-economic resources (Tolsma et al., 2007; Barban and White, 2011). A second explanation could be related to discriminatory teachers' attitudes in the choice-orientation process. However, as shown by Krause et al. (2012) and Lüdemann and Schwerdt (2013), in Germany migrant students are just as likely as their native peers with similar socio-economic background to receive teachers' recommendations for any secondary school type.

On the contrary, differences in track placement seem to be at least partly ascribable to differences in previous academic performance. As made clear in Chapter 2, Section 2.1, Boudon (1974) introduced a key distinction in sociology of education between "primary" and "secondary" effects in school stratification. While the former concern the impact of family background mediated by school performance, the latter pertain to its direct effects. A well established tradition of empirical works has developed methods to disentangle primary and secondary effects and applied them to inequalities related to social origin (for an up-to-date comparative outlook, see Jackson, 2013). More recently, some scholars have applied the same methods to explain choice inequalities related to migratory status. Van De Werfhorst and Van Tubergen (2007) in the Netherlands, Cebolla Boado (2011) in France, Kristen et al. (2008) in Germany and Jackson et al. (2012) in England and Sweden found evidence of negative primary (performance) effects but positive secondary (choice) effects for second-generation immigrants. In other words, students with an immigrant background are found to make more ambitious track choices once previous academic performance has been controlled for. This result is quite surprising considering the fact that children of immigrants may lack relevant informational resources to navigate the receiving country's educational system. The reason why they disproportionately end up in the least prestigious tracks is to be traced back to their lower grades in primary and lower-secondary school, which in turn can be partly attributed to their migratory status. In effect, Frick and Wagner (2001) and Schnepf (2002) had already found that migrants are not less likely to enroll in the *Gymnasium* than natives with similar previous academic performance. However, the existence of a positive secondary effect should not be considered as a law-like regularity irrespective of the national context. For instance, the work of Barban and White (2011) indicates that in Italy both primary and secondary

effects are negative for students of migrant origin.

Therefore, as suggested by theorists of segmented assimilation, children of immigrants often have high educational aspirations, a finding that was hinted at by other empirical studies with a more qualitative insight: Abbas (2007), with an in-depth study carried out in Britain, found that working-class South Asian parents surprisingly displayed strong middle-class attitudes towards selective education. This counterintuitive finding is sometimes called "immigrant paradox" (Poortinga et al., 2011). Although they have been developed in a different context, theoretical and empirical accounts of educational aspirations of minority youth in the USA can shed light on aspirations expressed by children of immigrants in Europe. According to Kao and Tienda (1998), two main lines of research compete in explaining the high educational aspirations expressed by minority students and their families: on the one hand, under the "status attainment framework" (Barr et al., 1983), immigrants are assumed to be striving to meet the expectations of their co-ethnic communities; on the other hand, under the "blocked opportunities framework", (Sue and Okazaki, 1990), they are assumed to invest in schooling to compensate the expected discrimination on the labor market. The empirical analyses of Kao and colleagues, however, indicate that neither framework is particularly helpful in understanding the high educational aspirations of Asians in the USA. Rather, they suggest that these aspirations are driven by unrealistic wishes of upward social mobility on the part of immigrant families, coupled with an insufficient knowledge of the host country educational system, a pattern which they define "immigrant optimism framework" (Kao, 1995; Kao and Tienda, 1995, 1998). Unfortunately, up to this moment, the relevance of such mechanisms has not been systematically assessed in the European context. Two recent works go in this direction. On the one hand, Salikutluk (2013)'s analyses on the aspirations to complete tertiary education of Turkish youth, as opposed to native Germans, suggest that all the above-mentioned mechanisms play a role in explaining the immigrant paradox, except for that related to the lack of information. Indeed, students of Turkish origin have sufficient information about the requirements of the educational system. However, as she recognizes, these are preliminary results which deserve deeper investigation. On the other hand, Teney et al. (2013) tested and rejected the hypothesis of perceived ethnic discrimination in the labor market based on the educational aspirations declared by pupils of nine minority groups in the city of Brussels. Rather, they suggest that the intergenerational transmission of aspirations for upwards mobility plays a crucial role in determining the higher educational aspirations of immigrant students.

3.1.2 The role of teachers, classrooms, and schools

The studies reviewed so far focus on the micro-level determinants of migrant educational disadvantage, notably on the characteristics of individual students and their families of origin. Instead, in this section, I will discuss another cluster of works, which adopt a meso-perspective by focusing on the role of teachers, classrooms, and schools in shaping the educational opportunities of children of immigrants. While the general issue is always whether some students suffer from an educational disadvantage in reason of their migratory origin, the research question is here shifted toward the role of educational institutions in mediating the intergenerational transmission of inequality.

Clearly, teachers play a key role in determining how and what children learn. To start with, psychological literature indicates that what teachers expect from their students has a strong performative power on their actual learning behaviors and cognitive development. In other words, teachers' beliefs about the academic performance and the overall intelligence of their students can turn into self-fulfilling prophecies, a phenomenon that is known as "Pygmalion effect" (Rosenthal and Jacobson, 1968). In particular, it has been shown that (i) teachers often have lower expectations for students from low socio-economic status and/or immigrant or minority backgrounds and that (ii) the latter are particularly vulnerable to the effects of such expectations (Jussim and Harber, 2005). Hence, teachers' biases on the academic potential of children of immigrants can hinder their actual cognitive development and contribute to their learning disadvantage relative to their native peers.

Secondly, teachers are called to evaluate students in the form of grades, which are the most visible indicator of school success and shape academic aspirations for the future. Empirical works on teachers' evaluations contribute to a greater understanding of the mechanisms behind migrant educational disadvantage when they distinguish between two different dimensions of educational achievement: test scores, which reflect the performance of students with respect to externally defined criteria, as opposed to grades or marks assigned by teachers, a more subjective measure, which is likely to be influenced by the overall evaluation of the student's capacities, potential, effort, and behavior and could be potentially affected by prejudices. With a study on children of migrants from former Soviet Union to Israel, Leopold and Shavit (2013) show that, despite they perform similarly on test scores, immigrants and natives of similar cultural capital are evaluated differently by their teachers, with immigrants ending up with lower grades. Put differently, migratory status mediates teachers' biases in favor of students from culturally

endowed homes. Therefore, teachers' discriminatory attitudes could partially explain the lower educational performance of children of immigrants. In Germany too, Lüdemann and Schwerdt (2013) find that second-generation immigrants are more likely to have lower grades than natives who attain similar performance scores in standardized tests. The effect is significant even after controlling for socio-economic resources, but only for female students.

In the third place, the role of teachers is important because their recommendations on school and track choice may impact the overall development of the educational careers of their students. This is especially problematic for immigrants students and their parents, who often lack the cultural capital specific to the host society and relevant to make informed decisions at crucial educational transitions. Especially in educational systems where tracking occurs at early age and teachers' recommendations are mandatory for track choice, the role of teachers is decisive. As we have just seen, teachers' beliefs on academic potential may be biased by students' migratory status. However, lower teachers' expectations do not necessarily translate into more discouraging recommendations for the future. As shown by Kristen (2006), Krause et al. (2012) and Lüdemann and Schwerdt (2013), in Germany migrant students are just as likely as their native peers with similar ability to receive teachers' recommendations for any secondary school type. In particular, by using PIRLS 2001 data on 4$^{\text{th}}$ graders, Lüdemann and Schwerdt (2013) find that second-generation immigrants are more likely to receive teachers' recommendations for the vocationally-oriented track of *Hauptschule* than for the academically-oriented track of *Gymnasium*. However, the effect is no longer significant after controlling for socio-economic status and ability (measured by performance in standardized tests).

Beyond the role of teachers, another meso-level factor that is likely to influence educational inequalities by migratory status is the way students are allocated to classrooms and schools. It is often the case that students with similar initial achievement levels, socio-economic status (*SES*) or migratory background end up being schooled together. The extent to which classrooms and schools are segregated may have determinants that are endogenous or exogenous to the school system. On the one hand, it partly reflects residential segregation, i.e. the disproportionate concentration of individuals of similar *SES* or ethnic origin in given neighborhoods (Karsten, 2010). On the other hand, school and classroom segregation might derive from the fact that some educational systems are explicitly aimed at fostering academic homogeneity, for instance through ability grouping or ability-based tracking (Schofield, 2006). Since the condition of low-achiever is more common among students of disadvantaged background, these mechanisms lead to

an over-representation of disadvantaged students in second-tier tracks, classrooms, and groups. Moreover, segregation may depend on the degree of freedom in school choice and on the possibility for schools to define admission rules and to engage in students' profiling Karsten (2010).

In particular, many contributions have focused on the consequences of immigrant segregation in schools. There appears to be solid empirical evidence of a negative correlation between the concentration of students of immigrant origin in given schools and the average achievement in the same schools (Felouzis, 2003; Portes and Hao, 2004; Fekjær and Birkelund, 2007; Szulkin and Jonsson, 2007). Whether this correlation reflects a causal relation between immigrant segregation and achievement is a much more debated issue. In particular, once accounting for socio-economic background and the non-randomness of sorting into schools, the effects of immigrant concentration become rather small or non-significant.

In principle, three main mechanisms may explain the negative correlation between segregation and achievement. They are respectively related to peer-, school-, and compositional effects (Cebolla Boado and Garrido Medina, 2011). First, if students of immigrant origin are already less inclined towards schooling, finding themselves grouped together with other students with similar attitudes may have a negative influence on their school performance (Ogbu, 2003). Beyond the direct influence within the classroom, immigrant segregation may also entail access to less developed social networks in the community, and consequently to limited informational resources. This hypothesis has been developed with respect to (involuntary) minorities in the United States, most notably African-Americans. In this context, it has been supported by empirical evidence (Portes and Zhou, 1993; Hoxby, 2000; Portes and Rumbaut, 2001). However, as noticed by Kroneberg (2008), such theoretical account is only partially helpful when dealing with immigrants in Europe, some of whom exhibit strong aspirations for the upward mobility of their children. Therefore, students of immigrant origin may be even more positively oriented towards school than natives. A second possible explanation of the negative correlation between immigrant segregation and average school achievement refers to the existence of school effects. On the one hand, students of immigrant origin tend to be segregated into schools characterized by a poor learning environment, both with respect to teaching and to material resources (Schindler Rangvid, 2007). Indeed, highly qualified teachers have an incentive and means to leave troublesome schools (Wyckoff and Boyd, 2005; Barbieri et al., 2010). At the same time, a higher turnover is associated with less effective teaching (Wyckoff and Boyd, 2005). On the other hand, in schools or class-

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rooms populated by many immigrant students, in order to keep up with students who lack some linguistic skills, teachers may slow down the pace and lower their assessment standards. This adaptation process may result into a less demanding learning environment (Schofield, 2006; Cebolla Boado and Garrido Medina, 2011). The third and final mechanism that can explain why higher levels of school segregation are associated with lower achievement scores is not a causal one, but refers to mere compositional effects. To rephrase, since students of immigrant origin generally perform worse than native students, schools where immigrant students are overrepresented will naturally tend to display lower average scores. While this is always partially true, compositional effects do not rule out, in principle, the possibility that segregation has an additional impact on achievement, because, even after accounting for individual characteristics, an association between the two might still be in place.

In order to disentangle the three above-mentioned mechanisms and to assess the relative importance of each one of them, several empirical works have investigated the effects of school or classroom concentration of immigrants on achievement more in depth. Such works have found little evidence of a causal impact of migrant concentration on educational outcomes (Fekjær and Birkelund, 2007; Szulkin and Jonsson, 2007; Cebolla Boado, 2007; Cebolla Boado and Garrido Medina, 2011; Contini, 2013). Rather, compositional effects seem to drive the correlation. In particular, Schindler Rangvid (2007), Cebolla Boado (2007), Cebolla Boado and Garrido Medina (2011), Ohinata and van Ours (2011, 2013), Contini (2013) and Schneeweis (2013) found no or negligible peer effects in Denmark, France, Spain, the Netherlands, Italy and Austria respectively. In other words, the presence of immigrants students does not have a negative influence *per se* on general performance. Rather, where concentration of immigrants is associated to lower test scores or grades, composition effects are in place: prior sorting of individuals across schools brings about more or less favorable school compositions: schools where students are more favorably selected generally perform better because their more advantaged students do so. Some of these studies also indicate that, when in place, negative peer effects associated to migrant school concentration are generally more detrimental for immigrant students themselves than for native students (Szulkin and Jonsson, 2007; Contini, 2013; Schneeweis, 2013), and especially so for linguistically-intensive subjects (Ohinata and van Ours, 2011).

3.1.3 Cross-country differences

The empirical literature reviewed so far in this chapter reveals that in most Western European countries, children of immigrants suffer from a double educational disadvantage: one related to their socio-economic background, and one specific to their migratory status. In several of these countries, this migrant-specific disadvantage is serious. However, the review has also suggested that cross-country differences exist in the severeness of this disadvantage. Some educational systems seem to foster learning opportunities for students of immigrant origin.

In particular, we have seen that country studies performed in France and Britain show that, in these systems, immigrants perform nearly as well as native students with similar socio-economic background. For instance, in Britain, Dustmann et al. (2010) find that, despite the fact that minority children experience achievement gaps before starting school, these gaps are substantially reduced during compulsory schooling, and turn into substantial advantages for some ethnic groups at the end of compulsory schooling. They also show that second generation immigrants tend to attain higher qualifications than their parents and—with the exception of Black Caribbeans—than their native peers. The intergenerational improvement is far larger for ethnic minorities than for natives, delineating a process of integration into the British educational system. Beyond these more apparent cases, it is difficult to compare results of single-country studies and to assess where children of immigrants perform substantially worse than their native peers and where, on the contrary, they fare nearly as well.

Some works adopt a comparative perspective in the sense that, despite being carried out at a national scale, they share the same analytical framework and address the same research questions. The main findings of such studies have been reported in the previous sections. From a methodological viewpoint, it is worth mentioning the special issue of *Ethnicities* investigating, separately for several Western European countries and the USA, whether traditional measures of social background can explain the observed ethnic inequalities in educational attainment (see the guest editorial by Heath and Brinbaum, 2007). While focusing on different aspects of educational outcomes, relying on different kinds of datasets and adopting different operationalizations of the key variables, these papers take a step forward in revealing similar processes behind Ethnic Educational Inequality (EEI) across national contexts. A similar comparative effort has been made by Heath and Cheung (2007), who analyze EEI as a component of the more general picture of the socio-economic integration of second-generation immigrants in several Western

European countries, Israel, North America and Australia. Despite providing fascinating insights on the mechanisms underlying the ethnic stratification patterns in schools and the intergenerational transmission of inequality within immigrant families, juxtaposed single-country studies are not truly comparative. Hence, for those who are interested in understanding whether and why children of immigrants perform differently in various countries, they are limited because they do not allow direct comparison neither between the outcomes of interest, nor between their determinants.

In order to perform meaningful comparisons, one has to make sure that the analytical units, the concepts at stake and the variables used to operationalize them are similar enough. To start with, a sufficient degree of homogeneity must be reached among destination countries to be compared. This issue is extensively discussed in Chapter 2, Section 2.4, where I motivate my scope conditions and case selection, and in Chapter 4, Section 4.1.3 where I review comparative studies that investigate the way institutional aspects shape opportunities and constraints of students with an immigrant background. Secondly, comparative researchers must ensure that the concepts of "children of immigrants" and "educational outcomes" have the same meaning in the selected countries. Citizenship and ethnic self-identification have strong political and historical connotations in European countries and beyond. Hence, in order to identify immigrants, most comparative studies rely on the birthplace of students and their parents. As for educational outcomes, dimensions of attainment and choice are much more diverse across countries than that of cognitive achievement. Therefore, the privileged dimension in comparative studies is often that of achievement, even if several studies from the sociology of education focus on school completion and track choices instead. International comparisons also have to set a reference point in order to define educational success. Since the goal of most studies is to assess the degree to which children of immigrants are integrated in the host society school system, the reference point is generally set as the mean performance of native students. Hence, inequalities stemming from migratory status are conceived as relative disadvantages with respect to the majority group. The third challenge to be met by comparativists is to find common measurement frameworks in order to operationalize the key concepts of the analysis. Data derived from national statistical offices pose a hurdle to comparative research because they employ different definitions (regarding educational outcomes, migratory status as well as other measures of family background). Therefore, genuinely comparative studies usually rely on self-collected data or internationally standardized data.

Studies based on self-collected data are rare because they are necessarily part of large-

scale and extensive surveys. A prominent research project of this kind is represented by TIES (*The Integration of the European Second Generation*), a seven-year collaboration on the educational and occupational attainment of children of immigrants in eight European countries (Austria, Belgium, France, Germany, the Netherlands, Spain, Sweden and Switzerland). The general idea behind its research design is that, in order to study the experiences of immigrants, three meaningful comparisons can be made: the "linear" strategy consists in contrasting the origin- and destination-country of each immigrant group, the "convergent" one in contrasting different origin groups within one destination-country, and the "divergent" one in contrasting the same origin group across different destination countries (Green, 2005, p.13-16). The TIES project is indeed based on the divergent strategy, since the survey focuses on one immigrant group at a time across destination countries: the descendants of immigrants from Turkey, former Yugoslavia, and Morocco. Several publications streamed from this project, like Crul and Schneider (2009), which develops the case of Turkish students in Germany and the Netherlands, and Crul et al. (2012a), a more comprehensive account of the project. The chapter on educational attainment of Alba and Waters (2011) also reports part of the results from the TIES survey. Generally, students of Turkish origin are more likely to dropout from upper-secondary schooling than natives. However, in the Netherlands, Belgium, Germany, and Austria, more than 25% of Turkish second-generation immigrants are early school leavers, while in Switzerland, France, and Sweden this percentage goes down to about 10%. The authors mention that while in the first cluster of countries dropout rates are also very high for natives, this is not true for the second cluster of countries. In particular, in Sweden the percentage of early school leavers among natives is extremely low, so that immigrants still face a serious *relative* disadvantage. Unfortunately, the authors do not report the figures for natives, so that it is not possible to compare the degrees of relative disadvantage across countries. The empirical findings of the TIES project point to the importance of educational systems in explaining why students with the same immigrant background have different academic performances in Western European countries. In particular, they find partial evidence that tracking into differentiated curricula is detrimental for integration: indeed, in France and the Netherlands, two moderately stratified systems, children of immigrants generally attain higher qualifications than in Germany, Austria and Belgium; however, in the extremely comprehensive Swedish system they perform quite badly. The authors also mention preschool development as a potential institutional factor to explain cross-country differences. In Belgium and France, preschool attendance is almost universal, while in the Netherlands, Sweden, and especially in Ger-

many and Austria, attendance rates are much lower. Moreover, in the latter countries, fewer second-generation immigrants than natives tend to go to preschool.

When gathering their own primary data is not feasible, comparativists have to resort to secondary data collected across countries. Recently, a step forward towards the comparability of educational achievement has been taken by international standardized surveys on student performance, such as the *Programme for International Student Assessment* (PISA), conducted by the OECD, the *Trends in Mathematics and Science Study* (TIMSS) and the *Progress in International Reading Literacy Study* (PIRLS), both conducted by the *International Association for the Evaluation of Educational Achievement* (IEA). These surveys also provide extensive information on background characteristics, directly comparable across countries. The potential of these studies has been exploited mainly by economists. Still, in recent years several sociologists have also relied on internationally standardized assessments to investigate migrant educational disadvantage from a comparative perspective. In what follows, I will review the empirical results of these studies concerning the cross-country differences in the educational disadvantage of children of immigrants. The focus of these studies, however, is not so much a descriptive comparison, but rather the explanation of such cross-country differences by institutional variables. I will discuss the latter findings in Chapter 4, Section 4.1.

Econometric studies comparing migrant educational disadvantage across countries are chiefly based on the above-mentioned standardized assessments of students' performance. Schnepf (2006, 2007, 2008) outlines a rich descriptive account of migrant achievement gaps in ten OECD countries with a high population of immigrant pupils. She checks the robustness of her findings by performing separate analyses on data from PISA—which surveys 15-year-old students on the domains of reading, mathematics and science—PIRLS and TIMSS—which survey 4th graders on reading, and maths and science respectively. By running separate regression models for each country, she finds that—relatively consistently across surveys—holding constant pupils' socio-economic background, migratory status negatively affects achievement in France, the Netherlands, Sweden and Switzerland. On the contrary, in English-speaking countries (Australia, Canada, New Zealand, Great Britain and USA) there is no evidence of a specific migrant disadvantage (Schnepf, 2006). Moreover, in the English-speaking countries, language skills seem to explain immigrants disadvantage, while socio-economic background is a more important determinant of immigrants' gap in continental Europe (Schnepf, 2007). However, this result is not surprising. Indeed, it should be noted that, with the exception of Great Britain, English-speaking countries constitute a special kind

of receiving societies. On the one hand, they are countries of traditional immigration, where integration practices and policies are more developed than in prevalently post-war migration Europe. On the other hand, in the last decades, such countries have adopted selective immigration policies, bringing to an extremely favorable composition of immigrants in terms of skills. Accordingly, in another study based on previous waves of the TIMSS survey, Buchmann and Parrado (2006) had found that migrant/native achievement gaps are larger in Nordic and Continental Europe than in traditional immigrations countries, and they remain larger net of socio-economic status (SES) and language usage. The position of Spain, Portugal, and Greece is intermediate, since they display large gaps but, after controlling for SES and language spoken at home, they are not significant anymore. However, it should be noted that in the period analyzed by this study (mid 1990s), the sample sizes of first- and especially second-generation immigrants were very low in these Southern European countries.

Schnepf also finds that in all countries, language spoken at home, generational status, and age at arrival in the country are crucial in differentiating the relative performances of immigrant students (Schnepf, 2006). Yet, immigrants are an extremely heterogeneous category: for almost all countries analyzed by Schnepf (2008), the dispersion of scores is considerably higher among immigrants than among natives. By means of quantile regression, Schnepf shows that dispersion mainly derives from low achieving immigrants and that at lower percentiles language skills impact more on educational achievement than at the top of the achievement distribution.

Jaap Dronkers and collegues conducted several cross-country studies on educational achievement of first- and second-generation immigrants. Pooling countries together, they used non-hierarchical multilevel models to explain reading performance of children of migrants assessed by PISA in terms of individual-, school-, track-, origin-country- and destination-country-characteristics (Levels et al., 2008; Dronkers et al., 2012b; Dronkers and Kornder, 2013). Their main contribution is to account for the diversity of immigrant populations and to introduce explanatory variables connected to the country of origin. They find that some minority groups find it particularly hard to reach the school performance of their native peers with similar family background. In particular, South Asians in Denmark, Southern Europeans in Switzerland, and Western Europeans in Belgium emerge as problematic groups. The authors contrast such countries with Australia, New Zealand and Scotland, where the integration of immigrants in the school system appears smoother, irrespective of the origin group considered. Germany, Greece, and Latvia are found in intermediate positions. In a more recent study, Dronkers et al. (2012b) find

that prevailing religion has an effect on educational achievement, with students originating from predominantly Hindu or Buddhist countries performing best and students from predominantly Islamic countries performing worse (Dronkers et al., 2012b). However, further research showed that the low educational performance of Islam female migrants' pupils can be traced back to the low level of gender equality in such countries (Dronkers and Kornder, 2013).

In one of the rare studies in this field conducted from the perspective of political science, Fossati (2011) performed a similar investigation pooling destination countries together to estimate the institutional determinants of migrant underachievement in PISA tests with multilevel models. Her focus is not only represented by the features of educational systems, but also by welfare-state regimes and immigration policies. Her results show that immigrant students perform particularly well in Canada and Great Britain, while they dramatically lag behind their native peers in Scandinavian countries and in countries of continental Europe. She finds a positive effect of social-democratic welfare regimes, reduced school selectivity and immigration-friendly integration regimes on the educational achievement of *natives*. However, she fails to find any effect on the achievement of migrants. Rather, the achievement of immigrant students is positively related to income inequality (measured by the Gini index), while it is negatively related to gender equality (measured by the share of women in parliament) and to social-democratic orientation (measured by left incumbency). She suggests that there might be a tradeoff between equality of opportunity for socio-economically disadvantaged students background on the one hand, and equality of opportunity for immigrant students on the other hand. By relating her findings to the positive discrimination literature (Gomolla and Radtke, 2002), Fossati argues that well-intentioned policy measures may have counterproductive results.

A more descriptive comparative analysis on immigrants' achievement gaps is represented by Dustmann et al. (2012a). In a first step of the analyses, these authors contrast immigrant students across destination countries, irrespective of their country of origin. Consistently with previous studies, they find that in traditional immigration societies (Australia, Canada, and the USA) the performance of second-generation immigrants is not significantly different from that of natives with similar socio-economic background. Conversely, in Finland, Austria, and Belgium their situation is critical, since on average they score 50 to 100 PISA points less than comparable natives. Immigrant/native achievement gaps are also substantial—though not as extreme—in Continental Europe, Nordic countries, Portugal, and Spain. On the contrary, in the UK, France, Greece, and

Italy the gaps are rather moderate, though still significantly different from zero. However, it should be noted that in the latter two countries the sample sizes are relatively small. In a second step, Dustmann and collegues adopt an analytical strategy that, following Green (2005), could be seen as a combination of the "linear" and the "divergent" approach. On the one hand, they compare mathematics achievement of children of Turkish immigrants in several destination countries, and on the other hand they compare the same scores to those of Turkish children in Turkey whose parents have not emigrated. Their results indicate that in most host countries, the achievement of the children of Turkish immigrants is lower than that of their native peers, but higher than that of children of their cohort in the home country. This result holds when conditioning on parental background characteristics. With additional analyses, they show that the difference between performances in Turkey and in immigration countries can be explained to a great extent in terms of higher school- and peer- quality relative to that in the home country.

Finally, a recent study by Schneeweis (2011) explicitly addressed the issue of how features of the educational systems affect migrant/native achievement gaps, exploiting the existing cross-country institutional variability. In her study, Schneeweis adopts a two-step analytical strategy. First, with individual level analyses on migrant under-achievement—which she runs separately for each country—she estimates what she calls a measure of integration, i.e. net of socio-economic differentials. Second, she ranks countries according to this measure. This becomes her dependent variable in a country-level regression where her main independent variables are characteristics of educational systems. The second-step of her analysis will be documented with greater precision in Chapter 4, Section 4.1.3. Instead, given the focus of the present section, here it is worth mentioning her descriptive findings. Once again, children with migration background are found to perform quite well in English-speaking countries—and especially so in Australia, Canada, New Zealand, and the USA. On the other hand, her measure of integration is quite low in German-speaking countries, Benelux countries, France, and Scandinavian countries. Countries also differ in the extent to which socio-economic resources explain immigrant/native gaps. While in Continental Europe and Nordic countries these resources account for more than half of the achievement gap, in Southern Europe the explained portion is lower. Conversely, in Eastern Europe, the explained part of the gap is even negative, meaning that immigrant students are more favorably endowed with socio-economic resources than native ones.

The studies reviewed in this section indicate that cross-country differences in the degree of migrant educational disadvantage exist. In particular, empirical research con-

sistently shows that in traditional immigration societies, the integration of students of immigrant origin is not an issue. The specificity of such countries, which I discussed already in Chapter 2, Section 2.4, is here confirmed in terms of educational outcomes. In other words, traditional immigration societies form a qualitatively different cluster of countries. Furthermore, when the reviewed studies analyze the performance of immigrant students in Eastern European countries, they often fail to find clear results. This is generally acknowledged by the authors themselves, who trace the inconclusiveness of these findings back to the limited sample sizes and the peculiar characteristics of migrations flows in post-communist Europe. These empirical findings sustain my decision of restricting the scope conditions to Western European countries.

Overall, in the last two decades scholars from different disciplines have made a huge step forward in the comparative analysis of migrant educational disadvantage. Single-country studies provide a reliable descriptive picture of how children of migrants fare with respect to natives in different receiving societies. Moreover, some of these authors have rightfully called for the need to account for ethnic or national belonging of migrants, be it in terms of individual resources and access to networks, or in terms of macro features of the origin country. Nevertheless, as noticed earlier, unfortunately such single-country studies are not directly comparable. International research projects based on self-collected data provide a reasoned framework for comparison and rich insights on the micro-, meso-, and macro-factors that are specifically relevant for children of immigrants. However, they require massive efforts and financial investments. As a consequence, they typically involve a limited number of destination countries, like in the case of the TIES project. The most important contributions to the comparative study of migrant educational disadvantage come from studies that rely on internationally standardized assessments of students' performance. The search for standardized measures across countries makes educational outcomes and their individual determinants truly comparable. This endeavor improves our understanding of integration processes and outcomes within the educational sphere. Still, such studies are aimed at explaining cross-country differences in migrant learning disadvantage by country-level institutional factors. Hence, in order to increase their sample sizes, they are typically based on quite heterogeneous samples of countries. Moreover, given their focus on explanatory research questions, most of the time such works do not adequately discuss the descriptive findings hidden in their analyses. All things considered, the state of the art in the comparative analysis of migrant educational disadvantage calls for a more systematic and in-depth assessment of the performance of second-generation immigrants in Western European countries.

3.2 Empirical statistical analyses: migrant achievement penalties

The second part of this chapter is devoted to present original empirical analyses on the educational achievement of children of immigrants in Western Europe, and more specifically on the relative disadvantage specifically associated to migratory status[1]. More precisely, in Section 3.2.1 I introduce my research questions and motivate the focus on (i) relative disadvantage with respect to natives, (ii) educational achievement, (iii) second-generation immigrants and (iv) assessment near the end of compulsory schooling, in the framework of Equality of Educational Opportunity as defined by Coleman (1968). I also explain in greater detail what I mean by migrant achievement penalty and how it is related to the effect of socio-economic status (*SES*). Subsequently, in 3.2.2 I delineate my analytical strategy by introducing a novel measure of migrant achievement penalty and by specifying the way it has been parametrically estimated. Section 3.2.3 describes the dataset used, by highlighting its potentials and limitations in addressing my research questions. It also shows how the variables of interest were operationalized. In Section 3.2.4 I present the main empirical findings and discuss their implications for the different dimensions of equality of educational opportunity in Western Europe. Finally, in Section 3.2.5, I further detail the motivations of my model construction and present the results of some sensitivity tests performed in order to check the robustness of my results against alternative model specifications.

3.2.1 Research questions and hypotheses

Object of the analyses presented in this section is the educational achievement of second-generation immigrants relative to their native peers, comparatively assessed on 15-year-old students in 17 Western European countries. My analytical focus is based on Coleman's conception of Equality of Educational Opportunity (EEO) as equality of educational outcomes between categories of students who have different endowments of economic, social and cultural resources but have developed their educational careers within the same school system (Coleman, 1968, 20-22). In order to capture the overall importance of the school systems in shaping EEO, my analyses are based on educational outcomes of 15-year-old students, i.e., near the age limit which is set as the *end of compulsory schooling* in all European countries. Furthermore, I concentrate my attention on

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[1]Part of the analyses presented in this chapter can also be found in Borgna and Contini (2013).

the *relative* disadvantage of migrant students as opposed to absolute performance levels: since my aim is to compare the educational opportunities for migrant students in several countries, I am interested in the differential impact of educational systems on the process of knowledge and skills acquisition of migrants *vs.* natives. Accordingly, I focus on *second-generation immigrants* who were born in the destination country. Therefore, just like their native peers, they have been fully exposed to the school and preschool system of the receiving society. On the contrary, first-generation students have usually been partially exposed first to the educational system of the origin-country and then to that of the destination country. More generally—as explained in Chapter 2, Section 2.3—when interested in the assimilation patterns of first-generation immigrants, it is essential to differentiate according to age at migration. Ideally, an analysis of the relative educational disadvantage of first-generation immigrants should be limited to those who have been fully exposed to destination country's educational system, hence to those who arrived before the age of 3 (age at which preschool facilities typically become available in European countries). However, as will be made clear in Section 3.2.3, due to data restriction it is not possible to single out this age group. As a consequence, the only immigrant group that can be meaningfully compared to native students is that of second-generation immigrants. My empirical analyses are based on educational *achievement* in standardized tests on mathematics, reading and science literacy. As a matter of fact, educational outcomes involve two distinct dimensions: attainment (i.e. the formal progression through the school system) and achievement (i.e. the skills and knowledge actually acquired). I decided to focus on the outcomes of the learning process (achievement)—as opposed to qualifications attained—because, thanks to international assessments on students' performance, they are directly comparable across countries. On the contrary, attainment is less comparable in reason of the different designs of educational systems, in terms of length, transitions and tracks.

In my investigation, I move from previous works on migrant learning disadvantage reviewed in Section 3.1 and extend their scope by addressing questions on the individual and institutional sources of migrant penalties in a comparative perspective. At the same time, for the above-mentioned reasons my focus is narrower than that of those studies because I concentrate on the relative underachievement of second-generation immigrants. The general aim of the analyses presented in this chapter is to assess whether second-generation immigrants perform worse than their native peers and, if this is the case, whether this implies a migrant specific disadvantage in educational achievement net of students' socio-economic status (*SES*). In my analyses, I identify a component of

underachievement which can be explained by different *SES* endowments of natives and migrants, and a residual component which remains unexplained. The latter, in turn, can be made by returns to some migrant specific resources and/or by differential returns to *SES* resources. The identification of the sign and the relative magnitude of these effects in the various countries under investigation constitutes the main purpose of the analyses.

My case selection, which I discussed in Chapter 2, reflects the need to obtain a rather homogeneous sample of countries in terms of immigration history and institutional structure[2]. Even so, migrant populations across Western Europe are diverse. Therefore, the cross-country variability of migrant underachievement and/or migrant specific penalties could be attributed to different origin compositions of migrant populations. In order to account for these possible composition effects, I partially adopt the "divergent strategy" consisting in comparing a given immigrant group across destination countries. This strategy was originally proposed by Green (2005) and it was applied by several empirical studies reviewed in Section 3.1 (Crul and Schneider, 2009; Alba and Waters, 2011; Crul et al., 2012a; Dustmann et al., 2012a). Unfortunately, due to data restrictions, the divergent strategy cannot be applied to all the countries of interest, because many do not provide information on the country of birth. Hence, first I analyze educational achievement of second-generation immigrants to the whole set of my country selection and second, by narrowing the focus to those countries that provide the relevant information, I check the robustness of my findings by contrasting same-origin immigrants across receiving societies.

Summing up, the research questions addressed in this empirical section are: do second-generation immigrants (*G2*) perform worse than their native peers by the end of compulsory schooling? Can the different educational performance of natives and *G2* be fully explained by different endowments in socio-economic status (*SES*) resources or rather is there a specific "migrant achievement penalty"? If such migrant penalty exits, to what extent can it be traced back to differential returns to *SES* and to what extent instead it reflects migrant-specific (lack of) resources? Do Western European countries display different degrees of migrant underachievement and migrant achievement penalties? If such cross-country differences exist, can they be accounted for by different origin compositions of immigrant populations?

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[2]As mentioned, the specific countries analyzed are: Austria, Belgium (split into Belgium-Flanders and Belgium-Wallonia, in reason of their different educational systems), Switzerland, Germany, Denmark, Spain, Finland, France, Greece, Italy, Luxembourg, the Netherlands, Norway, Portugal, Sweden and England and Wales.

Drawing on the theoretical and empirical literature reviewed in the first part of this chapter, I make five research hypotheses :

1. *G2* generally underachieve their native peers despite having been exposed to the same educational system;

2. *G2* generally perform worse even after accounting for *SES* differentials: migrant-specific penalties exist;

3. *SES* and migratory origin negatively interact in affecting educational achievement;

4. The degrees of general underachievement and migrant-specific penalties vary across countries;

5. These cross-country differences are robust to possible composition effects related to the origin country.

3.2.2 Analytical strategy

A common measure of migrant underachievement is based on the average gap of migrants with respect to natives. This is often used as a proxy for inequality of educational opportunity by migrant status (Dronkers et al., 2012b) or for immigrant integration (OECD, 2006; Schneeweis, 2011; Cobb-Clark et al., 2012; Crul et al., 2012a). I propose an alternative measure (also discussed in Borgna and Contini, 2013), based on migrants' z-scores, standardized with respect to the national distribution of natives. Such measure has a number of advantages compared to average achievement gaps: first, it is based on a well-known metrics. Second, it is more informative since it accounts for the variability existing in a given receiving society. This makes it more consistent with the concept of integration, which does not necessarily imply a close proximity of the individual to some abstract midpoint, but rather avoiding relegation into marginalized sectors of society (Ruedin, 2011, 14). The third advantage stems from a combination of the previous two: taking this measure as a proxy of integration within the national educational system, we could envisage parallel measures of integration with respect to other sectors of the receiving society, and easily compare them. I will now detail two declinations of this measure: the first one operationalizes the concept of general migrant underachievement, the second one that of migrant specific penalty.

Measuring migrant educational underachievement

Imagine to compare two extreme cases: in the first society the dispersion of scores for native students is very high (e.g., with a standard deviation of 100), in the second they are much more concentrated around the median value (e.g., with a standard deviation of 50). Even if the distance between the average migrant and the average native is the same in the two societies (for instance, -50 PISA points), one can argue that in the second society the lack of integration of migrants is more pronounced, since they are very distant not only from the midpoint of the natives' distribution, but also from its lowest bounds.

The measure of underachievement I adopt accounts for the fact that natives may have larger or narrower variances. It is based on migrants' z-scores, standardized *with respect to the national distribution of natives* (N):

$$z_{i,M} = \frac{Y_{i,M} - \bar{Y}_N}{\hat{\sigma}_N} \tag{3.1}$$

where $Y_{i,M}$ is the score of the individual migrant M, $\bar{Y}_N$ is the average score for all natives N and $\hat{\sigma}_N$ is the standard deviation of natives' scores.

My index of general underachievement is the average of these "raw" z-scores over the population of migrant students:

$$\bar{z}_M = \frac{1}{n} \sum_i z_{i,M} = \sum_i \frac{Y_{i,M} - \bar{Y}_N}{\hat{\sigma}_N} = \frac{\bar{Y}_M - \bar{Y}_N}{\hat{\sigma}_N} \tag{3.2}$$

The interpretation of $\bar{z}_M$ is straightforward: it reveals the distance between the average raw scores of migrants and natives expressed in terms of standard deviations of the distribution of natives. For instance, a z-score of -0.8 implies that if we place the average migrant into the distribution of natives, he or she would score 0.8 standard deviations below the average. Assuming normality, this positions second-generation immigrants in the 21st percentile rank of the distribution of natives.

Measuring migrant educational penalty

Previous literature highlighted that migrant educational underachievement can be explained to a significant extent by differentials in economic, social and cultural endowments (cf. Section 3.1). In order to control for this compositional effect and to isolate migrant specific penalties in educational achievement, I use a modified version of the above mentioned formulas. The "controlled" z-score of a student of migrant status and

a vector of individual characteristics x is:

$$z_{i,M|x} = \frac{Y_{i,M,x} - \bar{Y}_{N|x}}{\hat{\sigma}_{N|x}} \tag{3.3}$$

The average controlled z-score given x is:

$$\bar{z}_{M|x} = \frac{\bar{Y}_{M|x} - \bar{Y}_{N|x}}{\hat{\sigma}_{N|x}}$$

while the average over all migrant students is:

$$\bar{z}_M^x = \sum_x \bar{z}_{M|x} p_{M|x} \tag{3.4}$$

where $p_{M|x}$ is the proportion of migrants with $X=x$.

Instead of evaluating $\bar{z}_M^x$ completely non-parametrically, I refer to a simple country-level model for performance score Y:

$$Y_i = \alpha_N + \beta_N X_i + (\alpha_M - \alpha_N) M_i + (\beta_M - \beta_N) X_i M_i + \epsilon_i \tag{3.5}$$

where M is a dummy indexing migrant background, α_M and α_N the intercepts for migrants and natives respectively, and β_M and β_N the corresponding effects of socio-economic status. In this case:

$$
\begin{aligned}
\bar{z}_M^x &= \frac{1}{\hat{\sigma}_\epsilon} \sum_x \left[\left(\hat{\alpha}_M + \hat{\beta}_M x \right) - \left(\hat{\alpha}_N + \hat{\beta}_N x \right) \right] p_M|x \\
&= \frac{1}{\hat{\sigma}_\epsilon} \sum_x \left[(\hat{\alpha}_M - \hat{\alpha}_N) + \left(\hat{\beta}_M - \hat{\beta}_N \right) \bar{X}_M \right]
\end{aligned} \tag{3.6}
$$

Incidentally, this measure is related to a decomposition of the migrant-native performance gap performed using the method proposed by Blinder (1973) and Oaxaca (1973):

$$\bar{Y}_M - \bar{Y}_N = (\hat{\alpha}_M - \hat{\alpha}_N) + \left(\hat{\beta}_M - \hat{\beta}_N \right) \bar{X}_M + \hat{\beta} \left(\bar{X}_M - \bar{X}_N \right)$$

Here, the last term of the Blinder-Oaxaca decomposition represents the portion of the gap ascribable to compositional effects due to different endowments in X. Instead, the first two terms constitute the unexplained component which coincides with the numerator of my controlled z-score (Equation 3.6). If X is expressed in terms of deviation from the mean, the difference between the intercepts is the migrant-native gap for the average X, while the second term accounts for different returns to socio-economic status between migrants and natives[3].

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[3]Schneeweis (2011, 1283) uses the unexplained component of the Blinder-Oaxaca decomposition as dependent variable in her analyses. Note that, differently from her, I do not put much emphasis on differential returns to interpret controlled z-scores, as my empirical results show that in all countries the largest part of the unexplained component is captured by the difference in the intercepts.

3.2.3 Data, operationalization, and models

Programme for International Student Assessment (PISA)

Analyses are based on representative data from the *Programme for International Student Assessment* (PISA) collected in the years 2006 and 2009[4]. PISA assesses 15-year-old students' competences in three domains: reading, mathematics, and science. Test scores are standardized on a common scale (OECD countries mean is 500 with a standard deviation of 100), which allows direct comparisons of student achievement across countries. Moreover, individual, family, and school background information is collected through questionnaires administered to students and school officials. PISA samples are derived from a two-stage stratified sampling procedure with schools selected in the first stage and individual students selected in the second one. In order to account for this complex sampling structure and to provide design-based measures of uncertainty, PISA recommends using the final sampling weights together with the 80 replicate sampling weights provided. Moreover, to obtain unbiased estimates of the standard errors for the mean scores, it is recommended to use the five plausible values for students proficiency. I do so by following the suggested procedure of "unbiased shortcut" (OECD, 2009, 129).

Since mathematics literacy is less influenced by lack of linguistic skills than reading and science, I use the former as the educational outcome of main interest. This choice has the advantage of limiting compositional effects due to the origin country. Nonetheless, to gain leverage, I replicate analyses on the two other literacy domains. In the PISA framework, mathematical literacy is defined as the ability of students to analyze, reason, and communicate ideas effectively as to pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations (e.g., personal, educational, occupational, public, and scientific). Descriptive statistics on math scores can be found in Table A.2 in the Appendix.

The high comparability of its measurement framework, the rich information collected on students' background, the focus on the end of compulsory schooling, and the number of countries involved makes this survey a unique source of data for my research questions. However, a limitation of PISA is given by the lamentable fact that—just like other international surveys on cognitive abilities—it does not collect consistent information

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[4]Analyses were first performed separately for the two waves 2006 and 2009. Since results proved consistent, in order to ensure greater sample sizes for immigrant students, I rerun the analyses on the pooled waves.

on the exact country of birth, the nationality, or the mother tongue of students[5]. A more specific limitation of the PISA survey is that some questions asking information on students' early years display a high number of missing values: in particular the question on age at arrival in the destination-country has too few valid answers to allow a proper differentiation of first-generation immigrants according to the length of their staying in the country and their exposure to its educational system.

Variable construction

The sample units for the analysis are 15-year-old students over 17 Western European countries. I define migrant categories according to information on place of birth provided by PISA: *G2* are second-generation migrants (native-born students with both foreign-born parents). Natives (students with at least one native-born parent) is the residual category, while first-generation migrants (foreign-born students with both foreign-born parents) are excluded from the sample[6]. To operationalize the various dimensions of family background potentially affecting educational achievement, I used a synthetic measure provided by PISA: the index of economic, social and cultural status (*ESCS*). This is derived from three indices: highest score of parents on the Ganzeboom's scale of occupational status (Ganzeboom et al., 1992); highest parental education on the ISCED scale[7]; and home possessions (*HOMEPOS*) which in turn comprises items on the family wealth (*WEALTH*), cultural possessions (*CULTPOS*) and educational resources (*HEDRES*) scales, as well as the number of books at home.

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[5]In PISA, the questions regarding the place of birth are specific to national questionnaires and in many European countries only limited options are offered to answer them. The question on language usually spoken at home has the same limitations, while no question concerns nationality. Contextual questionnaires from IEA surveys (PIRLS and TIMSS) only provide information on whether the student and her parents are foreign born or not, and on whether the language spoken at home is the official idiom of the destination country or not.

[6]Data from Germany also exclude students whose mother was born in former Soviet Union, since some indications (extremely high test scores, German as language spoken at home) suggest they are ethnic German return migrants.

[7]ISCED stands for *International Standard Classification of Education*, a framework developed by the UNESCO in 1997 "to facilitate comparisons of education statistics and indicators across countries on the basis of uniform and internationally agreed definitions" (`http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx`)

Models

In order to compute the controlled z-score as a measure of migrant educational penalty, I run country-specific individual-level regressions on mathematics score over a dummy variable for gender (F), a dummy variable for migrant status (M), a continuous variable for socio-economic resources (X) and an interaction between the last two terms:

$$Y_i = \alpha_N + \beta_N X_i + (\alpha_M - \alpha_N) M_i + (\beta_M - \beta_N) X_i M_i + \gamma F_i + \epsilon_i \tag{3.7}$$

For the countries where the interaction term proved non significant at the 5% level, I run a more parsimonious model without interaction:

$$Y_i = \alpha_N + \beta X_i + (\alpha_M - \alpha_N) M_i + \gamma F_i + \epsilon_i \tag{3.8}$$

Both these models are extremely flexible because they allow each parameter to vary across countries. Descriptive information on the sample sizes and summary statistics on the dependent variable and controls for natives and second-generation migrants can be found in Tables A.1-A.3 in the Appendix A.

3.2.4   Results and discussion

Results of the estimation of performance scores for each country are shown in Table 3.1. $(\alpha_M - \alpha_N)$ is the mean difference in the scores of migrants and natives at $ESCS = 0$ (the OECD average), while β_N is the effect of one additional point in the $ESCS$ scale for natives. Where the interaction coefficient $(\beta_M - \beta_N)$ is not significant, $(\alpha_M - \alpha_N)$ is the mean difference at all values of $ESCS$.

As expected, in all countries immigrants perform substantially worse than their native peers, even after controlling for socio-economic resources, thus supporting *Hp 1* and *Hp 2*. Yet, differentials vary greatly across countries, from 10 PISA points in England and Wales to 56 in Belgium-Flanders (supporting *Hp 4*). The socio-economic background also has large effects on educational achievement, for both native and migrant students.

Hp 3 is only partially supported. As expected, in countries where the interaction term is significant, it is generally negative, meaning that migrants benefit less than natives from a high endowment of socio-economic resources. However, in Denmark, England and Wales, Spain, Greece, Italy, and Sweden the interaction is not in place. As discussed in 3.1, previous studies reached no consensus on the existence of differential returns to parental socio-economic resources. According to Heath et al. (2008), these inconsistencies might reflect actual cross-country differences. In other words, in some countries

country	$(\alpha_M - \alpha_N)$	β_N	$(\beta_M - \beta_N)$
Austria	-38.11** (5.44)	40.37** (2.13)	
Bel. Flanders	-56.43** (9.73)	44.63** (1.59)	-23.79** (6.07)
Bel. Wallonia	-30.21** (6.61)	51.80** (2.28)	-21.00** (5.19)
Switzerland	-39.51** (3.12)	34.25** (1.36)	
Germany	-41.15** (4.84)	45.33** (1.80)	-15.35** (4.00)
Denmark	-40.26** (4.82)	32.52** (1.32)	-9.39* (3.90)
England+Wales	-10.86** (4.00)	40.8** (1.58)	
Spain	-25.80** (6.59)	28.45** (0.97)	
Finland	-54.27** (12.04)	28.58** (1.17)	
France	-33.31** (6.73)	52.17** (1.81)	-19.28** (4.14)
Greece	-10.43 (6.96)	33.88** (1.56)	
Italy	-35.77** (8.38)	23.24** (1.41)	
Luxembourg	-21.07** (2.66)	29.66** (1.01)	
Netherlands	-35.71** (6.00)	38.47** (1.64)	-16.94** (3.78)
Norway	-25.41** (7.08)	34.43** (1.53)	
Portugal	-40.02** (8.34)	31.57** (1.31)	10.10* (5.14)
Sweden	-34.32** (4.60)	37.56** (1.60)	

Table 3.1: Source: PISA 2006-2009. Country-specific regressions of math scores estimated using replicate weights and plausible values. ** Sig. at 1% level * Sig. at 5% level. Standard errors in parentheses. Model: refer to Equations 3.7 and 3.8. Controls: female, *ESCS*, *ESCS*G2*.

the differential returns may be in place, while in others they may be not. However, he also argues that they might simply reflect different methodological and analytical choices made by different scholars, as well as—for countries where interactions are not significant—small sample sizes. In my analyses, I adopt a consistent measure of educational achievement across countries and run the very same statistical models. Moreover, countries where *ESCS*G2* interactions are not significant are not necessarily those with the smallest sample sizes (cf. Table A.1 in Appendix A). Therefore, it is reasonable to conclude that in some countries second-generation immigrants actually have differential returns to *SES* while in others they do not. There seem to be no special relation between the significance of the interaction terms and the size of the *SES* coefficient for natives. In other words, countries where second-generation immigrants suffer from negative differential returns to socio-economic and cultural resources are not necessarily those where such resources influence to a greater extent educational achievement, nor those where

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they influence it to a smaller extent. Then what differentiates countries with significant interaction terms with countries with non-significant ones? My tentative explanation is that in Belgium, Germany, Denmark, France, and the Netherlands country-specific cultural capital is particularly important to navigate the educational system. Therefore, the cultural capital of immigrant parents is more acutely devalued in those five countries than in the remaining countries.

Nevertheless, even when significant, interaction terms are rather small with respect to the coefficients associated to the migrant dummy, indicating that underachievement of second-generation immigrants is not so much driven by differential returns to socio-economic resources, but rather by the lack of other migrant-specific resources.
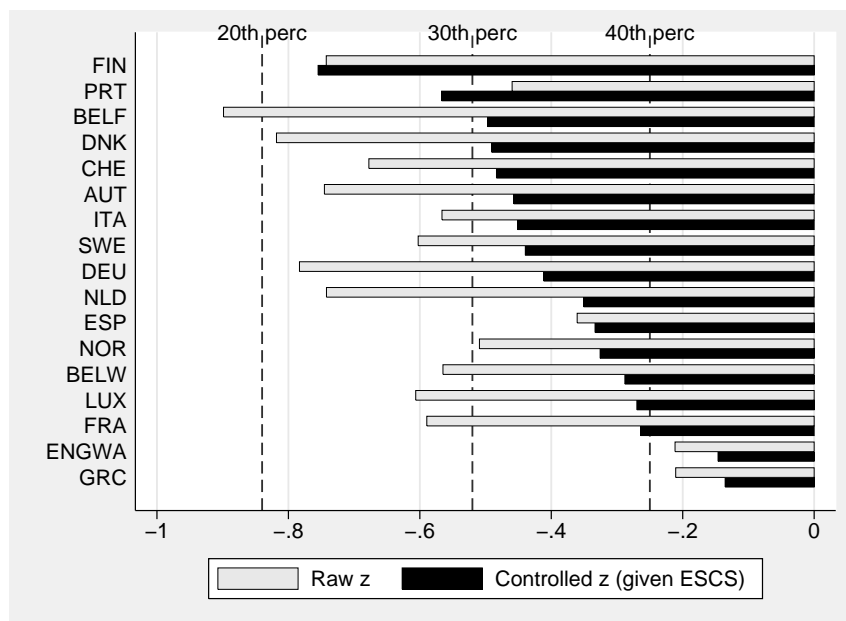
Figure 3.1: Overall underachievement and migrant achievement penalty. Source: PISA 2006-2009 Maths (PV). Raw and controlled z-scores for $G2$

How do these results translate in terms of my measures of migrant disadvantage? As shown in Figure 3.1, raw z-scores provide a clear-cut picture of how severe is the issue of migrant underachievement in Western Europe. In most countries, second-generation migrants lie below the 30th percentile of the distribution of natives, despite being born in the receiving society and having been fully exposed to its educational system. In Belgium-Flanders the situation is particularly critical, since the average second-generation migrant scores about 0.8 standard deviations less than the average native, lying around the

20th percentile of the distribution of natives. Generally speaking, migrant achievement penalties (controlled z-scores) are huge both in absolute and relative terms: the average second-generation migrant child lies below the 35th percentile of the distribution of natives with the same socio-economic resources in Finland, Portugal, Belgium-Flanders, Denmark, Switzerland, Austria, Italy, Sweden and Germany. The least unequal countries for migrant achievement penalties are Greece, England-Wales, France, Luxembourg, and Belgium-Wallonia.

Moreover, *SES* differentials partly explain underachievement, but not fully, and not in all countries. In Germany, France, the Netherlands, and Luxembourg, underachievement is at least halved when accounting for such differences, while in Finland, Portugal, Italy and Spain more than three quarters remain unexplained. It is interesting to point out that in the former countries mass immigration already developed in the post-war period as an effect of guest-worker programs or flows from former colonies, while in the latter countries it is a more recent phenomenon. Second-generation immigrants still experience serious educational disadvantages in both groups. However, in new-immigration countries, migrant-specific lack of resources is more important than lack of traditional sources of inequalities in explaining such disadvantages. Finally, Western European countries display sharp differences in both general underachievement levels (which range between around the 20th percentile of Flanders and Denmark to the 40th percentile of Greece and England and Wales) and migrant specific penalties (going from the 22nd percentile of Finland to the 44th of Greece and England and Wales again).

Are the countries with the largest migrant-specific penalties also unequal with respect to socio-economic background? Figure 2-left displays how Western European countries perform with respect to these two dimensions of educational inequality[8]. As shown by Figure 3.2, not only migrant-specific penalties do not coincide with socio-economic penalties, but they are negatively correlated in this sample of countries. This finding could be interpreted as signaling a policy tradeoff. To rephrase, countries that are able to mitigate traditional forms of inequalities may perform less well when migrant-specific disadvantages are at stake. This explanation was invoked by Fossati (2011), to account for her finding that where income dispersion is low—and especially in Scandinavian countries—immigrant children perform poorly. However, the correlation between migrant-specific and socio-economic penalties might also spurious.

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[8]The "socio-economic penalty" was obtained by dividing the coefficient of *ESCS* for natives by the root-mean-square error. This indicator measures by how many standard deviations a native individual with *ESCS=x-1* lags behind the native individual with *ESCS = x*.
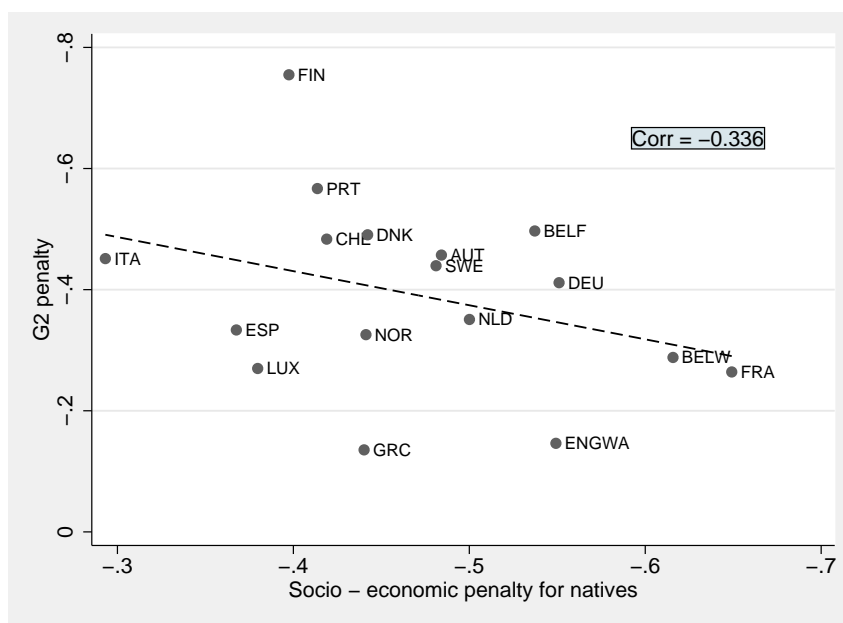
Figure 3.2: Migrant penalty *vs.* Socio-economic penalty in educational achievement. Source: PISA 2006-2009 Maths (PV). Raw and controlled z-scores for $G2$

To my scope, this finding is especially interesting in so far it allows to envisage a typology of educational systems based on the level of Inequality of Educational Opportunity (IEO) they produce on these two main dimensions: socio-economic penalties and migrant-specific penalties. As illustrated by Figure 3.3, indeed, we can first detect some strongly socially inegalitarian systems that fail to integrate migrant students as well (Belgium Flanders and, to a minor extent, Sweden, Austria, and Germany). On the contrary, other systems (Greece and Luxembourg, but also Norway and Spain) appear to be able to limit the impact that socio-economic status and migratory status on educational performances. Perhaps even more interesting, however, are the off-diagonal cases. On the one hand, in some educational systems that are not egalitarian with respect to socio-economic background migrants perform like natives with similar socio-economic resources (England-Wales, France, Belgium Wallonia, followed by the Netherlands). On the other hand, other systems are relatively egalitarian to disadvantaged natives but very detrimental for migrants, given socio-economic status (Italy and Finland and, to a minor extent, Switzerland, Denmark, and Portugal). The placement of the latter two clusters of countries—driving the negative correlation between migrant penalties and socio-economic penalties—suggests that migrant-specific penalties and socio-economic penalties are two

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distinct aspects of educational inequality and should not be confounded. On the contrary, previous work (Levels et al., 2008; Schneeweis, 2011; Cobb-Clark et al., 2012; Dronkers et al., 2012b; Dronkers and Kornder, 2013) implicitly assumed that the two effects go in the same direction, when including institutional variables related to socio-economic background in their explanatory models. This evidence suggests that a deeper reflection is needed on the features of educational systems that may be specifically beneficial or detrimental to immigrant-background students of migrant origin.
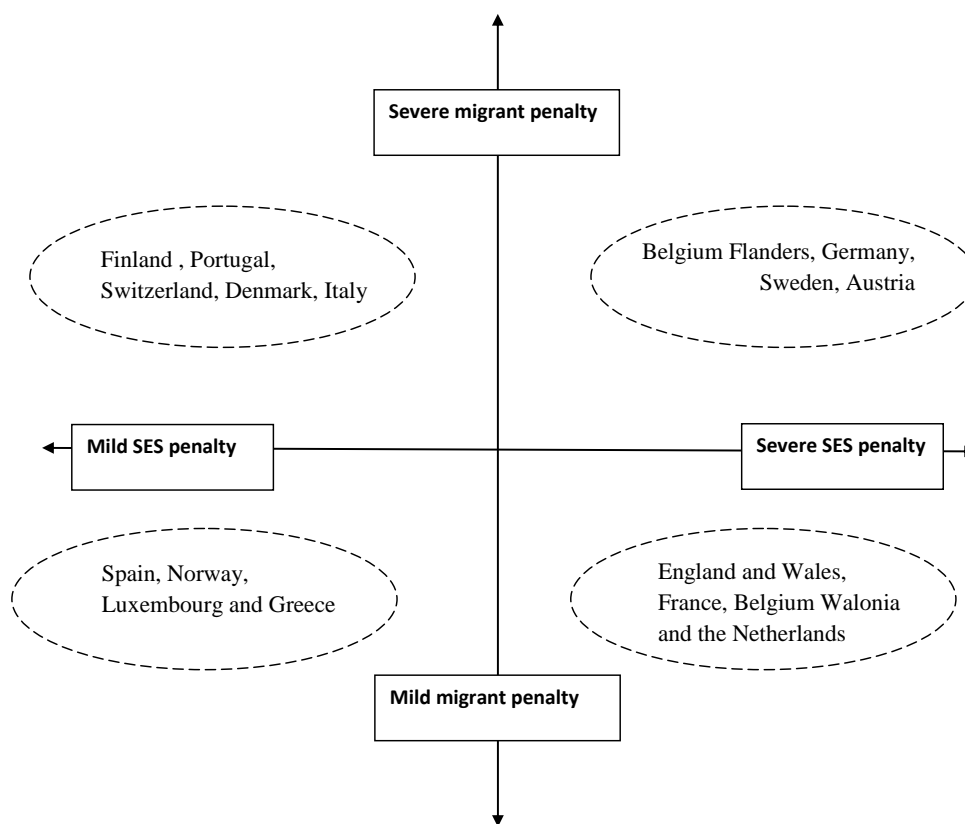
Figure 3.3: Typology of educational systems by Inequality of Educational Opportunity (IEO) driven by *SES* and migratory status

Yet, the typology just presented—and more generally the cross-country variability of migrant penalties—cannot be considered sound before having verified that the cross-

country variability of migrant penalties cannot be reduced to compositional issues. To rephrase, educational systems displaying mild migrant penalties might not be the most egalitarian, but rather those having the most favorable origin-country composition of immigrant population. This is why I perform additional analyses based on the "divergent
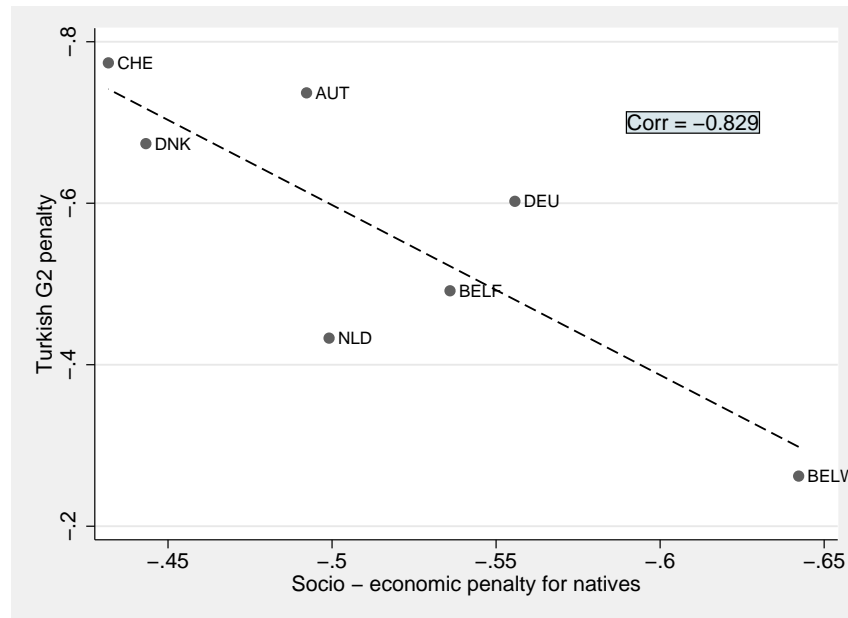
Figure 3.4: Migrant penalty *vs.* socio-economic penalty, for Turkish students only. Source: PISA 2006-2009 Maths (PV). Raw and controlled *z*-scores for *G2*

strategy" proposed by Green (2005), that is, contrasting same-origin migrants across destination-countries. Unfortunately, due to the data restrictions outlined in 3.2.3, it is only possible to do such robustness checks on a limited number of countries. More precisely, I contrast students with Turkish immigrant mothers across seven destination countries, for which the information on country of birth of parents is available: Belgium Wallonia and Belgium Flanders, Switzerland, Denmark, the Netherlands, Germany, and Austria. The focus on second generation migrants of Turkish origin is justified by their considerable presence in many Western European countries and their high degree of comparability. Indeed, as documented in Table A.3 in the Appendix, they are very much alike in so far socio-economic and cultural resources are concerned. Moreover, from the linguistic point of view, Turkish is very distant to all of the official idioms spoken in Western Europe. Finally, as argued by Schneider and Crul (2009, 7), Turkish immigrants are also comparable across destination countries in reason of their motivation to

migrate (labor and family reunification) and in reason of their prevalent rural origin. As shown in Figure 3.4, the ranking of most countries is left unchanged. The inverse relation with socio-economic penalties holds true, and appears to be even stronger: therefore, even if compositional effects are in place, they are not responsible for the negative correlation. The results of the divergent strategy, despite not generalizable to the whole set of Western European countries, on the one hand substantiate the empirical findings presented above—and in particular the counterintuitive relation between migrant penalties and socio-economic penalties; on the other hand, they provide further information on the countries considered, contributing to a more sensible interpretation of their positioning in the typology proposed above. All things considered, by ruling out possible confounding effects—even if for a subset of countries—the robustness checks presented here help drawing more aware conclusions on the more or less egalitarian character of national educational systems. Hence, the hypothesis that cross-country differences are robust to possible compositional effects (*Hp 5*) is at least partially confirmed.

To summarize, the empirical statistical analyses presented in this section reveal a critical picture of the educational underachievement of second-generation immigrants in Western Europe. Students of migrant origin generally perform substantially worse than their native peers: in most countries, the average *G2* is situated below the 30th percentile of the achievement distribution of natives. Through a novel measure of migrant achievement penalty, I have shown that migrant underachievement is not fully explained by *SES* differentials: hence, a migrant-specific disadvantage in educational achievement exists. The hypothesis of a differential impact of *SES* resources on natives and migrants was only partially confirmed: while in some countries *G2* benefit less of these resources, in other countries the interaction term proved not significant. I have also provided evidence that cross-country differences in migrant achievement penalties are in place and cannot be reduced to compositional issues related to the origin-country. Therefore, I argue that there is room for an institutional explanation of this variability. Finally, from the analyses presented in this section, migrant penalties and socio-economic penalties emerged as two distinct dimensions of educational inequalities. I interpret this finding as a call for an in-depth reflection on dimensions of educational systems liable to specifically affect the underachievement of second-generation migrants.

3.2.5   Notes on model specification and robustness checks

The statistical models presented in the previous section include only few explanatory variables. This is a deliberate choice since the goal of the first step of research is not to attain a high predictive power, but rather to identify the "migrant specific penalty" in educational achievement. In other words, I do not aim at disentangling the micro-level mechanisms that explain *why* students of immigrant origin lag behind their native peers, but rather at quantifying *the size* of this disadvantage, insofar it is specifically associated to their migratory status. Given that the migrant-specific penalty is the *explanandum* of the second step of my research (focused on the structure of educational systems), in the individual-level model construction, I carefully selected those variables that are not endogenous to characteristics of the destination-country's educational systems. In this section, I motivate the choice of the control variables and briefly describe sensitivity tests performed in order to check the robustness of the results against alternative model specifications.

First of all, the fact that I operationalized parental socio-economic background with the synthetic indicator of *ESCS* provided by PISA is debatable. Family resources that are not specific to migratory status can be grouped under three main dimensions: (i) economic capital; (ii) social capital; (iii) cultural capital, in its components that are not country-specific. As mentioned in Section 3.2.3, *ESCS* is a composite index based on the aggregation parental occupational status, parental education, and home possessions. These items operationalize the dimensions of economic, social, and cultural capital in multiple ways. For instance, cultural home possessions are a proxy of economic capital, but also of cultural capital. Parental education is a proxy of cultural capital, but also of social capital. Occupational status is a proxy of social capital, but also of economic capital... Therefore, with the use of *ESCS* I gain in parsimony, while capturing several relevant dimensions. The choice of *ESCS* as a single control variable also makes it easier to compare migrant-specific penalties and socio-economic penalties. However, I performed some robustness checks in order to test whether using considering each dimension separately produces substantially different results compared to using *ESCS* as a synthetic index. In the first alternative specification, parental education, parental occupation and home resources are introduced as distinct control variables. In particular, beyond the female dummy, I controlled for *HISEI* (highest parental score on the Ganzeboom's scale of occupational status), *HISCED* (highest parental education on the ISCED scale) and *HOMEPOS* (index of wealth possessions, cultural possessions, educational possessions).

Figure 3.5: Consistency of results with alternative model specification. Baseline model (M0) controls for female and *ESCS*. Alternative model (M1) controls for female, *HISEI, HISCED, HOMEPOS*.

Figures 3.5-left and -right compare the results from my baseline model (controlling for *ESCS*) with those from the alternative model. In particular, I compare the estimates of the coefficient associated to the *G2* dummy, on which my measure of migrant achievement penalty is based. The estimates of the two models are highly consistent, both in terms of correlation between the two measures ($\rho = 0.954$) and in terms of country rankings.

In the second model, I controlled for the female dummy and the *HISEI* index only. Therefore, only the dimension of occupational status is considered here as a possible confounder of the relationship between migratory status and educational achievement. Indeed, as indicated by Engzell and Jonsson (2013), child and parental reports on parents' educational qualifications often different substantially: parental reports are much more accurate and the consequence is that *SES* effects can be severely underestimated with children's reports[9]. On the contrary, there is a much higher degree of accordance for parental occupation. From this perspective, it would be better to use parental occupation as an indicator of *SES*, rather than parental education (Engzell and Jonsson, 2013). At the same time, the authors also show that the estimates of the immigrant origin effect on test scores are not heavily affected by measurement error, neither in parental occupation, nor in education. Hence, this source of error has no serious consequences on the estimates of the immigrant-origin effect given social origin. Nevertheless, I performed a sensitivity check controlling for parental occupation only. Figure 3.6-left and -right display the consistency of the results from the baseline model with those from the alternative model

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[9]However, when available, parental reports are usually affected by large non-random non-response rates, which also heavily bias the estimates.
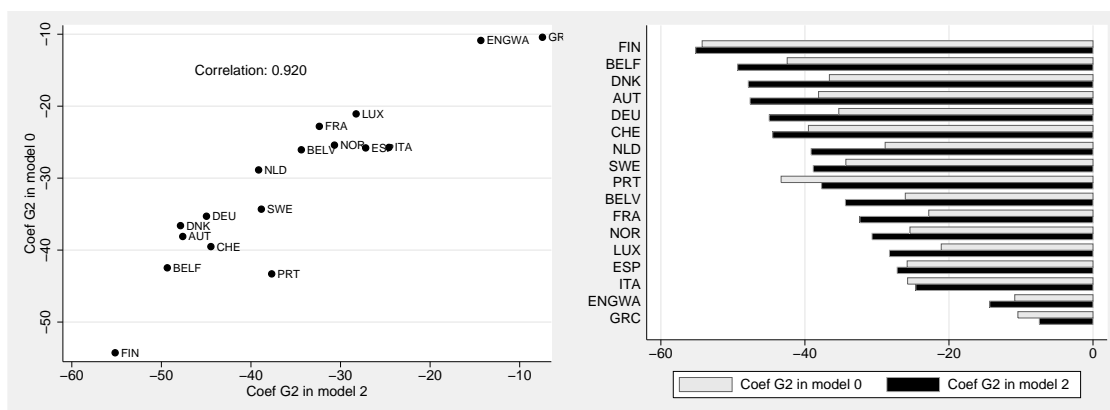
Figure 3.6: Consistency of results with alternative model specification. Baseline model (M0) controls for female and *ESCS*. Alternative model (M2) controls for female, *HISEI*.

controlling for *HISEI* only. As expected, the achievement gap is generally higher when controlling for parental occupation as a unique indicator of socio-economic background. However, the country ranking is not substantially altered. Moreover, the two estimates are highly correlated across countries ($\rho = 0.920$).

A third potential issue that might arise from the use of *ESCS* as a control variable is that parental occupation is partially endogenous, because the labor market opportunities available to immigrants—especially of extra-EU origin—are not the same as those available to citizens with comparable education. Indeed, system-level features as labor market structure, immigration selection policies and integration policies for adults affect the mismatch of immigrants' skills and their job positions. The same reasoning could apply to indicators of wealth, such as home possessions. However, parental occupation is exogenous to children's achievement, and thus is not affected by features of the destination-countries' educational systems. As a consequence, controlling for parental occupation and wealth indicators would be problematic if one is interested in the overall picture of immigrants' integration in the host society and its indirect consequences on the educational achievement of immigrant children. On the other hand, this dissertation is focused on the role of educational systems. Hence, there is no endogeneity problem related to parental occupation. Moreover, I argue that it is not only possible, but necessary to control for parental occupation and home resources, if one wants to contrast immigrant and native children with comparable cultural, but also economic and social resources. To be more specific, by controlling for parental education only, one would miss an important part of the influence of socio-economic background on educational achievement. This is particularly relevant for students of immigrant origin, since educational
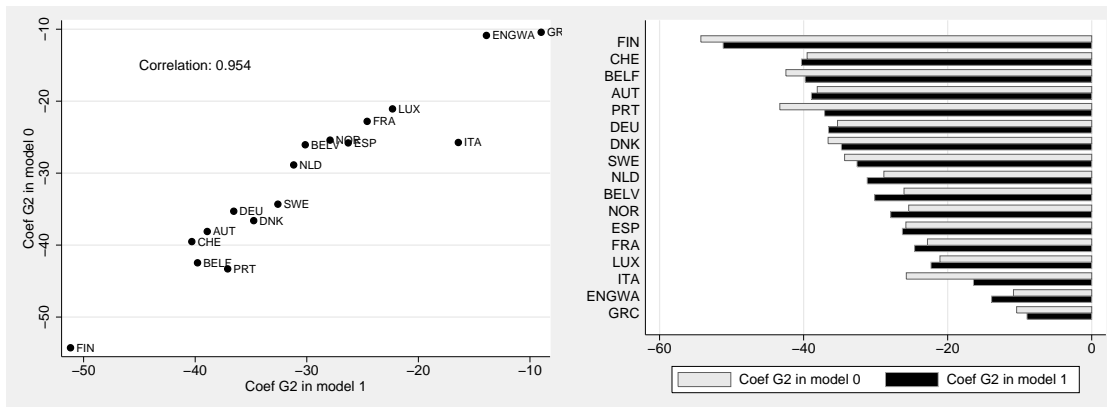
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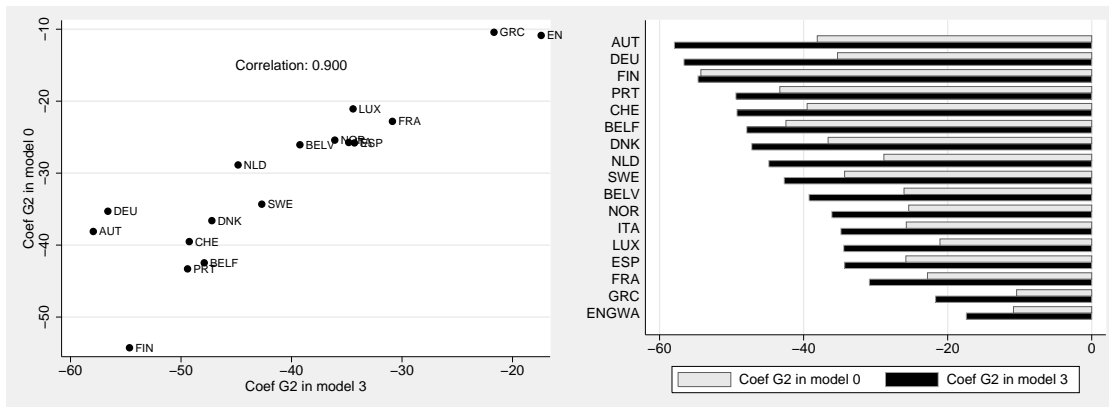
Figure 3.7: Consistency of results with alternative model specification. Baseline model (M0) controls for female and *ESCS*. Alternative model (M3) controls for female, *HISCED*.

qualifications acquired in the origin country may not have (or may be perceived not to have) the same value as those acquired in the destination country. Let us compare two individuals. The first one is a second-generation immigrant. He has highly educated parents, who are nevertheless employed in a low-status, poorly paid job in the destination country. The second one is a native student of native parents, who are highly educated and have high-status and well-paid positions. The first student cannot benefit from a number of additional monetary resources (e.g. access to expensive study materials) as well as non-monetary resources (e.g. access to specific social networks). By controlling for parental education only, one would erroneously interpret the effects of this lack of resources as an effect of the migratory status. Yet, as a third robustness check, I repeated the analyses by controlling for the gender dummy and the *HISCED* index only. Therefore, the occupational status and the home resources are left out as control variables. As shown by Figure 3.7-left and -right, the estimates are highly correlated with the original ones ($\rho = 0.900$), and the ranking is similar. Hence, the choice of one model over the other should not substantially affect the construction of my measure of migrant achievement penalty. At the same time, Figure 3.7-right also shows that the *G2* coefficient of model 3 is even larger than the one of model 2. This confirms that leaving aside the dimensions of parental occupation and home resources bias upwards our estimates of migrant achievement penalties.

PISA provides information on whether students speak the destination-country language at home. Since previous studies found that language spoken at home is a significant predictor of educational achievement, one could argue that in my model specification I should include this control. One could also argue that I should control for language spo-

ken at home as a proxy for parental linguistic skills and/or acculturation. Yet, I believe that controlling for this variable is not appropriate. A first order of reasons concerns the unclear meaning of this variable. Whether or not children speak the destination-country language ($L2$) at home depends on a variety of factors, certainly including children's and parents' linguistic skills in $L2$. In turn, children's linguistic skills can be influenced by language spoken at home. However, the direction of this relation is not obvious from a theoretical perspective. While Esser (2006) argues that factors that promote $L1$ retention hinder immigrants' skills in $L2$, many educational scientists support the concurring hypothesis of "linguistic interdependence" (Cummins, 1979). As lamented by Kristen et al. (2011), no empirical rigorous study has tested the validity of one over the other. What is more, the relation between language use and parental linguistic skills in $L2$ is far from clear-cut. It might well be the case that immigrant parents, while mastering $L2$, prefer to speak to their children in their mother tongue in order to preserve their cultural ties with the origin country. On the contrary, it is possible that immigrant parents, despite having a very poor knowledge of the host-country language, make an effort to use it to communicate with their children. In addition, pupils may speak the host language with their siblings and switch to the origin-country language with their parents. Unfortunately, the phrasing of the question in the PISA questionnaire is quite vague ("What language do you speak at home most of the time?"), so that is not possible to disentangle the two.

A second order of reasons I believe that controlling for language spoken is not appropriate relates to the endogeneity of this variable with respect to the achievement of second-generation immigrant children. In fact—as argued before—language use is to some extent influenced by children's and parents' linguistic skills in $L2$. The level of linguistic skills of immigrant children is highly endogenous to achievement in all the literacy domains assessed by PISA. Clearly, the educational system affects the degree to which immigrant students master $L2$. Parental skills are also endogenous, because—through their children's schooling—parents can improve their linguistic competences. For example, if immigrant children generally attend preschool from early age, they will have more opportunities to improve their linguistic skills and therefore, be more inclined to speak $L2$ also at home, with siblings and parents. Therefore, controlling for the individual-level variable of language spoken at home would hinder the identification of the systemic effect of preschool, by capturing part of the desired effect.

3.3 Empirical fuzzy-set analyses: coinciding factors of migrant disadvantage

In Section 3.2 I have called attention to the existence of a migrant achievement penalty. More precisely, I have emphasized the fact that at the end of compulsory schooling, in all Western European countries second-generation immigrants lag behind their native peers in educational achievement even after accounting for socio-economic status (*SES*). However, statistical analyses have also shown that a substantial part of migrant underachievement is indeed explained by *SES* resources. Hence, even if the focus of this dissertation are migrant-specific penalties, the importance of *SES* should not be disregarded. For these reasons, in the present section I am going to develop further the way migrant educational disadvantage is related to social stratification of migrants and natives in Western Europe. More specifically, I explore the accumulation of factors of advantage and disadvantage among natives and immigrants and relate them to their achievement gaps. In order to do so, I take advantage of the mixed-methods approach of this dissertation and use fuzzy-set analysis as an alternative analytical strategy to statistical methods, especially able to detect asymmetrical patterns. I first present my research questions, which refer to the extent to which native and second-generation students in Western Europe compound factors of advantage and disadvantage related to various dimensions of socio-economic status (*SES*). Next, I describe my analytical strategy, framing it into the more general ensemble of comparative configurational methods and motivate the use of fuzzy-set coincidence analysis as opposed to mainstream statistical methods. Finally, I present my empirical findings by highlighting an interesting pattern that is invisible to correlation analysis.

3.3.1 Research questions

Social stratification of individuals typically occurs along a number of different dimensions, as profusely recognized by sociologists since Max Weber. When these dimensions coincide to a great extent, social structures are said to be "crystallized" (Freedman et al., 1951). From a set-theoretical perspective, one can think of individuals as simultaneously belonging to multiple sets, according to the dimension considered: social class (*élite*, bourgeoisie, proletariat), cultural or social status (high, low), education level (primary, secondary, tertiary). Up to now, I have relied on a unidimensional conception of *SES*. More precisely, I have assumed that the various dimensions of *SES* have an additive effect

on educational achievement. However, one could argue that the same dimensions have a stronger effect when they combine. Moreover, factors of advantage and disadvantage related to various dimensions of *SES* do not necessarily operate in a symmetrical way in affecting educational performance. Since the present work has a comparative outlook, I am going to consider this issue from a country level perspective. By focusing on Western European countries—for the reasons outlined in Chapter 2, Section 2.4 —I will address the following questions:

1. Do second-generation immigrants (*G2*) compound factors of advantage and/or disadvantage related to *SES* more than their native peers?

2. Do Western European countries differ in the way *G2* and natives compound factors of advantage and/or disadvantage?

3. If such cross-country differences exist, are they related to migrant educational disadvantage?

Given the exploratory character of the present empirical section, I do not have strong theoretical hypotheses on these research questions. However, I expect that—if cross-country differences are in place—countries where migrant underachievement is higher also display a stronger unbalance in the way natives and *G2* compound factors of disadvantage. Indeed, the compounding of factors of disadvantage (crystallization "from the bottom") could point to a situation of social exclusion where only highly resilient students can escape educational failure. On the contrary, no empirical evidences suggests that simultaneously enjoying several assets (crystallization "from the top") is decisive to be among top-performers.

3.3.2 Analytical strategy

In order to assess the crystallization of social structures, sociologists have relied on correlation measures (Lenski, 1954; Landecker, 1981). However, I argue that set-theoretic methods—and in particular the technique of fuzzy-set coincidence analysis proposed in Borgna (2013)—is more apt to assess the degree of crystallization. Hence, I will show that set coincidence is fundamentally different from correlation, first of all because its focus is on the joint subsistence of attributes rather than on a common probabilistic trend. This is particular important when studying stratification systems, which—as Landecker himself maintains—are "constellations of rank systems" (Landecker, 1981, 40), that is,

constellations of "qualitatively different status hierarchies" (*ivi*, 19). Secondly, the usefulness of fuzzy-set coincidence analysis in this field derives from its capability to account for asymmetrical patterns. Indeed, a social structure can be crystallized either because some individuals are able to accrue their position by cumulating several assets, or because some other individuals are trapped in the lowest strata by multiple deprivations, or, still, because both these processes are in place. Correlational analysis is not able to disentangle these processes and could fail to detect patterns of crystallization if only one of the two is in place. On the contrary, fuzzy-set coincidence analysis requires careful calibration of set membership for factors of advantage and factors of disadvantage separately, and the two do not need to be symmetrical: in this way, crystallization processes "from the top" and "from the bottom" can be distinguished.

Set theoretic research and social science

The application of fuzzy-sets to social sciences developed from crisp-set Qualitative Comparative Analysis (csQCA) which was intended for Boolean sets, where cases could either assume value 1 (if they belonged to the given set) or 0 (if they belonged to its negation) (Ragin, 1987). However, to account for the fact that most social and political phenomena exist in degrees, the framework of QCA was later extended to fuzzy logic, under which the degree of membership to a given set may vary, assuming any value from 0 to 1 (Ragin, 2000, 2008). Fuzzy sets do not equate with continuous variables, because their construction relies on a procedure called "calibration" which anchors set membership scores to qualitative thresholds and truncates irrelevant variation. When calibrating raw data, researchers rely on external substantive or theoretical criteria or on meaningful breaks in the internal distribution to determine qualitative thresholds for full membership (1), full non-membership (0) and maximum ambiguity (0.5). Intermediate values are typically assigned using a linear or log-linear function. As Ragin puts it: "Fuzzy sets are simultaneously qualitative and quantitative. They address the varying degree to which different cases belong to a set (including the two qualitative states, full membership and full non membership), not how they differ from one another along quantifiable dimensions of open-ended variation"(Ragin, 2000, 154).

The specificity of fuzzy-set coincidence

Set-coincidence can be defined as the degree to which two or more sets overlap, or, in other words, the extent to which they constitute one and the same set. In a crisp-set

framework, coincidence scores can be calculated as the number of cases in the intersection of two or more sets over the number of cases in the union of the same set. Given that in fuzzy logic the union of two sets corresponds to taking the maximum membership score and their intersection corresponds to taking their minimum, fuzzy-set coincidence score can be calculated as:

$$\frac{\sum min\,(x_i, y_i)}{\sum max\,(x_i, y_i)} \tag{3.9}$$

where x_i and y_i are individual membership scores in the sets X and Y (Ragin, 2008, 59). Both indexes vary from 0 (absence of set coincidence) to 1 (perfect set coincidence). The symmetrical nature of set coincidence might induce more than one reader to wonder if there is any difference with correlation. However, set coincidence differs from correlation in at least two respects. The first one pertains to its underlying logic, while the second one derives from more pragmatic considerations regarding the "hidden" asymmetrical nature of set coincidence. To start with, a correlation coefficient is an estimate of a common probabilistic trend of two variables among our observations. It concerns the functional form of the relation between two variables, be it linear in the case of strictly defined correlation coefficients—such as Pearson's R—or more complex in the case of other measures of association—such as odds-ratios. Instead, a set coincidence score close to 1 indicates that most of our cases share exactly the same degree of membership in two sets. It is about the joint subsistence of attributes in given cases. In Ragin's words: (fuzzy-set coincidence) "is a special case of correlation. In a plot of two fuzzy sets, any straight line that is neither vertical nor horizontal yields a perfect correlation coefficient. However, perfect set coincidence occurs only when all the cases plot exactly on the main diagonal of the fuzzy plot" (Ragin, 2008, 59). A second aspect which differentiates coincidence from correlation is that, despite appearances, fuzzy-set coincidence is not completely symmetrical in nature. Indeed, as I have mentioned, any fuzzy-set analysis relies on calibration, which anchors set membership scores to qualitative thresholds and truncates irrelevant variation. Calibration can be asymmetrical (or "dual") rather than symmetrical (or "unipolar"). For instance, if a researcher moves from an interval scale variable to define two different sets, referring to the two extremes of this source variable, when imputing membership scores he may decide to leave space for a "gray" area, where cases do not hold membership in one set, but neither do they in the other set. Put differently, one set is not the negation of the other. More specifically, in this section I assess the degree to which individuals cumulate socio-economic advantages and disadvantages. The fact that an indicator of economic wealth is strongly correlated with one of cultural status

implies that, in the given sample, the two simultaneously increase or decrease. However, from simple correlational measures it is impossible to understand whether this is true because some individuals are able to accrue their position by cumulating richness with a high cultural status, or rather if some other individuals are trapped in the lowest strata by their poorness and their low cultural status. On the contrary, coincidence analysis is able to uncover these different patterns, because it requires the researcher to carefully calibrate the two indexes into precise sets defining e.g. "richness" and "poorness".

3.3.3 Operationalization: fuzzy-set calibration

The fuzzy-set analyses presented in this section are based on the 2006 and 2009 waves of the *Programme for International Student Assessment* (PISA) survey described in Section 3.2.3.

To operationalize socio-economic status (*SES*), I draw on the Bourdieuian concept of class which emphasizes the dimensions of status, cultural capital and wealth. My fuzzy-set calibrations are based on four indexes provided by the PISA dataset: *HISEI* refers to the dimension of status and it is the highest occupational level of parents according to Ganzeboom socio-economic index (range 1-100); *HISCED* is a proxy for institutionalized cultural capital and it is a categorical variable measuring the highest educational level among parents according to ISCED 1997 scale (ranging from none: 0 to academic degree: 6); *CULTPOS* is instead a proxy for objectified cultural capital and it is a linear index standardized over all OECD countries built on possession of classical literature, books of poetry and pieces of art (ranging from -2.00 to +2.00 circa); finally, *WEALTH* clearly operationalizes the wealth dimension and it is a linear index standardized over all OECD countries built on possession of a room of their own, a link to the Internet, a dishwasher, a DVD player and three other country-specific items and the number of cellular phones, televisions, computers, cars and the rooms with a bath or a shower (ranging from -6.00 to +4.00 circa) . Descriptive statistics on control variables can be found in Table A.6 in the Appendix A.

For each of these variables, I calibrate two fuzzy sets: one as a factor of advantage (e.g. "high occupational status") and one as a factor of disadvantage (e.g. "low occupational status") . Dual unipolar calibrations are performed, so that one set is not the negation of the other. As a consequence, some individuals may fail to display the factor of advantage *and* the factor of disadvantage and they will have membership score lower than 0.5 in both sets. In order to define the critical thresholds for the institutionalized

cultural capital (parental education), I relied on substantial knowledge on the perceived value of educational qualifications. On the contrary, for status (parental occupation), objectified cultural capital (cultural possessions), and wealth (home possessions), I relied on the internal distribution, since these three are composite indexes. Table A.7 in the Appendix A details the calibration thresholds and their motivation. Finally, I calculate fuzzy-set coincidence scores (see Equation 3.9) separately by country and by migratory status (natives and second-generation migrants) assessing the degree to which factors of advantage and disadvantage coincide.

3.3.4   Results and discussion

Table 3.2 shows that fuzzy-set coincidence scores are definitely closer to zero than to one[10]. In other words, in Western Europe there is no substantial crystallization of factors of advantage or disadvantage, neither among natives nor among children of immigrants. However, factors of advantage systematically coincide more for natives than for second generation migrants, while the opposite is true for factors of disadvantage. In other words, it is more likely for households which are privileged under one aspect to enjoy other assets if parents are native-born than if parents are foreign-born. On the contrary, unprivileged households are more likely to suffer from a multiplicity of deprivations if parents are foreign-born than if they are native-born.

It is worthwhile to point out that we could not have unveiled these patterns by performing mainstream correlational analysis, as can be clearly seen in Figure 3.8. The average correlation of uncalibrated assets is not systematically higher for either of the two student categories defined by migratory status. In effect, it is exactly the asymmetry of coincidence patterns for factors of advantage and disadvantage that makes it invisible to a symmetrical technique like correlation: the higher coincidence of disadvantages for second generation migrants compensates the higher coincidence of advantages for natives. What might seem a "zero pattern" from a correlational point of view is actually a double pattern of inequality, as revealed by fuzzy-set coincidence analysis.

Even if fuzzy-set coincidence analyses reveal a common pattern in Western Europe—in the sense that natives systematically compound more factors of advantage than *G2* do, and the opposite is true for factors of disadvantage—cross-country differences exist in the extent of such migrant/native differentials. How are these differentials related to the educational underachievement of *G2* in various Western European countries?

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[10]Part of the findings presented in this section can also be found in Borgna (2013).

country	Advantages			Disadvantages		
	G2	Natives	Difference	*G2*	Natives	Difference
Austria	0.035	0.139	-0.104	0.154	0.059	0.095
Belgium Flanders	0.045	0.143	-0.098	0.148	0.027	0.122
Belgium Wallonia	0.075	0.158	-0.083	0.082	0.033	0.050
Switzerland	0.070	0.112	-0.042	0.138	0.066	0.072
Germany	0.043	0.151	-0.109	0.160	0.061	0.098
Denmark	0.031	0.166	-0.135	0.188	0.044	0.145
England+Wales	0.116	0.138	-0.022	0.069	0.058	0.011
Spain	0.086	0.134	-0.048	0.150	0.100	0.050
Finland	0.142	0.125	0.017	0.070	0.023	0.047
France	0.092	0.158	-0.066	0.139	0.087	0.052
Greece	0.066	0.158	-0.092	0.033	0.074	-0.042
Italy	0.009	0.016	-0.007	0.162	0.096	0.066
Luxembourg	0.075	0.158	-0.082	0.192	0.037	0.156
Netherlands	0.037	0.152	-0.115	0.141	0.018	0.123
Norway	0.059	0.119	-0.060	0.047	0.010	0.037
Portugal	0.226	0.197	0.029	0.145	0.161	-0.016
Sweden	0.052	0.135	-0.084	0.068	0.033	0.035

Table 3.2: Advantage and disadvantage coincidence scores. Source: PISA 2006-2009. Fuzzy-set coincidence of factors of advantage and disadvantage, by country and migratory status

Figure 3.9 shows that the disproportionate coincidence of both advantages and disadvantages are associated to migrant educational disadvantage in the expected way. In countries where *G2* suffer markedly more than natives of a compounding of factors of disadvantage, they also experience particularly severe achievement gaps. The same happens, though to a lower extent, in countries where natives are particularly more able than *G2* to compound factors of advantage.

Summing up, in this section I have used the novel procedure of fuzzy-set coincidence analysis to assess the degree to which factors of advantage and disadvantage related to socio-economic status (*SES*) coincide differently for native students and students of immigrant origin in Western Europe. We have seen that neither advantages nor disadvantages coincide substantially in any of the categories considered. However, fuzzy-set coincidence analysis revealed an interesting pattern that was invisible to correlational
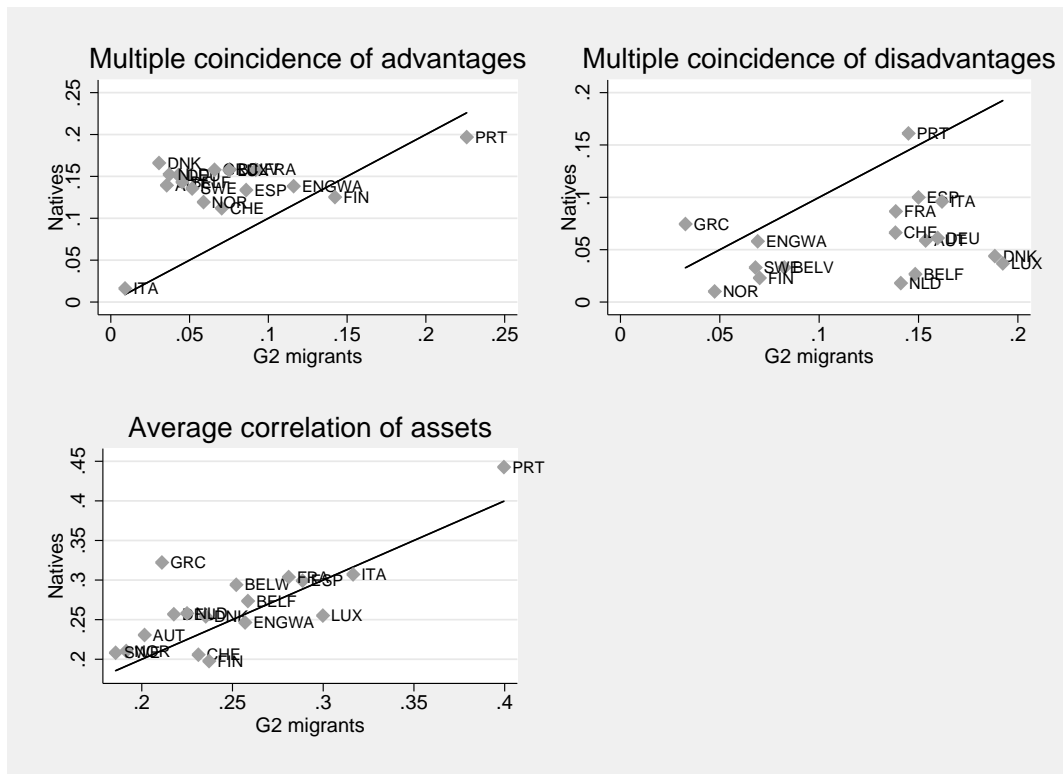
Figure 3.8: Set coincidence *vs.* correlation. Source: PISA 2006-2009. Average correlations of assets are computed as the simple average of the components of the correlation matrix between *HISEI*, *HISCED*, *CULTPOSS* and *WEALTH*. Fuzzy-set coincidence scores are instead computed as multiple coincidence scores.

analysis. In almost all the countries considered, second-generation immigrants are more likely than natives to compound factors of disadvantage, while natives are more likely to compound factors of advantage. Finally, by relating coincidence differentials to average achievement gaps I have shown that countries where second-generation immigrants suffer from a higher educational underachievement also display a stronger unbalance in the way natives and second-generation immigrants compound factors of disadvantage and—to a lesser extent—advantage.
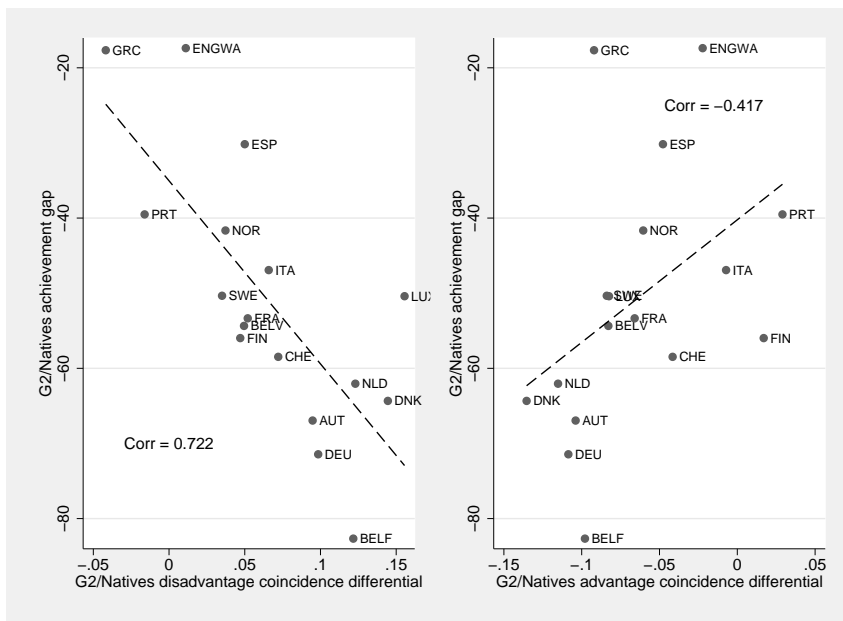
Figure 3.9: Differential coincidence of assets and achievement gaps. Source: PISA 2006-2009. Native/*G2* differentials in fuzzy-set coincidence of advantages and disadvantages *vs.* average achievement gaps in mathematics

Chapter 4

The role of educational systems for migrant learning disadvantage

In Chapter 3 I have shown that Western European countries differ in the extent to which second-generation immigrants suffer from a migrant-specific penalties in educational achievement. Empirical analyses have also made clear that such differences cannot be reduced to different compositions in the immigrant populations, leaving room for an institutional explanation. In this chapter, I explore the role of educational systems in explaining such cross-country variability in migrant achievement penalties. In order to identify potential *explanantes*, I move from the theoretical framework developed in Chapter 2, and focus on four main institutional dimensions: (i) the *duration* of schooling, i.e. the amount of time pupils spend in the educational system; (ii) its degree of *stratification*, i.e. the structural differentiation of students within given grades; (iii) the allocation of human and financial *resources*; (iv) the degree of *standardization* in the quality of education provided nationwide. I also consider contextual elements of Western European countries, in particular those connected to the history of immigration and to the linguistic composition of immigrants. In what follows, I review previous studies that, albeit following different approachs, have put forward country-level explanations of migrant learning disadvantage. Most often, these studies are not based on explicit theoretical frameworks. However, summarizing their approaches and findings is useful to better frame my contribution. My empirical investigation of which institutional configurations, embedded in which contexts, produce more or less severe degrees of migrant achievement penalties is carried out with both variable-oriented and diversity-oriented methods.

4.1 Previous studies

4.1.1 Educational institutions and class-driven inequalities

Education is often seen as a double-edged sword in the stratification process (Shavit et al., 2007). On the one hand, it is designed to provide learning opportunities to all individuals irrespective of their family background and it is therefore the key instrument of social mobility, as opposed to inherited privileges. On the other hand, education mediates the intergenerational transmission of inequality, since children with a favorable family background are more likely to gain access to high educational levels to and successfully complete them. Whether a function prevails over the other depends, among other factors, on the way the educational system itself is organized.

There is a rich literature aimed at identifying the role of features of the school system in shaping educational inequalities associated to socio-economic background. Such works are typically based on internationally standardized assessments of students' performances, such as the *Programme for International Student Assessment* (PISA), the *Trends in Mathematics and Science Study* (TIMSS) and the *Progress in International Reading Literacy Study* (PIRLS). By exploiting cross-country institutional variability, these scholars trace differences in the educational achievement of the most and least socio-economically endowed students to features of the school system. In particular, most empirical contributions come from the economics of education (for a comprehensive review, see Hanushek and Wössmann, 2011). However, in this field we can also find studies from the sociology of education (Van de Werfhorst and Mijs, 2010), as well as from political science (Schlicht et al., 2010). This literature has singled out some dimensions of educational systems as particularly detrimental for the equality of educational opportunity. Early tracking into differentiated curricula has been consistently found to increase educational inequalities driven by family background (Brunello and Checchi, 2007; Schütz et al., 2008; Van de Werfhorst and Mijs, 2010). Still, Korthals (2012) finds that, when further differentiating early tracking systems, the evidence is more nuanced. In particular, systems with many tracks, and where tracking takes into account prior performance, are associated to greater equality of educational opportunity. Another institutional aspect on which empirical studies agree is the egalitarian role of early childhood and care facilities. Preschool attendance is positively associated to the cognitive development of socio-economically disadvantaged children, even after selection issues have been solved (Currie, 2001; Carneiro and Heckman, 2003; Magnuson et al.,

2006; Schütz et al., 2008; Felfe and Hsin, 2012). Other features of the school system are more disputed. In particular, research has come to ambivalent conclusions on the effects of instruction time (Schlicht et al., 2010; Hanushek and Wössmann, 2011) and of the market structure of schools (Ball, 1993; Ammermüller, 2005) on educational achievement and equality of opportunity. The same can be said for school autonomy (West et al., 2010), though, generally, school autonomy is found to be beneficial in systems with external exit exams (Fuchs and Wössmann, 2007; Wössmann, 2007).

4.1.2 Educational institutions and migrant-learning disadvantage

The role of the school system for the educational opportunities associated to migratory status is far less studied. Essentially, three kinds of studies can be distinguished. First, fundamentally descriptive contributions which analyze how immigrant students perform in different destination countries and suggest some implications in terms of educational policies. Second, empirical studies that target a specific characteristic of the school system and attempt to estimate its impact on the educational outcomes of children of immigrants. Third, more comprehensive studies whose aim is to explain—from a statistical viewpoint—as much as possible of the cross-country variability of migrant/native achievement gaps, and whose main explanatory variables are the institutional features of educational systems.

In the first group of studies, we find publications of the kind of those stemming from the TIES project (Crul and Schneider, 2009; Alba and Waters, 2011; Crul et al., 2012a). These authors provide a throughout descriptive picture of the situation of second-generation immigrants in the educational systems and in the labor markets of Austria, Belgium, France, Germany, the Netherlands, Sweden, and Switzerland. When discussing the different country performances in promoting the educational success of immigrants, they suggest that some features of the school system may play a role. For instance, Crul et al. (2012b) point out that in Germany, Austria, and Belgium, where tracking into differentiated curricula is quite rigid and takes place at early age, the vast majority of second-generation immigrants is not able to attain high-level educational qualifications. However—as the authors themselves recognize—among more comprehensive systems, the situation is ambiguous: while in France students of immigrant origin display relatively low dropout rates and high educational attainment, in Sweden they do not achieve results in any way comparable to their native counterparts. The authors also underline the fact that the educational disadvantage of immigrants is milder in countries where

preschool facilities are very common, such as Belgium and France, as opposed to the Netherlands, Sweden, and especially in Germany and Austria. In this second group of countries, preschool attendance rates are much lower and, most importantly, fewer second-generation immigrants than natives tend to go to preschool. The contribution of these scholars is an important one, because they go beyond the debate on "integration models", preponderant in the field of migration studies in Europe. Instead, they stress the role of institutions in shaping the opportunity structure where children of immigrants develop their educational and occupational careers. However, mainly because of the limited number of countries available, their explanation does not go beyond the simple juxtaposition of countries. For these reasons, I do not discuss here any further study of this kind, but rather move towards more systematic assessments of the role of school systems in exacerbating or mitigating the educational opportunities of children of immigrants.

In the second group of studies—more focused on single features of the educational system—a common research question is whether preschool attendance has a positive effect on later educational outcomes. For instance, Biedinger et al. (2008) studied the effects of preschool attendance on performance scores in standardized tests that students take at the beginning of compulsory schooling in Germany. Quite surprisingly, they found that attending preschool is not beneficial *per se* for any group of students. However, attending a preschool with a favorable social composition has a positive impact on later performances, and especially so for students of migrant origin. While interested in similar substantive issues, Dustmann et al. (2012b) employ a different analytical strategy. They exploit a reform in the German federal preschool system—taken as a natural experiment—to study the effects of universal childcare on students of different family backgrounds. Their findings indicate that preschool attendance improves overall school readiness for first- and second-generation immigrants, while it has no significant effect on natives, thus helping to narrow immigrant/native achievement gaps. Spiess et al. (2003) had reached similar results with respect to another outcome, i.e. track placement. They followed the educational careers of native and immigrant students up to the 7th grade, when the first tracking occurs. In order to account for potential selectivity issues, they control for individual variables that are likely to influence the probability to attend the *Kindergarten*. According to their results, for natives *Kindergarten* attendance does not have a significant influence on later school placement. On the contrary, for immigrants, the likelihood of being placed in the prestigious track is significantly higher for children who have attended preschool.

Beyond preschool, in this second group of studies we find another specific focus, i.e. the extent to which, at a *national* level, the school system is characterized by immigrant segregation in certain schools or tracks. Such studies are different from those reviewed in Chapter 3, Section 3.1, because the latter consider the impact of school segregation at the school level. On the contrary, Schnepf (2008) is interested in explaining country-level migrant/native gaps. In particular, she introduces an aggregate measure of school migrant segregation as a potential explanatory variable of cross-country differences in achievement gaps. She finds it to have a negative—though not always significant—effect on the performance of both migrants and natives. However, Schnepf herself raises some doubts on the heuristic potential of international surveys to assess migrant segregation: given the relative small number of pupils sampled by these surveys, the estimates could be biased upwards. In a similar stream of research, Brunello and Rocco (2011) investigate whether the presence of immigrants has an influence on natives' learning performance. They consider country-level indexes of both immigrant shares and immigrant segregation across schools. They find that immigrant concentration is negatively and statistically significantly associated with the achievement performance of natives in the PISA tests. However, the effect is small in size, since doubling the share of immigrant pupils in secondary schools would reduce the test score of natives by one percentage point. They also show that—conditional on the average share of immigrant pupils—reducing the dispersion of this share between schools has small positive effects on natives' scores.

4.1.3 Cross-country explanatory studies

The third groups of studies reviewed in this chapter lies between the descriptive accounts on the one hand, and the analyses aimed at isolating the causal effects of specific educational policies on the other hand. Aim of these studies is to explain—from a statistical point of view—the variation in the educational achievement of immigrants who have been schooled in different destination countries. These authors estimate multi-level regression models or two-step cross-country regressions based on data collected in different destination countries by international surveys on students' performance—in particular PISA (targeting 15-year-old students), but also TIMSS and PIRLS (targeting fourth-graders). In most cases, the dependent variable is the migrant/native achievement gap. For a small number of studies, the dependent variable is instead defined as the simple performance level of immigrant students. The difference is slight but relevant: while the previous focus on the capability of educational systems to mitigate the *relative* disadvantage of

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immigrants, the latter focus on their capability to raise the *absolute* migrant achievement. The independent variables are characteristics at the micro- (the individual and his family), macro- (the educational system and the host society), and sometimes meso-level (the classroom, the school, and the track). In order to increase the sample size, they typically include a number of heterogeneous countries, to the detriment of comparability[1]. As opposed to the first two groups, I will discuss studies from this third group in greater detail, because they are the closest reference point for my dissertation.

Dronkers and colleagues focus on immigrant students' absolute levels of performance (Levels et al., 2008; Dronkers et al., 2012a,b). More specifically, they perform pooled-country multilevel regressions on students' mathematics and science performance in the PISA tests. In order to estimate the effects of system-level features, in their models they interact them with individual-level variables. Their main contribution is to consider not only destination-country, but also origin-country institutional features. Yet, in order to do that, they are forced to select destination countries in reason of the availability of information on the origin of migrants. This choice results in a reduced sample size (N=16), which weakens the generalizability aim maintained in the article. At the same time, results are undermined by the heterogeneity of the sample, which includes Australia, Latvia, Liechtenstein, and New Zealand, as well as Western European countries. In what concerns the effects of the origin-country institutional features, they distinguish between second- and first-generation immigrants and, among the latter, between 1.75, 1.5 and 1.25 generations defined according to their age at immigration. However, when looking at the destination-country institutional features, they consider immigrants as a homogeneous category and do not allow for differential effects. Dronkers et al. (2012b) introduce a meso-level of analysis. In particular, by including characteristics of the school (i.e. the school composition) as explanatory variables, together with the system-level degree of stratification, the authors attempt to disentangle the effect of tracking from "genuine" school effects. Indeed, attending a school with a large share of immigrants, socio-economically disadvantaged children, or low-ability children may be detrimental even if the system-level character of the schooling system is comprehensive. However, if one is interested in system-level features, this approach is not particularly fruitful, because it ascribes the effects of segregation to the school-level. These authors find that the level of economic development of an emigration country is positively associated with school achievement (Levels et al., 2008). However—after controlling for characteristics of

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[1]Indeed, even if analyses are based on a large number of individual observations, the relevant sample size to identify institutional effects is the number of countries.

the educational systems (in particular, long term compulsory schooling)—it is not significant anymore (Dronkers et al., 2012a). Concerning destination countries, they find that teacher shortage has a negative effect on immigrants' performance. Differently from what expected, the role of tracking into differentiated curricula is ambiguous: comprehensive systems do benefit immigrant students, but only if they have a favorable socio-economic background (Dronkers et al., 2012a).

A similar study was performed by Fossati (2011), who modeled the general test performance in PISA (averaging up literacy in mathematics, reading, and science). Like Dronkers and collegues, she is interested in the absolute level of performance of immigrant students, but she also models the achievement of natives in order to have a term of comparison. Her sample comprises 22 Western and Eastern European countries, with the addition of Canada. In an attempt to gain greater model parsimony, she makes rather strong assumptions. For instance, she fixes the effects of individual level variables across countries, irrespective of the well established evidence showing that the effect of socio-economic background varies considerably between early and late tracking countries (Hanushek and Wössmann, 2006; Schütz et al., 2008). Moreover, like Dronkers and collegues, she assumes that destination-country institutional features have the same effect on first- and second-generation immigrants. Since the key interest of her analysis is on welfare state regimes, rather than on educational systems, I already discussed part of her findings in Chapter 3, Section 3.1.3. Her results on the role of educational systems to explain cross-country variation in students' achievement are ambivalent: the duration of compulsory schooling is positively related to natives', but not to immigrants' achievement. The same is true for the duration of comprehensive schooling, i.e. before tracking into differentiated curricula.

The analytical strategy proposed by Schneeweis (2011) is more flexible than those presented so far. Indeed, she relies on a two-step regression analysis. First, with country-specific individual-level regressions, she derives a measure of "integration" for immigrant students. This is based based on the Blinder-Oaxaca decomposition of the migrant/native achievement gap into a part explained by socio-economic status and one unexplained, attributed to differential returns to socio-economic resources. Hence, the effects of socio-economic background are left free to vary and across countries. In the second step, this unexplained component becomes her dependent variable of a pooled country regression and a country-fixed effects model, where features of educational systems are her main explanatory variables. While in the first step estimates for first- and second-generation immigrants are derived separately, in the second step she assumes that institutional ef-

fects are constant across the two categories. Schneeweis uses a rich dataset obtained by pooling several waves of PISA, TIMSS IV, and TIMSS VIII and including all the available countries in either of the assessments. This translates into rather big sample sizes supporting the statistical power of her country-level estimates. However, by pooling several waves together she equates cross-country variation and over-time variation in migrant integration. Moreover, by pooling different surveys together, she assumes that the same institutional mechanisms explain the integration of fourth-graders, eight-graders and 15-year-old students. A third shortcoming of this inclusive strategy is that the sample of countries to be analyzed is extremely heterogeneous, going from Western and Eastern European countries to traditional immigration countries like New Zealand and Australia, to Latin American countries up to Middle-East, Far-East and African countries. Clearly, those countries have too many institutional and historical differences, including in the kind of immigration they attract, to be genuinely comparable. Given the big sample sizes, she is able to estimate the effects of a number of institutional variables, including school segregation by migratory status and social background, instruction hours, compulsory schooling start, preprimary enrollment rates, pupil/teacher ratio, external students' assessments and remedial or enrichment courses. Moreover, in an attempt to deal with country heterogeneity, she controls for the developmental level and income dispersion[2]. Her findings indicate that extended instruction hours and high rates of preprimary enrollment mitigate—though not always significantly—migrant underachievement. On the contrary, remedial courses and pupil-teacher ratios have ambiguous effects, with positive effects in some model specifications and negative effects in others. Indecisive is the role of school segregation: while segregation by socio-economic background is negatively related to migrant integration, segregation by migratory status seems to have a beneficial effect on the educational achievement of children of immigrants. In her discussion, Schneeweis treats this latter finding as an internal inconsistency and states that no conclusion can be drawn on the role of school segregation. However, these results are not necessarily inconsistent. From a theoretical point of view, students in socially-segregated schools have access to fewer material and relational resources. On the contrary, children of immigrants could benefit from attending schools with a high proportion of students with the same background, especially if co-ethnics, as suggested by the literature on ethnic capital (Borjas, 1992; Hatton and Leigh, 2011) and by the segmented-assimilation framework

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[2]In an additional model specification, she controls for the different origin-compositions of immigrant populations by including controls for emigration macro-regions. However, this is only possible for a small number of country-years, while the others are recoded as missing dummies.

(Portes and Zhou, 1993; Portes and Rumbaut, 2001; Zhou, 1997). Nevertheless, another possible explanation of these ambivalent findings has to do with variable construction. Migrant segregation is computed with the dissimilarity index introduced by Duncan and Duncan (1955). The latter is the proportion of migrant students who would have to be reassigned to other schools in order to achieve the same proportion in each school as for the whole area. Given that for Schneeweis the whole area is the country, and immigrants are not not evenly spread over the national territory, her index of migrant segregation confounds actual school segregation with the territorial distribution of migrants.

In the last study discussed in this section, Cobb-Clark et al. (2012) estimate an individual-level pooled-country model for PISA scores, as a function of individual characteristics—including migratory status—and country-level variables. Their country-fixed-effects models comprise interactions between each institutional feature and the dummy variables for migratory status, so that each estimated parameter for these interaction terms conveys the differential effect of a given institution on test scores for a given category of migrant students with respect to natives. The sample of countries analyzed is less heterogeneous than the one used by Schneeweis (2011), but nevertheless includes Western and Eastern European countries, as well as traditional immigration societies like the USA, Australia, and New Zealand. This makes up a reasonable sample size but, given the number of institutional features, the sample is still too small to assess them all at the same time. Therefore, only three to four country-level variables at a time are included in the regressions. Differently from the previous studies, they estimate the differential effects of educational institutions on different categories of immigrant students. In particular, they separate second- *vs.* first- generation immigrants, and they differentiate the latter according to age of arrival in the country. They also distinguish immigrants who speak the test language at home from those who do not. In this sense, their model specification is praiseworthy because of its flexibility. Yet, under another perspective the models are considerably restrictive because the effects of gender and socio-economic background are not allowed to vary between migrants and natives, nor across countries and institutional features. Quite consistently over the three literacy domains, Cobb-Clark and colleagues find that a high level of educational expenditure and of teachers' salaries increase $G2$/native achievement gaps, while external evaluations reduce them. On the contrary, the starting age of compulsory schooling and the age when tracking occurs do not show significant effects, with the partial effect of age at tracking reducing the science achievement gaps of second-generation immigrants.

Taken altogether, the studies reviewed so far are praiseworthy because they have

opened up a fertile field of inquiry, apt to provide a contribution also in terms of policy implications. Indeed, cross-country comparisons of migrant underachievement take a step forward in shedding light on how features of educational systems relate to migrant learning disadvantage. However, they have a number of theoretical and methodological limitations that I have already hinted at, and that I try to discuss in greater detail in what follows.

First of all, they lack an explicit theoretical framework. As noted by Busemeyer and Trampusch (2011, 432), the disproportion between data analysis and theory is a general problem of comparative studies on educational outcomes. Often research questions seem to be driven by data availability rather than theoretical considerations and—he argues—this might explain the inconsistent findings on the role of institutions. However, this problem is even more serious in the emerging subfield of comparative studies on migrant educational underachievement. The authors reviewed earlier merely derive their hypotheses from previous studies on the effects of educational institutions on class-driven educational inequalities (cf. Section 4.1.1). In other words, they include the typical institutional variables used in this literature in their regression models, but they do not motivate their choice in terms of micro-level mechanisms that could explain migrant-specific educational disadvantage. Yet, before building a regression model, one should reflect on a number of theoretical questions. To what structural dimension of educational systems do the chosen institutions refer? Which dimension of migrants' educational opportunities (achievement, underachievement, achievement penalty) are they likely to impact? What micro level mechanisms do they imply? Are they likely to interact in affecting migrants' educational opportunities?

The last question opens up the field for the second critical point I want to make. In all the studies reviewed so far, the authors assume that educational systems are simply a sum of independent features, whose effect on students' achievement is nothing but additive. This is a strong simplifying statement that should be tested empirically rather than assumed *a priori*. Moreover, this is also a problematic assumption when authors include in their models independent variables that actually measure very similar concepts, or that could be though as substitutable conditions. For instance, Schneeweis (2011) includes both preschool enrollment rates and starting age of compulsory schooling. As I will argue below, both these characteristics refer to the dimension of duration of schooling, and in particular to its starting age. Consequently, the substantive meaning of the effect of one *given* the other one is not clear. Clearly, given the small sample sizes available when doing cross-country comparisons, and especially so in the subfield of immigrants'

educational achievement, it is impossible to estimate models with an excessive number of interaction terms. I argue that the way to come out of this deadlock is twofold. First of all, scholars should develop a theoretical reflection that allows to reduce the number of educational features specifically detrimental for second-generation immigrant students. Secondly, they should unambiguously adopt a descriptive perspective and chose appropriate analytical methods to address their research questions. In this dissertation, I chose to focus on a limited number of potentially relevant educational features and to rely on comparative configurational methods to detect the possible interactions between such features in producing more or less severe migrant-specific penalties in educational achievement.

In the third place, the studies reviewed above have methodological limitations. As mentioned earlier, in order to increase the number of observations, they gather countries which differ greatly not only in their educational systems, but also in their societal structure, geographical position, and developmental level. This lack of comparability hinders the explanatory potential of these studies. Moreover, the selected countries display very heterogeneous origin-country compositions of the immigrant populations, resulting in different degrees of cultural and linguistic distance liable to affect educational achievement of children of migrants. Unfortunately, international surveys on cognitive abilities generally do not collect detailed data on the origin country. Failing to account for these compositional effects poses a second threat to the identification of institutional effects. While these studies control for socio-economic background and migratory status (first- *vs.* second-generation immigrants), they do not always differentiate first-generation according to their age at arrival in the country. More generally, first-generation immigrants are less comparable than second-generation, because part of their educational career has developed in their origin country. Finally, their model specification is sometimes imprecise. In order to limit the number of parameters, restrictive and sometimes not plausible assumptions are posited in the regression specifications. For example, all the previous studies with the exception of Cobb-Clark et al. (2012) assume constant effects of institutions on the two migrant categories. On the other hand, the latter, just like Fossati (2011), fix the gender- and *SES* effect across countries. Furthermore, all the studies include an individual-level control for host-country language spoken at home. As mentioned in Chapter 3, Section 3.2.5, this choice can be useful to increase the explained variance, but is not necessarily helpful when one wants to quantify the achievement disadvantage of immigrants in a given educational system. Since most native parents have a good command of the host-country language, the immigrant students' performance—*net*

of the language spoken at home—refers to the (however small) portion of children of immigrants whose parents speak the destination-country language with them. On the contrary, the authors that control for language spoken at home generalize their findings on the whole population of immigrant students.

Such theoretical and methodological limitations are reflected in the lack of consistency between the empirical results of these studies. Fossati (2011) and Cobb-Clark et al. (2012) find no significant effect of age at tracking, while according to Dronkers et al. (2012a), comprehensive systems do benefit immigrant students with a favorable socio-economic background. Schneeweis (2011) fails to find conclusive results on the role of school segregation, since it appears that migrant segregation is good, but social segregation bad for children of immigrants. With respect to starting age of compulsory schooling, Cobb-Clark et al. (2012) find no significant influence on second-generation immigrants. On the contrary, Schneeweis (2011) finds a positive effect of preschool attendance, while remedial courses and pupil-teacher ratio have ambiguous effects. Ultimately, the above mentioned studies do not provide any compelling evidence on the role of single educational features of destination-countries in reducing or amplifying migrant disadvantage in educational achievement. As a consequence, empirical evidence on the role of educational systems in mediating the intergenerational transmission of inequality for migrants *vs.* natives is still inconclusive, and further attention should be devoted to the assessment of how single features of educational systems interact in producing more or less severe migrant educational disadvantages.

4.2 Hypotheses formulation

4.2.1 Theoretically relevant dimensions of educational systems

In order to develop my explanatory hypotheses, I move from four institutional dimensions identified in Chapter 2, Section 2.2: the duration of schooling, its degree of stratification, the allocation of human and financial resources and the degree of standardization in the quality of education provided nationwide. All these dimensions are to some degree important in order to explain the educational disadvantage of immigrant students relative to their native peers.

The *duration of schooling* is a relevant dimension because it is possible to argue that systems where pupils are exposed to the contact with teachers and peers for a longer time are more beneficial than others for children of immigrants. In particular, the moment

children enter (pre)school is crucial: children's lives, previously fully spent within families and communities, are now exposed to the surrounding society. For many immigrant children this may be the moment when the first interactions with natives occur. The exposure to school, broadly defined, could benefit not only the absolute performance levels of immigrants, but also their performance relative to natives. For instance, empirical evidence has consistently shown that entering the system at early age through preschool does not have uniform effects on pupils. Socio-economically disadvantaged children generally benefit more than advantaged ones from preschool attendance, in terms of cognitive (Magnuson et al., 2006; Schütz et al., 2008; Brilli et al., 2011) and non-cognitive abilities (Currie, 2001; Esping-Andersen and Mestres, 2003; Carneiro and Heckman, 2003; Votruba-Drzal et al., 2004; Felfe and Hsin, 2012). Preschool attendance has also been found to have differential effects on children of immigrants. Although empirical evidence is still limited, some studies conducted in the US, Germany, and the Netherlands suggest that preschool attendance has positive effects on second-generation immigrants' cognitive development (van Tuijl and Leseman, 2007; Biedinger et al., 2008) as well as on their subsequent track placement (Spiess et al., 2003). Given the universal nature of compulsory schooling, it is not easy to assess its impact on future educational outcomes of different categories of students. When attempting to explain cross-country differences in migrant learning disadvantage, however, the timing when compulsory education start may matter. I argue that mechanisms similar to those associated with preschool attendance may be triggered by an early entry in compulsory schooling. Indeed, curricular and extracurricular activities provide an obvious context to learn the official language of the destination country (Christensen and Stanat, 2007). Moreover, early socialization with native peers could reduce cultural distance and the lack of information experienced by immigrant families (Schofield, 2006). Therefore, my first hypothesis is:

HP1: Low preschool attendance rates and/or late start of compulsory schooling contribute to severe migrant penalties in educational achievement.

A high degree of structural *stratification* might also be relevant, because it is generally considered to be detrimental to the egalitarian character of school systems. There is robust evidence that early tracking into differentiated curricula increases educational inequalities driven by socio-economic background (Ammermüller, 2005; Marks, 2005; Hanushek and Wössmann, 2006; Brunello and Checchi, 2007; Schütz et al., 2008; Van de Werfhorst and Mijs, 2010). Since educational choices depend on strategic information and cultural capital (Müller and Karle, 1993; Breen and Goldthorpe, 1997), early tracking

systems might be specifically detrimental to the children of migrants. Indeed, immigrant families are likely to suffer from a lack of the culturally-relevant resources crucial to making informed school choices. However, empirical evidence suggests that, when compared with native peers with similar prior achievement, students with an immigrant background tend to make more ambitious educational choices (Kristen et al., 2008; Cebolla Boado, 2011; Jackson et al., 2012). Therefore, the role of stratification *per se* for migrant underachievement is not obvious. Yet, one could still argue that highly stratified systems are detrimental for immigrant students when they yield to immigrant students being disproportionately concentrated in low-quality tracks.

In other words, stratification might become an issue when it is coupled with a low degree of national *standardization* and/or an uneven distribution of human and financial *resources* across schools. In this case, students attending vocational tracks are likely to be penalized compared to those attending academic tracks, because they are exposed to low-quality teaching and low-performance targets. At the same time, the dimensions of standardization and resources might be relevant even in absence of a high degree of stratification. Even in comprehensive educational systems, residential segregation in poor districts and/or discriminatory school enrollment policies can bring to the uneven concentration of immigrant students in certain schools. This form of school segregation may exacerbate inequalities if no compensatory policies are enacted to foster the provision of high-quality teachers and additional resources to schools with disadvantaged children. There is some evidence that schools with disadvantaged students have lower quality teachers in Norway (Bonesrønning et al., 2005), Denmark (Schindler Rangvid, 2007), and Italy (Barbieri et al., 2010). In effect, highly qualified teachers have incentives and means to leave troublesome schools (Wyckoff and Boyd, 2005). Moreover, a higher turnover is associated with less effective teaching (*ivi*). A disproportionate concentration of students of immigrant origin may entail additional problems, since teachers' adaptation to children with different cultural and linguistic background is likely to slow down the learning pace (Fekjær and Birkelund, 2007). Besides the exposure to lower-quality teaching, the relegation of immigrant students into marginal sectors of the schools system may be problematic because students may negatively influence each others' performance via "peer effects" (Hoxby, 2000). Empirical studies on migrant segregation have focused on its effects on the achievement of native students and found that the presence of immigrants students does not have a negative influence *per se* on general performance (Fekjær and Birkelund, 2007; Szulkin and Jonsson, 2007; Cebolla Boado, 2007; Cebolla Boado and Garrido Medina, 2011; Contini, 2013). Nevertheless, when in place, negative peer effects

associated to migrant school concentration are generally more detrimental for immigrant students themselves than for native students (Szulkin and Jonsson, 2007; Contini, 2013).

Ultimately, I argue that in order to understand cross-country variation in migrant-achievement penalties, it is useful to look at the outcome of the complex processes outlined so far, involving the degree of differentiation, children's sorting, prior achievement, peer effects, teachers' quality and resources. I define such outcome as *marginalization* of second-generation immigrants in low-quality schools. From the arguments discussed above I derive my second hypothesis:

HP2: Early tracking brings forth severe migrant penalties in educational achievement only when combined with a high degree of marginalization of second-generation immigrants in low-quality schools.

4.2.2 Contextual factors

In addition, one must acknowledge that educational systems are embedded in national contexts that potentially affect their role in the process of creation of a relative achievement disadvantage of second-generation immigrants. To start with, since many of their learning difficulties stem from a lack of linguistic skills (Esser, 2006), the origin composition of immigrants is an important factor in a country's capacity to integrate their children in the school system. Moreover, some of the above-mentioned features of educational systems may be particularly beneficial to children of immigrants who speak a language that is very distant from that of the destination country. In particular, early entry in the (pre)school system might be decisive for such children, since cognitive sciences have shown that the ability to learn a foreign language decreases sharply with age (Birdsong, 2006). Hence, I hypothesize that:

HP3: A high proportion of immigrants speaking a language that is distant from that of the host society brings about severe migrant penalties in educational achievement.

Finally, even if Western European countries are quite homogeneous in comparison to traditional settlement societies (Australia, New Zealand, Canada, and USA) and Eastern and Central European countries, still they differ in terms of their immigration history. Freeman (1995) first distinguished states with post-war labor recruitment (continental Europe and the UK) from new immigration countries, which have turned from emigration into immigration societies in the 1980s (Italy, Spain) or even late 1990s (Greece,

Ireland, Portugal). In the 1960s, Sweden also had implemented some guestworkers programs, which nevertheless involved relatively moderate inflows from other Scandinavian countries. More generally, Nordic countries saw a sharp increase of immigration with the rise of asylum seekers in the 1980s and 1990s (Castles and Miller, 2003). On the one hand, host societies that received a great deal of immigrants from former colonies and/or via guestworkers programs in the 1950s, 1960s, and 1970s may be more equipped to deal with the inclusion of children of immigrants in the school systems, since they may have developed effective teaching practices to target their specific learning difficulties, in contrast to newer immigration countries such as Scandinavian and Southern European countries. On the other hand, the various "modes of integration" adopted by post-war labor immigration countries have been widely criticized for promoting shortsighted policies. The differential exclusionist model was based on the assumption that immigrants would act as guestworkers instead of settling down in the host society. Multiculturalism is blamed for producing a persistent separatism, while assimilationist policies often had the unintended outcomes of social exclusion and conflict (Castles and Miller, 2003, 258-260). In such countries, even children of immigrants who arrived in more recent waves could be trapped in conditions of social exclusion and stigma, which hinder the development of their educational careers. Therefore, it is not evident that schooling systems of post-war immigration countries have a easier job than those of newer immigration countries in tackling migrant learning disadvantage. Still, I argue that the immigration history of a destination country is an important contextual factor to account for. Consequently, my fourth and last hypothesis is that:

HP4: In post-war immigration countries, second-generation immigrants experience different penalties in educational achievement from countries where mass immigration began later on.

4.3 Analytical strategy

The overarching research question that I am trying to answer can be summarized as: in which kinds of educational systems children of immigrants experience the largest achievement penalties in Western Europe, and in which they do not? In order to address this question from different angles, I adopt an analytical strategy that is based on methodological triangulation. The first part of the empirical analyses presented in this chapter is aimed at assessing association patterns between institutional variables and migrant

achievement penalties across countries. Accordingly, they rely on variable-oriented methods, i.e. statistical techniques. More specifically, I assess bivariate correlations between the independent and the dependent variables. Next, I move to a multivariate framework with Ordinarily Least Squares (OLS) regressions and regression-tree analysis. The latter is an exploratory technique particularly suitable when complex patterns of interactions between independent variables are in place.

In the second part of my investigation, I shift my focus from variables to cases, hence acknowledging that educational systems are complex entities of interconnected elements, which is very difficult—and not necessarily meaningful—to separate. Moreover, educational systems are embedded in national contexts, which may influence their ability or inability to reduce migrant penalties. To deal with this complexity, I adopt a diversity-oriented research strategy, and more specifically I use fuzzy-set theory and configurational comparative methods. The latter are a useful framework for detecting complex causal patterns by systematically assessing subset relations between combinations of conditions and an outcome. Given the limited diffusion of these methods in the scientific community, as opposed to statistical analysis, in the following paragraph I provide a brief introduction to their logic and their operation.

4.3.1 Fuzzy-set Qualitative Comparative Analysis (fs-QCA)

Ragin (1987, 2000, 2008) developed Qualitative Comparative Analysis (QCA) as an extension of Mill's canons, by arguing that statements of necessity and sufficiency—much more common in social theory than apparent—imply subset relations, which mainstream statistical techniques are unable to identify. Scholars from different disciplines have resorted to these methods especially for their capacity to deal with complex causality, also known as multiple conjunctural (Ragin, 1987) or $INUS$[3] causation (Mackie, 1965), where neither the uniformity nor the additivity of causal effects are assumed. To rephrase, (i) causal conditions may operate in combination with each other, just as suggested by Mill's notion of chemical causation (Mill, 1868) and (ii) multiple paths can lead to the same outcome (Braummoeller, 2003). QCA moves from the assumption of maximum causal complexity acknowledging all possible configurations (combinations of conditions) as potentially leading to the outcome. A matrix with all possible configurations—the truth table—is created, to which cases are allocated according to the configuration they belong

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[3]A INUS condition as an Insufficient but Necessary part of a condition that is itself Unnecessary but Sufficient for the result.

to. Subsequently, by iterative paired comparison of configurations, irrelevant conditions are eliminated until a logically minimal expression is reached. This expression—the solution—is composed by one or more "prime implicants"—the causal paths. The latter are alternatively sufficient configurations for the occurrence of the outcome. Yet, it is extremely rare that all logically possible combinations of conditions display empirical instances. In other words, the universe of relevant cases may be too small to cover the property space entailed by the interplay of potential explanatory factors (Lazarsfeld, 1937), bringing about the problem of limited diversity, an inherent but overlooked issue in comparative social science (Ragin, 2000). When using mainstream statistical techniques, researchers more or less consciously make simplifying assumptions (such as additivity or linearity) in order to extrapolate their inferences beyond the available data. Often these assumptions are untenable and rely on "extreme counterfactuals" (King and Zeng, 2006). A distinctive feature of QCA is that it forces the researcher to make explicit use of counterfactual thinking in order to deal with limited diversity, by choosing a parsimonious, conservative or theory-based approach[4]. Fuzzy-set QCA (fsQCA) stems from the application of fuzzy algebra (Zadeh, 1965) to the original crisp-set QCA, which is based instead on Boolean algebra. In the latter framework, cases can either assume value 1 (if they belong to the given set) or 0 (if they belong to its negation) (Ragin, 1987). On the contrary, fsQCA acknowledges that most social and political phenomena are not easily dichotomizable: hence, the degree of membership to a given set may vary, assuming any value from 0 to 1 (Ragin, 2000, 2008). Fuzzy sets do not equate with continuous variables, because their construction relies on a calibration procedure informed by case-based and

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[4]In order to perform the minimization of configurations, the researcher has to choose how to treat the configurations that lack empirical instances (logical remainders). If no simplifying assumption is made, logical remainders are excluded from the minimization process (conservative approach, usually producing a rather complex solution). If all needed assumptions are made, any logical remainder useful for the minimization can be used (parsimonious strategy). Ragin and Sonnett (2004) recommend a theory-based approach to limited diversity, i.e. the identification of "easy counterfactuals" as logical remainders on which researchers can make plausible and theoretically justifiable assumptions. Only "easy counterfactuals" are used in the minimization procedure, leading to an intermediate solution whose complexity lies between the conservative and the parsimonious one. Schneider and Wagemann (2006) put forward a complementary theory-based approach to deal with limited diversity, based on the distinction between remote and proximate factors. Their suggested procedure divides the analytical moment in two steps: the first one is aimed at identifying the remote, structural contexts where the outcome is present. The second one is aimed at specifying the proximate conditions which lead to the outcome within those contexts. This decomposition dramatically reduces the number of logically possible combinations of conditions and hence attenuates the problem of limited diversity.

substantive knowledge, which anchors set membership scores to qualitative thresholds and truncates irrelevant variation.

Within this framework, I investigate the asymmetrical relations between institutional conditions and my outcome of interest, i.e. severe migrant penalties. I test the sufficiency and necessity of single conditions in bringing about the outcome and in avoiding it. Next, by means of a Venn diagram, I show all logically possible combinations of institutional conditions and describe Western European educational systems according to the configuration they belong to. Finally, I systematically assess which combinations of conditions are sufficient to produce severe penalties (or to avoid them). To do so, I perform fs-QCA and apply several strategies to deal with limited diversity.

4.4 Operationalization

4.4.1 Variable construction

The operationalization of the *explanandum*—"Migrant achievement penalties"—has been fully detailed in Chapter 3. In order to operationalize the structural and contextual *explanantes* described in Section 4.2, I construct five country-level variables. As motivated in the same section, the age at tracking into differentiated curricula pertains to the dimension of school stratification, while the entry age in the system pertains to the dimension of duration of schooling. The degree to which second-generation immigrants are marginalized in the worst-performing schools simultaneously pertains to the dimensions of school stratification, standardization and resources allocation. Besides these institutional variables, I also construct two contextual variables: one referred to a country's history of immigration—and more precisely to the period when mass immigration started—and another one to the linguistic composition of immigrants—in particular, the proportion of immigrants living in a country whose mother tongue is very distant from the one of that country. More precisely, the five explanatory variables are:

1. **Age at tracking into differentiated curricula**. The information refers to year 2007/2008 and was taken from the review of educational systems performed by Eurydice, a network of 38 country units coordinated by the European Commission's agency for education and culture (Eurydice, 2009, 2-7);

2. **Marginalization of second-generation immigrants in low performing schools**. I computed the index based on individual information provided by PISA 2006-

2009. The index represents the relative risk for *G2* (*vs.* natives) of attending the worst-performing group of schools (situated in the 10th percentile of the achievement distribution according to PISA average scores on all literacy domains). The index is then equal to $\frac{Pr(badschools)_{G2}}{Pr(badschools)_{NAT}}$, where $Pr(badschools)_{G2}$ is the probability of being the worst-performing schools for second-generation immigrants, and $Pr(badschools)_{NAT}$ the same probability for natives;

3. **Average entry age of second-generation immigrants in the (pre)school system**. I computed the index combining individual information on preschool attendance provided by PISA 2006-2009 and country-level information on the official starting age of compulsory schooling relevant for the birth cohort of interest (Eurydice, 2000, 65-66). I subtracted the individual years of preschool attendance retrospectively assessed by PISA from the official starting age, and computed the country average for second-generation immigrants. The index is then equal to $COMP.AGE - (1 * f_1 + 2 * f_2)$, where $COMP.AGE$ is the starting age of compulsory schooling, f_1 the proportion of *G2* children with one year of preschool, and f_2 that with two years;

4. **Starting decade of mass immigration**. The information is derived from previous literature discussed in Chapter 2 (Freeman, 1995; Bauer et al., 2000);

5. **Proportion of second-generation immigrants with high linguistic distance**. This index is computed in three steps. First, I computed shares of national origins in the population of second-generation immigrant students moving from (i) mother's birth country of second-generation immigrants, (ii) data on inflows in the period 1975-1993 provided by the United Nations Department of Economic and Social Affairs (UN-DESA) and (iii) information on foreign residents in the 2000s collected by national statistical offices[5]. Second, I assessed linguistic distance from

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[5] For countries where information on mother's birth country was available in the national questionnaires, PISA 2006-09 data were used to identify the origin of second-generation immigrants with different degrees of linguistic distance (Austria, Belgium-Flanders, Belgium-Walonia, Switzerland, Germany, Denmark, Greece, Luxembourg, the Netherlands, Norway, Portugal, Sweden). For countries where the information was not available from PISA, I used UN-DESA data on immigration flows in the period 1975-1993 to proxy origins of parents of second-generation immigrants born in 1994 (England and Wales, Sweden). Where no international information on country of origin was available, I relied on national statistics: Spain (Observatorio Permanente de la Inmigración - Ministerio del Interior: data on foreign residents aged 16-64 in 2003); France (INED: data on foreign residents aged 25-54 in 2009); Italy (ISTAT: data on foreign residents in 2003).

the official language of the host society for every single origin group. Distance is assessed according to the Encyclopedia of Languages (Lewis, 2009) as follows: if the two languages coincide to a great extent (ex. U.S. and British English), the distance is set at zero; if they share the same linguistic sub-family (ex. Spanish and French as Romance languages), the distance is considered mild; if they only share the same family (ex. Polish and French as Indo-European languages), distance is high; if they belong to different families (ex. Turkish as Altaic and German as Indo-European), distance is very high[6]. Third, I computed the share of immigrants with high or very high linguistic distance.

The distribution of countries on these variables can be found in Table B.1 in the Appendix.

4.4.2 Fuzzy-set calibration

As mentioned earlier, in order to perform fsQCA, researchers have to calibrate the sets corresponding to the outcome (*explanandum*) and the causal conditions (*explanantes*). In other words, one needs to identify some transparent and legitimate criteria to assess the degree of membership of each case to each set. I follow the "direct method" of calibration (Ragin, 2008, 186-190), which consists of moving from a "source" variable and setting three qualitative thresholds: full membership (1), full non-membership (0) and maximum ambiguity or crossover (0.5). Table 4.1 reports the critical thresholds chosen.

The source variable for my *explanandum*—"**Severe penalty**"—is the index of migrant achievement penalty presented in chapter 3, Section 3.2.2. In order to set the critical thresholds, I relied on meaningful breaks in the internal distribution of the index, identified by case inspection and cluster analysis[7]. The calibration resulted in the following partition: countries where *G2* score below the 30th percentile of comparable natives fully belong to the outcome ("Severe penalty"); countries where they score above the 40th

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[6]I assess the distance between the official language in the country of destination and the official language in the country of origin. However, when another language is widely spoken in the country of origin, I also assess the distance between the latter and the official language in the country of destination, and subsequently increase the distance by one level. Ex. Algerian immigrants in France: mild distance because: (i) official language in Algeria: Arabic; but (ii) French widely spoken in Algeria, and French to French: zero distance.

[7]The breaks proved robust to different clustering specifications of methods (average, complete link) and distances (euclidean, manhattan).

fully belong to the negated outcome ("Not severe penalty"); countries where they score between the 30th and the 35th percentile are more in than out of the outcome; countries where they score between the 35th and the 40th percentile are more out than in.

As for the *explanantes*, moving from the five structural and contextual variables listed in the previous section, I calibrated seven conditions:

1. **Tracked system**. An educational system where students are tracked into differentiated curricula before being assessed by PISA;

2. **Early-tracked system**. An educational system that tracks students into differentiated curricula at early age;

3. **Marginalizing system**. An educational system where second-generation immigrants are relegated to a great extent in low-quality schools or tracks;

4. **Early-entry system**. An educational system where children generally begin school or preschool before the age of 4;

5. **Late-entry system**. An educational system where children generally begin school or preschool after the age of 5;

6. **Linguistically distant country**. A country where a great proportion of immigrants speaks a language that is very distant from the official one;

7. **New immigration country**. A country where mass immigration began substantially after the post-war period.

While the first one is a crisp (dichotomized) set, the remaining conditions are all fuzzy-sets, hence case membership varies in degree. Since the distribution of *G2* average entry age has few extreme values, "Early-entry" and "Late-entry" are calibrated in a "dual" (asymmetrical) rather than "unipolar" (symmetrical) way. Hence, some cases do not belong neither to the set of "Early-entry" nor to that of "Late-entry".

The calibration of "Tracked", "Early-tracked" and "New immigration", was based on substantive and theoretical knowledge. I consider as tracked a system where students have already been differentiated into generalist and vocational tracks by the age they take the PISA test, i.e. 15. Hence the qualitative crossover for the crisp set "Tracked" is set at 14.5. In order to set the three critical thresholds (full membership, crossover, full non-membership) for the fuzzy-set "Early tracked" I relied on the literature on tracking (Hanushek and Wössmann, 2006; Brunello and Checchi, 2007; Van de Werfhorst and Mijs,

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2010). These scholars contrast on the one hand Germany, Austria, Belgium, Luxembourg, and the Netherlands (which track their students at 12 or beforehand) and on the other hand the UK, France, Spain, and Nordic countries (which track their students at 15 or later on). Italy and Switzerland are generally considered as intermediate cases, since they track their students at age 14 . Since I am interested in the performance of 15-year-old students, the second group clearly does not belong to the set of early tracked countries, while the first one does. Hence, 12 and 15.5 were chosen as thresholds for full membership and full non-membership, respectively. The third group belongs to the set of early-tracked systems, but with lower membership scores than the first one: 14.5 was chosen as crossover. As for the calibration of "New immigration country", I considered countries characterized by post-war guestworkers programs, where mass immigration began in the 1950s, as completely not belonging to the set (full non-membership: 1950s). Instead, Southern European countries, where mass immigration began in the 1980s or even 1990s, completely belong to the set (full membership: 1990s). Nordic countries, which hosted a great number of refugees since the 1970s, are considered new immigration countries but "less new" than Southern European countries (crossover: 1960s).

The calibration of "Early-entry", "Late-entry", "Marginalizing", and "Linguistically distant" was based on meaningful breaks in the internal distribution, identified by case inspection and cluster analysis[8]. Figure 4.1 plots fuzzy-set membership scores in the outcome against "source" variables and graphically illustrates the meaning of the qualitative thresholds chosen for cross-over, full membership and full not-membership.

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[8]Like for the outcome, the identification of these breaks proved robust to different specifications of methods (average, complete link) and distances (euclidean, manhattan).

Source variable	Fuzzy set	Critical thresholds
G2 achievement penalty	Severe penalty	Fully in <= -0.524, Cross-over: -0.385, Fully out >= -0.253
Age at tracking	Tracked	Cross-over: 14.5
	Early-tracked	Fully in: 12, Cross-over: 14.5, Fully out: 15.5
Relative risk of marginalization	Marginalizing	Fully in: 4.677, Cross-over: 2.768, Fully out: 1.708
(Pre)school entry	Early-entry	Fully in <= 3.5, Cross-over: 4, Fully out >= 5
	Late-entry	Fully in >=5, Cross-over: 4.66, Fully out: <= 3.5
G2 with high lang distance	Linguistically distant	Fully in >= 90.49, Cross-over: 64.18, Fully out <= 21.39
Mass immigration start	New immigration	Fully in >= 1990s, Cross-over: 1960s, Fully out <= 1950s

Table 4.1: Source variables, sets and critical thresholds for calibration. Method: direct (unipolar for Early-entry and Late-Entry, dual for the remaining sets). Full membership: 0.99. Full non-membership: 0.01. Function for intermediate values: logistic (R package QCA).
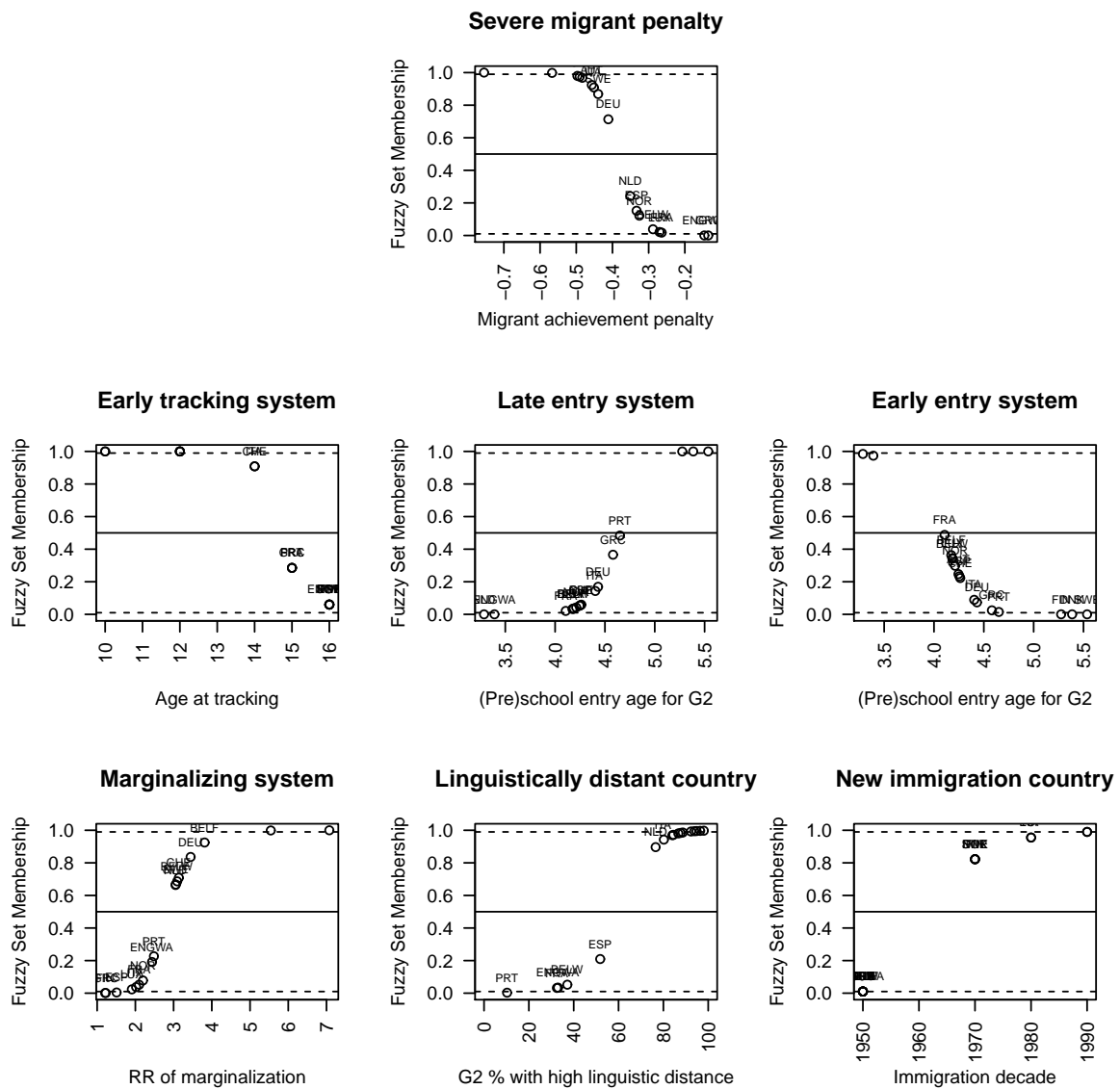
Figure 4.1: Calibration of outcome and conditions. Source variables against fuzzy-sets. Solid lines indicate critical thresholds for cross-over (0.5). Dotted lines indicate critical thresholds for full membership (0.99) and full non-membership (0.01).

4.5 Results from variable-oriented approach

After having identified theoretically relevant institutional dimensions of educational systems and having operationalized them with synthetic indicators, I investigate how they are related to the relative disadvantage experienced by children of immigrants in educational achievement. In this section, I present the results of analyses based on a variable-oriented approach, i.e. one focused on the associations between the independent and the dependent variables across countries. First, I look at bivariate correlations between institutional variables and the index of migrant achievement penalty I developed in Chapter 3, Section 3.2.2. In assessing the existence of linear symmetrical relations between each of the institutional variables and migrant penalties, I draw attention on possible outliers and discuss their leverage. Second, I perform exploratory cross-country regressions in order to address spuriousness issues and I estimate the net effects of institutional variables on migrant penalties. Third, I present results from regression-tree analysis, looking for complex interaction patterns between the institutional features and migrant achievement penalties.

4.5.1 Bivariate correlations

Table 4.2 displays the correlation matrix among all institutional variables and migrant achievement penalties. I expected "Age at tracking" to be positively associated with migrant achievement penalty[9], while "*G2* average (pre)school entry age", "Marginalization in low-performing schools" and "Proportion of *G2* with high linguistic distance" to be negatively associated with it. I held no expectation on the direction of the relation between the outcome and "Starting decade for mass immigration".

Quite surprisingly, age at tracking displays a zero linear relation with migrant achievement penalties. However, as can be seen in Figure 4.2, the correlation index masks a great variability among late-tracking countries. Some countries that track students at 15 or 16 display mild migrant penalties, like Greece or England and Wales, while others display quite severe penalties, like Portugal and Finland. This may indicate that a system cannot avoid severe penalties by simply delaying its tracking age. More generally, the graph suggests some kind of complex relation between age at tracking and migrant penalties, either because of an asymmetrical pattern (e.g. countries that track their stu-

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[9]Remember that the measurement unit of the migrant achievement penalty index is standard deviations and that negative values indicate larger penalties, while zero indicates no penalty.

	Penalty	Tracking	Entry	Marginalization	Imm decade	Lang dist
Penalty	1	**-0.010**	**-0.558**	**-0.228**	**-0.148**	**-0.216**
Tracking		1.000	0.361	-0.306	0.590	-0.314
Entry			1.000	0.195	0.493	0.239
Marginalization				1.000	-0.305	0.274
Imm decade					1.000	-0.157
Lang dist						1.000

Table 4.2: Pearson's correlation matrix of "Migrant achievement penalty", "Age at tracking", "*G2* average (pre)school entry age", "Marginalization in low-performing schools", "Starting decade for mass immigration", "Proportion of *G2* with high linguistic distance".

dents at early age are generally characterized by severe penalties, but the reverse is not true), or because of some combination of effects (e.g. late-tracking can reduce migrant penalties, but only when combined with some other factors).

Both the average entry age of second-generation immigrants in (pre)school and their relative risk of marginalization in low-quality schools display quite strong and negative correlations. Indeed, a later entry in school or preschool is quite strongly associated with a worsening of migrant penalties (ρ = -0.558), as is, even if to a lesser extent, the relative proportion of immigrants compared to natives in bad schools (ρ = -0.228). The observation of Figure 4.2 further reveals that the linear relation between degree of marginalization and penalties is particularly strong if immigrants are up to four times overrepresented in bad schools as opposed to natives. Austria and Denmark, where immigrants are five to seven times more likely to be found in bad schools, display severe penalties, but not more severe than the other marginalizing countries. Therefore, if we excluded these countries, the relation would be even stronger. On the contrary, outliers seem to drive the strong correlation existing between entry age and migrant penalty. Indeed, late-entry systems like Sweden, Denmark, and in particular Finland, display severe migrant penalties, while early-entry systems, like England and Wales and the Netherlands, display quite mild penalties. Among countries where entry age is neither very early nor very late, there is much more variability in the degree of migrant penalties. This finding suggests that, even if entry age may matter for migrant learning disadvantage, when its values are not extreme, we have to resort to other institutional factors in order to explain cross-country variability[10].

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[10]Note that the fuzzy-set calibrations performed in section 4.4 take into account these findings. Indeed, the calibration of "Marginalizing system" truncates the irrelevant variation after the value of 5, while the calibration of "Late entry" and "Early entry" was performed in a dual way to emphasize the explanatory power of the extreme values of the source variable.
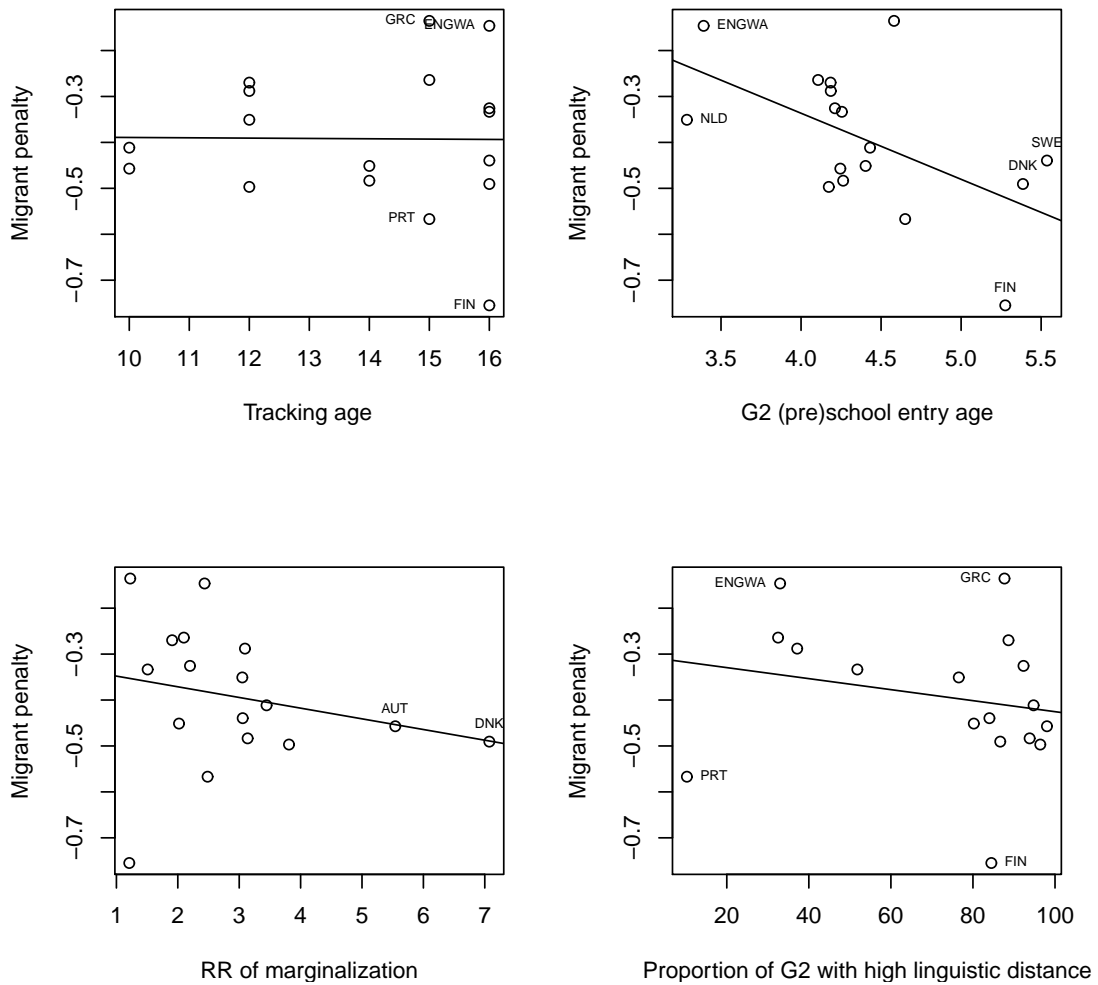
Figure 4.2: Linear correlation plots between "Age at tracking", "*G2* average (pre)school entry age", "Marginalization in low-performing schools", "Proportion of *G2* with high linguistic distance" and "Migrant achievement penalty". Peculiar cases identified by country labels.

Contextual factors are weakly related to migrant achievement penalties. With respect to linguistic distance, the relationship is negative as expected: an increase in the proportion of immigrants with a high linguistic distance corresponds to a worsening of migrant penalties (ρ = -0.216). As shown by Figure 4.2, some outliers exist, but do not affect the strength of the relation because they are pretty evenly distributed within the graph. An old history of immigration, on which I had no precise expectation, is also negatively related to migrant penalties, though only to a weak extent (ρ = -0.148).

Finally, the correlation matrix reveals that such theoretically relevant institutional features are not independent from each other. In particular, it is worth to point out that the average entry age in the (pre)school system is positively related to age at tracking. Hence, in highly comprehensive systems the inclusion of children of immigrants takes place at a relatively late age. Since a delayed entry age is associated with larger penalties, the zero correlation between age at tracking and migrant penalties could be driven by the confounding effect of entry age, associated with both variables. More generally, bivariate associations identified with correlation measures can be spurious rather than causal. Hence, I now move to a multivariate framework and in order to isolate the effects of institutional variables net of each others.

4.5.2   OLS cross-country regressions

Table 4.3 displays the results of two exploratory linear regressions on the institutional determinants of migrant achievement penalties. In the first model, I include only the three variables referring to characteristics of the educational system ("Age at tracking", "*G2* average (pre)school entry age", and "Marginalization in low-performing schools'), while in the second one I additionally introduce the contextual variables ("Immigration decade" and "Proportion of *G2* with high linguistic distance"). In both cases, the dependent variable is "Migrant achievement penalty".

All the effects go in the expected direction, including age at tracking, whose coefficient—net of that of entry age, to which it is positively correlated—changes sign with respect to the correlation coefficient. The fact that all the coefficients except for that of entry age fail to display acceptable significance levels is not surprising since the sample size is very small. As expected, standard errors are larger in Model 2, where degrees of freedom are reduced, but the size of the coefficients does not change substantially. Instead, I want to point out that the net effects of the theoretically relevant features of educational systems are quite weak. Indeed, entering school or preschool one year later is associated with a worsening of migrant penalties by about one sixth of a standard deviation (-0.16 or -0.17, depending on model specification). Increases in the age when pupils are tracked or in the relative proportion of immigrants compared to natives in bad schools bring about trivial changes in the size of migrant penalties.

The results of this exploratory regressions suggest that if we are interested in the role played by educational systems in affecting migrant learning disadvantage in Western Europe, the search for additive effects of single institutional variables may be an un-

	Model 1	Model 2
Intercept	0.126 (0.301)	-0.928 (6.565)
Age at tracking	0.014 (0.018)	0.013 (0.023)
G2 (pre)school entry age	-0.160** (0.066)	-0.168* (0.086)
RR of marginalization	-0.005 (0.025)	-0.003 (0.029)
Immigration decade		0.001 (0.003)
G2 with high lang dist		0.000 (0.002)
Observations	17	17
F-statistic	2.39	1.222
Adjusted R-squared	0.207	0.065

Table 4.3: Coefficients and fit values of OLS regression of "Migrant achievement penalty" on 'Age at tracking", "*G2* average (pre)school entry age", "Marginalization in low-performing schools", "Immigration decade","Proportion of *G2* with high linguistic distance". Standard errors in parentheses. ** Sig. at 0.05, * Sign at 0.1.

productive strategy. From a variable-oriented perspective, this acknowledgement could induce researchers to include several interaction coefficients in the regression models. However, their interpretation would become extremely cumbersome. Instead, in the next section I present results from an exploratory data technique, regression-tree analysis, which allows to detect and to easily interpret complex patterns of interaction.

4.5.3 Regression-tree analysis

Bivariate and multivariate analyses on the effects of theoretically relevant institutional characteristics on migrant achievement penalties have suggested that complex patterns of causation are in place in Western Europe. As mentioned in Section 4.3, I use regression tree analysis in order to explore possible interactions, for which I have no strong *a priori* assumptions. In fact, this multivariate data technique is exploratory and completely data-driven. It recursively partitions the data space into smaller regions, according to the one binary question which minimizes the sum S of squared deviations from the subgroup means in the response variable. Each parent node is further divided into child nodes, and the procedure is repeated until the largest decrease in S is below a given complexity threshold. A decrease in the complexity threshold corresponds to an increase in the overall R-squared in linear regression models. Figure 4.3 depicts results of the regression tree analysis. As a guidance to the interpretation of the tree, note that variables with the best predictive power are those generating splits at the higher level nodes and that

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show up again in subsequent divides, while those appearing for the first time in the lower level nodes are less important.
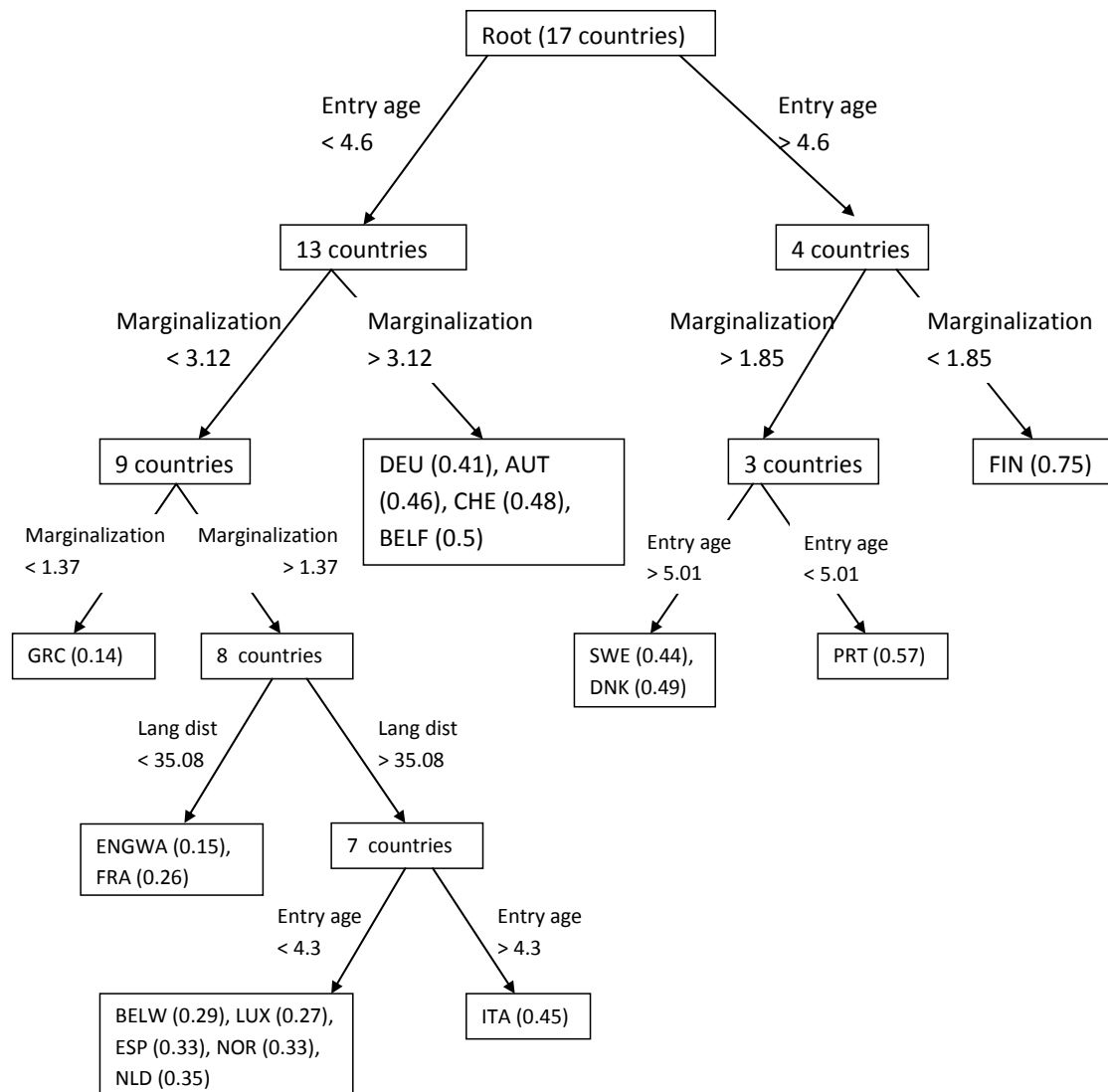
Figure 4.3: Results of regression tree analysis of "Migrant achievement penalty" on 'Age at tracking', "*G2* average (pre)school entry age", "Marginalization in low-performing schools", "Proportion of *G2* with high linguistic distance". Analyses performed with the R package rpart. Method: "anova", complexity parameter 0.01. To improve the readability of the graph, migrant achievement penalties are reported as absolute values

In the first step, countries are split according to the average entry age in the (pre)school system. In the right branch we find late-entry countries (Finland, Denmark, Sweden, Portugal), all exhibiting severe migrant penalties (0.44 to 0.75). In the left branch, where

age at entry is low to medium, the picture is more complex. This group is further divided according to the degree of migrants' marginalization. On the one hand, highly marginalizing systems (Germany, Austria, Switzerland, and Belgium-Flanders) all display severe migrant penalties (0.41 to 0.50). On the other hand, in Greece, where marginalization is very low, migrant penalties are close to zero (0.14). Moderately marginalizing systems display greater internal heterogeneity. England and Wales and France, where the proportion of immigrants speaking a very distant language is quite low, migrant penalties are also low (0.15 and 0.26). On the contrary, Italy is set apart in reason of its rather delayed entry age and displays a severe penalty (0.45). The remaining countries (Luxembourg, Belgium-Wallonia, the Netherlands, Spain, and Norway) all display fairly mild penalties (0.27 to 0.33).

A first discussion of these results concerns their degree of coherence with my theoretical expectations on the role of single institutional features. Generally, results support these predictions. Entry age in the (pre)school system stems as the most relevant variable in explaining cross-country differences in migrant penalties: it drives the first split and it emerges as a discriminating factor in further divides. As expected, earlier entry is associated to milder migrant penalties, with the exception of Portugal. Second order splits are driven by marginalization in low-performing schools, which is generally associated with more severe penalties. However, for a single observation (Finland), the split goes in the unexpected direction. The importance of contextual variables is only partially supported. Starting decade of mass immigration does not emerge as a variable of split, while linguistic distance does, but only in lower level nodes[11]. Possibly, this reflects a qualitative difference between new and old immigration countries that variable-oriented techniques like regression tree analysis are not able to handle. In the second place, one should acknowledge that these results confirm the existence of complex causality patterns in the production of migrant penalties. More specifically, equifinality is made visible by two clusters of countries above all: on the one hand, Nordic countries and Portugal emerge as late-entry systems producing high levels of migrant penalties. On the other hand, the same outcome is present in Germany, Austria, Switzerland and Belgium-Flanders. These countries are not characterized by late-entry but, instead, by a high degree of marginalization. Hence, two alternative paths towards large penalties

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[11]As expected, linguistic distance is more relevant to differentiate countries according to migrant penalties in the other domains of literacy assessed by PISA, as appears from additional analyses performed on reading and science. Results of regression trees on these domains are reported in Figures B.1 and B.2 in the Appendix B.

seem to be in place. Finally, these results can be read with an eye on the interactions between institutional features that emerge from the regression tree. In order to produce large migrant penalties, interactions do not seem very relevant because the two variables just mentioned appear crucial by themselves: a late entry age and sustained marginalization. However, in order to display mild penalties, systems have to combine several variables: England and Wales and France combine a low marginalization with a low linguistic distance, while Luxembourg, Belgium-Wallonia, the Netherlands, Spain, and Norway combine the same low marginalization with a relatively early entry age. Italy, where marginalization is also low but linguistic distance is high and entry age is not very early, is left to face severe penalties.

Overall, the regression-tree analysis presented in this section shows that, even when adopting a variable-oriented approach, complex patterns of interactions emerge between the institutional and contextual characteristics of educational systems. Multiple alternative combinations of characteristics are associated with high or low levels of migrant achievement penalties. Nevertheless, regression-tree analysis has some limitations. First of all, like all mainstream statistical analyses, it is based on correlations and it is therefore unable to detect asymmetrical relations. However, as I have shown in the previous section, explorative analyses suggest that some characteristics of the educational systems may be linked to migrant achievement penalties in an asymmetrical fashion. Second, like any variable-oriented technique, it is concerned with the overall variance of the dependent variable and the independent variables, irrespective of its substantive meaning. This implies that its major aim is to explain the greatest amount of variance, rather than explaining the value of the dependent variable in single cases or groupings of cases. A second implication of the variable-oriented approach is that it consider all variation—both in the dependent or independent variables—as relevant, irrespective of the substantive meaning of specific values. As I have already shown, fuzzy-set calibration is able to address this issue, by accounting for fine-grained differences but at the same time setting some qualitative thresholds. More generally, I argue that Qualitative Comparative Analysis provides a more powerful framework to systematically assess all the issues just raised, namely: (i) asymmetrical relations; (ii) patterns of complex causation; (iii) substantive and theoretical relevance of single cases or groupings of cases, seen as configurations of attributes. The next section is devoted to present results from Qualitative Comparative Analysis.

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4.6 Results from diversity-oriented approach

In this section, I question the symmetrical nature of the relation between features of educational systems and migrant penalties and hence I resort to set-theory, by assessing whether any characteristic is individually necessary or sufficient to produce severe migrant achievement penalties, or to avoid them. Next, I consider how such characteristics actually combine in Western European educational systems and whether we can identify any recurrent institutional configuration. Finally, I present results from Qualitative Comparative Analysis, as a systematic assessment of the configurations that are sufficient to produce severe migrant penalties, and of those that are sufficient to avoid them.

4.6.1 Assessing individual necessity and sufficiency

After having explored the correlations between institutional variables with migrant achievement penalties, I now resort to set-theory in order to assess asymmetrical relations of sufficiency and necessity between the same variables—though now calibrated into fuzzy-sets—and the presence (or the absence) of severe migrant penalties.

A first question that can be addressed is whether any condition is formally necessary for the occurrence of the outcome. In set-theory, this is equivalent to assessing whether the condition is a superset of the outcome, or in other words whether *all* instances of the outcome display the condition of interest. Comparative configurational methods follow a somehow less deterministic logic and allow for small deviations from an exact superset relation. The extent of these deviations and the explanatory power of the relation can be evaluated by looking at the parameters of fuzzy-set consistency and coverage[12]. Table 4.4 presents the results of an analysis of necessity of single institutional conditions (and their negation) for the presence of severe migrant penalties (and their absence)[13].

The consistency scores indicate that, formally, two conditions are almost necessary to

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[12]Consistency for necessity assesses the extent to which a superset relation is accurate. Formally, it measures the degree to which cases sharing the outcome Y agree in showing a given condition (or configuration of conditions) X. It is computed as: $\frac{\sum min(x_i, y_i)}{\sum (y_i)}$ where where x_i and y_i are individual membership scores in the sets X and Y. Coverage expresses the empirical importance of the necessity relation. Formally, it measures the degree to which instances of the causal condition (or configuration of conditions) X agree in displaying the outcome Y. It is computed as: $\frac{\sum min(x_i, y_i)}{\sum (x_i)}$.

[13]As noted by Bol and Luppi (2013), the traditional analysis of necessity fails to identify potentially necessary *combinations* of conditions. Following the stepwise procedure suggested by these authors, I systematically assess the degree of necessity of all possible configurations for the presence and the absence of the outcome. Results are reported in Table B.2 in the Appendix.

	SEVERE PENALTIES		severe penalties	
Condition	Consistency	Coverage	Consistency	Coverage
TRACKED	0.649		0.397	
tracked	0.351		0.603	
EARLY TRACKED	0.598		0.501	
early tracked	0.441		0.542	
MARGINALIZING	0.625		0.286	
marginalizing	0.463		0.812	
LATE ENTRY	0.443		0.134	
late entry	0.617		0.933	0.602
EARLY ENTRY	0.180		0.465	
early entry	0.894	0.649	0.617	
LANG DIST	0.885	0.657	0.569	
lang dist	0.166		0.488	
NEW IMM	0.529		0.372	
new imm	0.522		0.684	

Table 4.4: Results of analysis of necessity for the presence and the absence of the outcome. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency scores for each condition and its negation. Coverage scores are shown only for conditions close to necessity.

bring about severe penalties. The first one is a not-early entry in the (pre)school system, which displays a consistency value close to 0.9. Its coverage value is not low (0.649) suggesting that this relation is not trivial. Equally, being a linguistically distant country is found as a pretty consistent and not trivial superset of the outcome. By turning now to institutional characteristics that are needed to avoid severe penalties, Table 4.4 also shows that a not-late entry system is necessary for the absence of the outcome and that its explanatory power is quite large.

These results can be more easily interpreted if they are translated back to the more familiar language of Boolean algebra. First of all, in almost all Western European countries displaying severe penalties, a great proportion of immigrants speaks a very distant language from the official one[14]. This result suggests that—although second-generation immigrants were born in the host society—most of their learning disadvantages derive

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[14]The relation is of quasi-necessity rather than necessity, first of all because consistency is not remarkably high, and secondly because one country—Portugal—substantially contradicts the relation, by displaying severe migrant penalties in the absence of high linguistic difference.

from a lack of linguistic skills. Hence, countries where languages of immigrants are very distant from their own face the greatest difficulties in tackling migrant penalties in educational achievement, and only some of them succeed in avoiding severe penalties. In order to see what differentiates successful countries from unsuccessful ones, we must investigate which configurations of conditions are sufficient to avoid severe penalties. On the contrary, in countries where linguistic distance is low, generally no severe migrant penalties emerge.

To better understand the role of entry age, we shall remember that the calibration of Early-entry and Late-entry was performed asymmetrically, therefore one set is not the negation of the other one, but rather a subset of the negation of the other one. This asymmetrical calibration led to a skewed distribution of the membership scores in the two sets: the large majority of cases holds low membership in Late-entry and in Early-entry too, as can be observed in the Figure 4.1 presented earlier. As noted by Schneider and Wagemann (2012), if membership in a given condition is skewed, and membership is the outcome is skewed too, the empirical relevance of that condition can be overestimated by the coverage formula. In this case, membership in the outcome is not particularly skewed (cf. again Figure 4.1). Nevertheless, a closer inspection of the potential triviality of these quasi-necessary conditions is given by the XY plots depicted in Figure 4.4, where membership scores in "Not-early entry" and "Not-late entry" are plotted against memberships in the outcome and the negated outcome, respectively. While most countries have membership higher than 0.5 in both conditions, in neither plot cases are massively concentrated in the upper-right corner. On the contrary, several cases can be found in the lower-right corner of the plot. In other words, while all the cases displaying the condition also display the outcome, the outcome is not so common to cover all the instances of the condition: the two sets do not coincide. Rather, the condition is a superset —albeit imperfect—of the outcome. In effect, in this case, the formula of relevance for necessary conditions (Schneider and Wagemann, 2012, 236)[15] produces rather similar results to those produced by the formula of coverage. In particular, the relevance of "Not-early entry" for the presence of the outcome is 0.521, and the relevance of "Not-late entry" for the absence of the outcome is 0.475. Hence, the conditions seem to be not trivial.

More generally, both graphs in Figure 4.4 reveal that fuzzy-set membership in the

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[15]These authors propose to assess the relevance of necessary conditions as: $\frac{\sum (1-x_i)}{\sum [1-min(x_i,y_i)]}$ where x_i and y_i are membership scores in the condition and the outcome, respectively. Values close to one indicate high relevance, while values close to 0 indicate triviality.
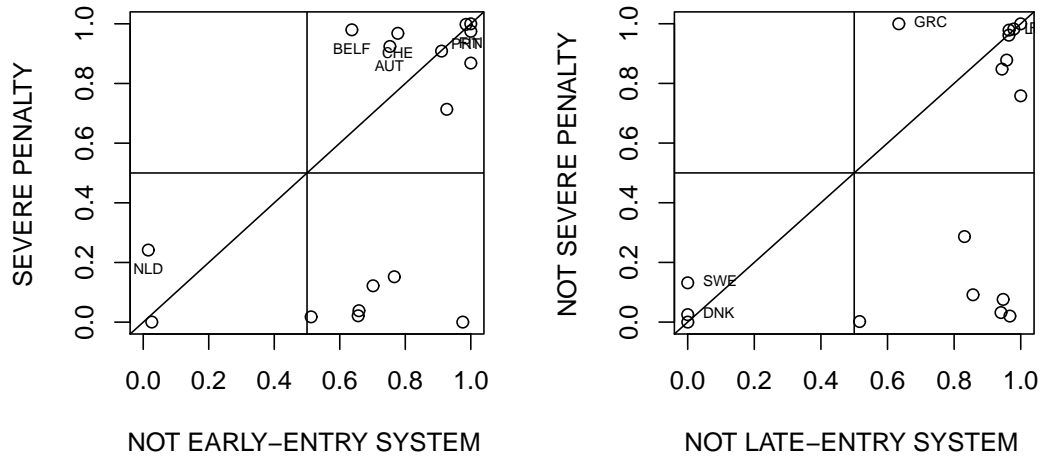
Figure 4.4: Fuzzy-set plots of necessary institutional conditions for the presence (left) and the absence (right) of the outcome. Inconsistent cases are identified by country labels.

condition is generally higher than fuzzy-set membership in the outcome, meaning that when the outcome is present, the condition is present too. Some inconsistent cases exist, but none of them is found in the upper-left corner of the plot, therefore they are inconsistent in degree or irrelevant, rather than inconsistent in kind (Schneider and Wagemann, 2012, 306-310). Plainly speaking, in all Western European countries that display severe penalties, children of immigrants enter the educational system after age 4. On the other hand, in all countries that avoid severe penalties, they enter the system before age 5.

After investigating individual necessity, we may be interested in seeing whether there is any institutional characteristic that is sufficient by itself in producing severe penalties, or in avoiding them. As shown by Table 4.5, only one condition satisfies the minimal requirements for the subset relation[16]: a late-entry system is a sufficient condition for severe migrant penalties (consistency: 0.88). In other words, the simple fact that children of immigrants enter an educational system after age 5 produces severe migrant achievement penalties in some countries. However, the proportion of outcome explained

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[16]Just like for necessity, in order to evaluate a sufficiency relation, researchers have to rely on parameters of consistency and coverage. Since sufficiency implies a subset relation, consistency for sufficiency measures the degree to which cases sharing a given condition (or configuration of conditions) X agree in displaying the outcome Y. It is computed as: $\frac{\sum min(x_i, y_i)}{\sum (x_i)}$ where where x_i and y_i are individual membership scores in the sets X and Y. Coverage expresses the degree of the outcome Y explained by the causal condition (or configuration of conditions) X. It is computed as: $\frac{\sum min(x_i, y_i)}{\sum (y_i)}$

	SEVERE PENALTIES		severe penalties	
Condition	Consistency	Coverage	Consistency	Coverage
TRACKED	0.644		0.356	
tracked	0.392		0.608	
EARLY TRACKED	0.591		0.447	
early tracked	0.494		0.549	
MARGINALIZING	0.786		0.325	
marginalizing	0.418		0.662	
LATE ENTRY	0.880	0.443	0.240	
late entry	0.441		0.602	
EARLY ENTRY	0.341		0.799	
early entry	0.649		0.405	
LANG DIST	0.657		0.381	
lang dist	0.299		0.794	
NEW IMM	0.649		0.413	
new imm	0.479		0.567	

Table 4.5: Results of analysis of sufficiency for the presence and the absence of the outcome. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency scores for each condition and its negation. Coverage scores are shown only for conditions close to sufficiency.

by this condition is quite low (0.443). Moreover, looking at the X-Y plot displayed in Figure 4.5, we realize that only three cases are substantially explained by this condition alone: although cases in the the upper-left part of the graph are consistent with the sufficiency relation, they are not explained since they do not display the condition. On the contrary, Sweden and Denmark (although not perfectly consistent) and Finland are explained because they are more in than out of both sets (outcome and condition). But what about other countries suffering from severe penalties? What institutional conditions account for their inegalitarian educational outcomes? In order to address these questions and to provide an explanation of greater empirical relevance, one must resort to some combinations of conditions, rather than single conditions.

4.6.2 Institutional configurations

Before moving to a systematic assessment of the sufficiency of combinations of conditions in producing or avoiding severe migrant penalties, I explore which configurations are
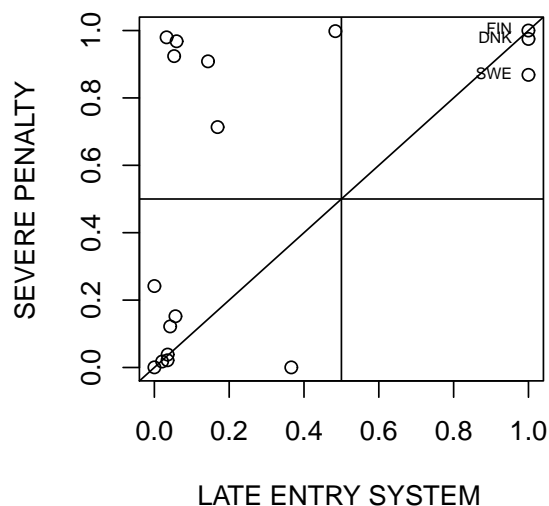
Figure 4.5: Fuzzy-set plot of LATE ENTRY as a sufficient condition for the presence of the outcome. Substantively explained cases are identified by country labels.

actually embodied by Western European countries. Figure 4.6 displays the property space resulting from all the 64 logically possible combinations of five institutional conditions: "Tracked", "Early tracked", "Late-entry", "Not early entry", and "Marginalizing"[17]. For the sake of simplicity, I depict the conditions in a dichotomized form. Coherence with the logic of fuzzy-set Qualitative Comparative Analysis is preserved, because the crossover of 0.5 marks a qualitative threshold between cases fundamentally in and out of the set. The graphical representation of how the relevant dimensions of educational systems combine in Western European countries shows no simple explanation of severe migrant penalties. Only two clear-cut clusters of countries emerge: on the one hand, not-tracking and not-marginalizing systems characterized by not-late entry (France, Spain, Greece and Norway), or even early entry (England and Wales). Such systems are all able to avoid severe migrant penalties. On the other hand, early-tracking and marginalizing systems characterized by not-early entry all display severe penalties (Austria, Flemish

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[17]Since graphical representations of combinations of more than five conditions are extremely hard to interpret, I include only the conditions referring to the educational systems and not those referring to the context. "Early entry" is negated because the intersection of "Late-entry" and "Early entry" would be a logical contradiction.

00000

ENGWA

00010 | ESP, FRA, GRC, NOR

early entry

10010

PRT

10000

00001

MARGINAL

00011

10011

10001

00101

00111

DNK, SWE

10111

10101

00100

LATE ENTRY

00110 | FIN

10110

10100

01100

01110

11110

11100

EARLY TRACKED

01101

01111

11111

11101

MARGINAL

01001

01011

AUT, BELF, CHE, DEU, BELW

11011

NLD

11001

ITA, LUX

01010

11010

01000

11000
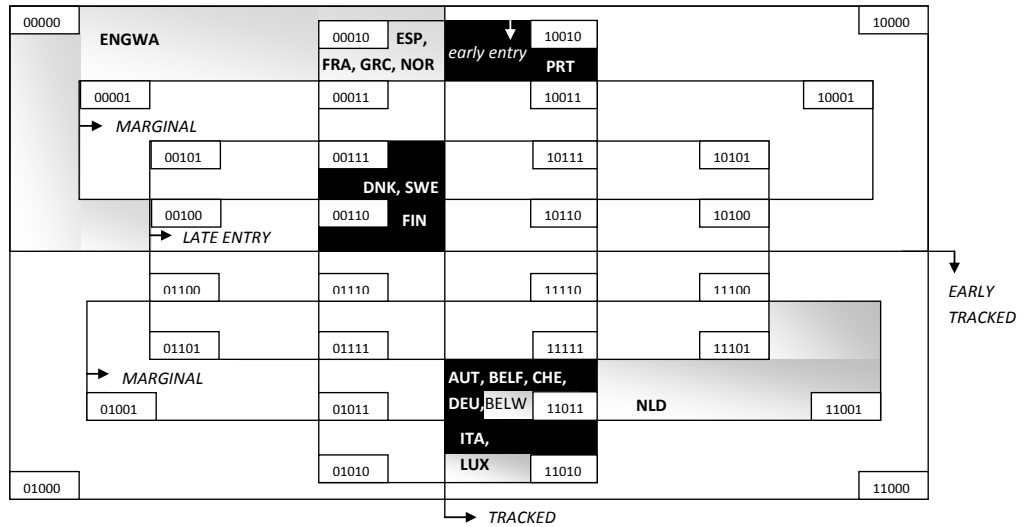
TRACKED

Figure 4.6: Venn diagram depicting all logically possible combinations of TRACKED, EARLY-TRACKED, LATE-ENTRY, early-entry, MARGINALIZING. The sequence of 0 and 1 in each cell represents the absence and presence of each factor in the aforementioned order. Cases depicted against a black background display severe migrant penalties, cases depicted against a gray background do not.

Belgium, Switzerland, and Germany) with the exception of Walloon Belgium. However the outcomes of countries displaying an institutional mix of theoretically egalitarian and inegalitarian conditions are less easily explained. Among countries that suffer from severe migrant penalties, Denmark and Sweden are not-tracking, but late-entry systems. The same holds for Finland. However, while Denmark and Sweden marginalize children of immigrants in low-quality schools, Finland does not. Italy and Portugal—which display the outcome too—are both tracking systems where marginalization does not take place and entry is neither late or early. However, Italy tracks students at early age, while Portugal does not. Among countries that avoid severe penalties, Netherlands emerges as a peculiar case, because it is very similar to Austria, Belgium, Switzerland, and Germany. However, differently from them, it is characterized by an early entry age in the system. In order to gain a better understanding of the configurations sufficient for the outcome (or for its absence), it is then needed to perform a formal minimization of the truth table.

The Venn diagram also shows that if we consider only institutional dimensions related to the school system, two configurations are contradictory with respect to the outcome. Walloon Belgium, as stated earlier, fails to display the outcome, but it is grouped to-

gether with systems where severe penalties are in place. However, a large proportion of immigrants in Belgium come from countries where French is widely spoken, therefore—from a linguistic point of view—many children of immigrants have a comparative advantage in the Walloon as opposed to the Flemish educational system. In the second contradictory configuration, Luxembourg appears together with Italy (early tracking, not-marginalizing, neither early entry nor late entry) but, differently from the latter, it does not display severe penalties. However, the two countries have two very different immigration histories: while Italy is a new immigration country, in Luxembourg mass immigration started in the post-war period. Therefore, including the contextual characteristics related to linguistic distance and to the history of immigration may be helpful in solving these contradictions.

Like the other exploratory analyses presented in this chapter, the Venn diagram suggests that no easy institutional explanation can account for migrant achievement penalties in Western Europe. Instead, it is worth to conduct a systematic comparative assessment of institutional configurations in order to understand the role of educational systems.

4.6.3 fs-QCA: model construction and robustness checks

Unlike variable-oriented research—where concept formation, case selection, measurement and model specification should be distinct phases of inquiry—comparative configurational methods entail a "dialogue of ideas and evidence" (Ragin, 1987, 164-71). Hence, fuzzy-set Qualitative Comparative Analysis (fs-QCA) is an iterative process where it is not only admitted, but expected that researchers adjust and refine their theoretical expectations in the light of empirical analyses. Moreover, researchers should be open to change the definition of critical thresholds for calibration and for truth table analysis, as well as their assumptions on counterfactual arguments. They should also explicitly discuss how these changes affect their results. Ultimately, the goal of fs-QCA is not so much to test theoretical hypotheses, but rather to explore complex causal patterns in given contexts. In this perspective, this subsection documents the process of my systematic assessment of institutional configurations leading to severe penalties in Western Europe.

Presence of the outcome

As I have shown earlier in this section, exploratory statistical and set-theoretical analyses consistently show that some countries display equally severe penalties while embodying

different kinds of educational systems. Against this evidence, it would be simplistic to conclude that educational systems are irrelevant in explaining migrant penalties in Western Europe, because there may be different combinations of institutional characteristics bringing to the same outcome. In order to construct my explanatory model, I moved from three institutional dimensions, calibrated into five fuzzy-sets (TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY and LATE-ENTRY educational systems) as detailed in Section 4.4. As shown by Figure 4.6, the configurations created by the combination of these institutional conditions display two contradictions with respect to the outcome. Given the deterministic nature of set-theoretic methods, it is essential to deal with contradictory rows before proceeding to the truth table analysis. There are several strategies to solve contradictions (Rihoux and De Meur, 2009; Schneider and Wagemann, 2012). In this case, I chose to add to the model two contextual conditions: NEW IMMIGRATION and LINGUISTICALLY DISTANT countries[18]. The new conditions are able to differentiate among the countries belonging to the contradictory configurations, respectively Italy *vs.* Luxembourg, and Walloon Belgium *vs.* Austria, Flemish Belgium, Switzerland, and Germany. This resulted in truth tables for the presence and the absence of the outcome free of substantive contradictions[19], reported in Tables B.3-B.9 in the Appendix. However, the drawback of this strategy is a considerable intensification of limited diversity, given that, by increasing the number of conditions, the number of logically possibly configurations is increased exponentially.

Table 4.6 presents the first results of the truth table minimization for the occurrence of the outcome. The solution indicates the presence of a complex pattern of causation: no single condition is sufficient in bringing about severe penalties, but some conditions can produce the outcome if combined. Moreover, severe penalties can alternatively stem from four different combinations of conditions.

As expected, the solution is quite complex, because I adopted the most conservative strategy to deal with limited diversity. In other words, in order to produce this solution, no assumption was made on the logical remainders, i.e. configurations that lack empirical instances. Theoretical knowledge is helpful in assessing whether the conservative solution contains some conditions which—despite not formally redundant from a logical point of

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[18] Again, for the definition and the calibration of these conditions refer to Section 4.4

[19] Substantive contradictions, or—as Schneider and Wagemann (2012) call them—True Logical Contradictions (TLCs), are configurations that correspond to some cases displaying the outcome (i.e. having a fuzzy-set membership score higher than 0.5) and to some other cases *not* displaying the outcome (i.e. having a fuzzy-set membership score lower than 0.5).

Path	cons.	cov.	Cases
(late entry * early entry * lang dist) * NEW IMM * (TRACKED * marg * early tracked)	1.000	0.065	PRT
(late entry * early entry * LANG DIST) * NEW IMM (TRACKED*marg*EARLY TRACKED)	1.000	0.103	ITA
(LATE ENTRY*LANG DIST) * NEWIMM * (tracked*MARGINAL)	0.999	0.173	DNK,SWE
(early entry*late entry*LANG DIST) * (MARGINAL * EARLY TRACK)	0.956	0.328	AUT, BELF CHE, DEU
Whole solution	0.977	0.650	

Table 4.6: Conservative solution of the minimization of the truth table for the presence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.9. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

view—can be removed by making plausible assumptions. In order to better understand this point, let us have a look at the third path of the solution. I find that in new immigration countries, a late entry into the educational system by children of immigrants who speak a very distant language from that of the host society is sufficient in bringing about severe penalties, provided that it takes place in *non-tracked* systems which marginalize students of immigrant origins in low-quality schools. Given the well-known inegalitarian character of tracking, it is plausible that severe migrant penalties would be produced also in similar systems which, nevertheless, *do track* students into differentiated curricula. In order to formally assess this argument, we would need the counterfactual configuration (LATE ENTRY*LANG DIST) * NEWIMM * (TRACKED*MARGINAL), which, unfortunately, does not exist in Western Europe. However, this configuration can be treated as an "easy counterfactual", hence assuming that if it existed, it would lead to severe migrant penalties (Ragin and Sonnett, 2004; Ragin, 2008). In other words, I can set a directional expectation on the role of tracking for the outcome: if tracking plays any role in producing migrant achievement penalties, it goes in the direction of worsening those penalties rather than mitigating them. Similarly, based on the theoretical reasonings developed in Section 4.2, one can set directional expectations on some other institutional characteristics, chiefly entry age and linguistic distance. By doing so, it is possible to use some of the logical remainders suitable to contribute to greater parsimony in the truth

table minimization. The role of directional expectations is then to justify the definition of such simplifying assumptions as "easy counterfactuals". Table 4.7 presents the results of a truth table analysis that incorporates such directional expectations. The solution is denoted as "intermediate", since it is a superset of the one obtained with the more conservative strategy, but is a subset of the one we might have obtained if we allowed for the use of any counterfactual configuration (including the "difficult" ones) in the minimization procedure[20].

Path	cons.	cov.	Cases
early entry * TRACKED * NEW IMM	0.999	0.220	PRT; ITA
(LATE ENTRY * LANG DIST) * NEWIMM * MARGINAL	0.999	0.173	DNK,SWE
(early entry*LANG DIST) * (MARGINAL * EARLY TRACK)	0.955	0.328	AUT,BELF,CHE,DEU
Whole solution	0.978	0.709	

Table 4.7: Intermediate solution of the minimization of the truth table for the presence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: TRACKED, LATE-ENTRY, early-entry, EARLY-TRACKED, MARGINAL, LANG DIST contribute to the presence rather than the absence of the outcome. Consistency cutoff: 0.95. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

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[20]As an alternative strategy to deal with limited diversity, Schneider and Wagemann (2012) put forward what they label "Theory-Guided Enhanced Standard Analysis (TESA)". This strategy addresses several issues inherent in the derivation of the "intermediate solution". First of all, as mentioned, the intermediate solution is a subset of the parsimonious solution, which is obtained by using all logical remainders suitable to gain parsimony in the truth table minimization. In order to get to the intermediate solution, researchers only use some of those remainders. More specifically, when setting directional expectations, only those that are theoretically justifiable *and* suitable to gain parsimony are used in the truth table minimization. However, as the authors argue: (i) remainders that are suitable to gain parsimony can be implausible; (ii) the goal of fs-QCA is not necessarily to gain greater parsimony. The TESA approach consists in inspecting all logical remainders and in setting configurational directional expectations. Unfortunately, given the limited theoretical development in the study field of this dissertation, it is very hard to derive directional expectations that go beyond the role of single conditions. Moreover, given the policy relevance of the research questions at stake, an important goal of my fs-QCA is to attain a parsimonious account of which features of educational systems lead to severe penalties and which do not, provided that the context is adequately taken into account. However, as I will display later in this section, I deal with the problem of limited diversity in two other ways: first, by performing a two-step analysis on remote and proximate factors (Schneider and Wagemann, 2006), and second, by streamlining the explanatory model.

The most evident finding concerns the relevance of entry age in (pre)school: late or not-early entry emerge in all the components of the solution. This is not surprising given the results of the analyses presented beforehand: entry age was the first variable of split in the regression tree analysis and had a strong correlation with migrant penalties. Most importantly, the analysis of necessity has shown that a not-early entry system is a quasi-necessary condition for severe penalties (consistency: 0.894, coverage: 0.649). Upon a closer inspection of the causal paths, we notice that tracking into differentiated curricula by itself is not decisive in producing the outcome. However, in new immigration countries, when not counterbalanced by an early entry age in the educational system, it is sufficient to produce severe migrant penalties (path 1). The remaining two paths are most interesting because they contrast two Scandinavian educational systems, known for their high degree of comprehensiveness, to highly differentiated systems that track students at young age. On the one hand, in Denmark and Sweden—new immigration countries with a large proportion of linguistically-distant immigrants—severe penalties are the product of a delayed entry in the (pre)school system together with a subsequent marginalization of immigrants in low-quality schools. On the other hand, in Austria, Flemish Belgium, Switzerland, and Germany, second-generation immigrants, a majority of whom also speaks a very distant language from that of the host society, enter the (preschool) system at a relatively young age. However, this cannot compensate for the detrimental combination of early tracking and marginalization of immigrants in low-quality schools. Possibly, in these countries marginalization is itself a product of tracking, since by the end of compulsory schooling children of migrants who chose a vocational track have already been exposed to a lower quality environment for three to five years.

It is easy to visualize the accurateness and the empirical relevance of the solution presented above by looking at Figure 4.7. The bottom-right part of the graph is empty, revealing that no inconsistencies in kind exist. In other words, all the cases belonging to one of the configurations entailed by the three causal paths also belong to the set of countries with severe migrant penalties. The case of Germany, lying below the diagonal but still above the 0.5 threshold, is to be considered an inconsistency in degree rather than in kind (Schneider and Wagemann, 2012, 306-310). The upper-left part of the plot corresponds to the unexplained cases. Finland lies in this part of the graph. This is particularly disturbing since Finland has a membership score of almost one in the set of severe penalties. In other words, it is close to the idealtype of an educational system where children of immigrants experience extreme penalties in educational achievement. Hence, even if the whole solution has a quite high coverage value (0.709), it is not
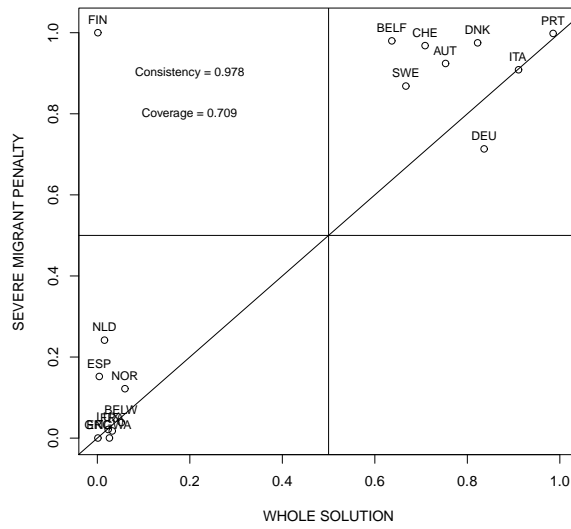
Figure 4.7: Fuzzy-set plot of the whole solution for the presence of the outcome. Solution:' refer to Table 4.7

completely satisfying, because it fails to explain the role of educational systems in one of the countries where children of immigrants are particularly worse off.

A closer inspection at the truth table (reported in Table B.3 in the Appendix B) reveals that the case of Finland corresponds to a configuration that has a subset consistency of 0.776 to the outcome. Therefore, by setting a row consistency threshold of 0.95 I have categorized such configuration as a logical contradiction, not to be used in the minimization procedure. Nevertheless, Finland is not a *substantive* contradiction, because it has a membership score higher than 0.5 in both the outcome and the configuration. Therefore, I repeated the analyses by setting a less stringent row consistency threshold (0.75) which allows the categorization of Finland's configuration as a positive case, i.e., displaying the outcome[21]. The intermediate solution of such analysis is reported in Table

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[21]According to Schneider and Wagemann (2012, 182-3), this is an acceptable threshold for row consistency, provided that the configuration corresponds to cases which are not substantive contradictions (or, as they call them, "true logical contradictions"). Finland has a membership of 0.822 in the configuration and 0.999 in the outcome, hence the configuration can be considered a substantive subset of the outcome. It should be noted that in computing the value for row consistency, one takes into account the fuzzy-set memberships in the configuration and in the outcome of *all cases*, and not just of the cases that substantively belong to the configuration. For this reason, the value of 0.776 for the configuration corresponding to Finland is lower than 0.822 (=0.822/0.999).

4.8[22].

Path	cons.	cov.	Cases
early entry * TRACKED * NEW IMM	0.999	0.220	PRT; ITA
(LATE ENTRY * LANG DIST) * NEWIMM	0.884	0.312	FIN; DNK,SWE
(early entry*LANG DIST) * (MARGINAL * EARLY TRACK)	0.955	0.328	AUT,BELF,CHE,DEU
Whole solution	0.936	0.824	

Table 4.8: Intermediate solution of the minimization of the truth table for the presence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: TRACKED, LATE-ENTRY, early-entry, EARLY-TRACKED, MARGINAL, LANG DIST contribute to the presence rather than the absence of the outcome. Consistency cutoff: 0.75. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

Now, not only the case of Finland is explained, but it is grouped together with the other two Scandinavian countries, which leads to a greater parsimony of the solution. In other words, Finland's configuration was similar in all respects but one (the presence/absence of a marginalizing system) to the configuration of Denmark and Sweden. Since cases in both configurations display the outcome, it is possible to rule out the relevance of marginalization in this causal recipe. The fit parameters reveal that lowering the row consistency threshold did not cause an abrupt loss of accurateness of the whole solution (consistency now: 0.936, before: 0.978), while its explanatory power has considerably increased (coverage now: 0.824, before: 0.709). Most importantly, as can be seen in Figure 4.8, all cases are now substantially explained and still no inconsistencies in kind exist.

The results presented in Table 4.8 are rather satisfying in terms of parameters of fit, as well as in substantive terms. Nevertheless, the complexity of the model is quite high. Though QCA was developed as a method to address the problem of "many variables, few observations", common in comparative research, a reasonable proportion of conditions to cases should be attained. First of all, an unbalance between conditions and cases is problematic because it corresponds to a large limited diversity in the data. As mentioned, a linear increase in the number of conditions corresponds to an exponential increase in the number of logically possible configurations. Hence, the universe of relevant cases is far too small to cover the property space entailed by the interplay of potential explana-

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[22]To be thorough, I also report the results of the conservative solution with a row consistency threshold of 0.75 in Table B.4 in the Appendix B.
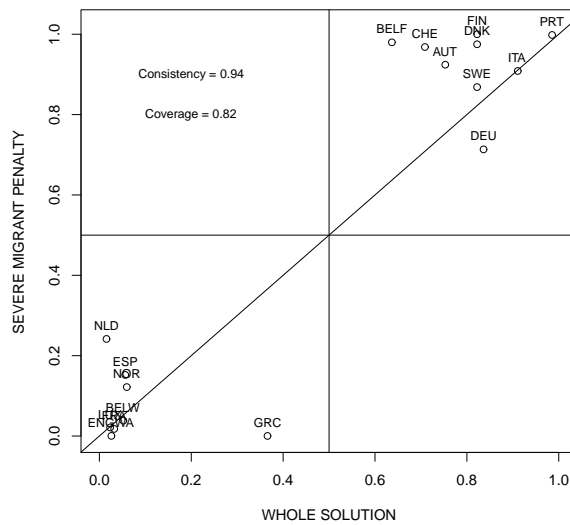
Figure 4.8: Fuzzy-set plot of the whole solution for the presence of the outcome. Solution: refer to Table 4.8

tory factors. While counterfactual thinking can be used to deal with limited diversity, researchers should avoid making too many assumptions. On the contrary, a balance between complexity and parsimony should be the aim of QCA researchers (Ragin and Sonnett, 2004). Secondly, as recently shown by Marx (2010) and Marx and Dusa (2011), when the proportion of conditions to cases is too high, QCA does not produce robust results[23].

Hence, I proceeded to streamline the explanatory model. In particular, two conditions—despite not being logically redundant—emerged as potential candidates to be excluded. On the one hand, EARLY-TRACKED: the two paths where tracking appears as a relevant factor to explain severe migrant penalties—path 1 and path 3 in Table

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[23]More precisely, the authors perform simulations of cs-QCA on large numbers of random data and conclude that "csQCA applications with more than 7 conditions (including the outcome) and applications where the proportion of conditions on cases is higher than .33 are not able to distinguish real from random data due to the problem of uniqueness." (Marx, 2010, 155). Although further simulations should be run in order to verify if the same thresholds hold when using fs-QCA, by using this criterion as an approximate rule of thumb, I reckoned that my initial model was not robust enough. In my initial model, I had seven conditions, plus the outcome, over 17 cases (proportion: 0.412). On the contrary, the streamlined model presented in what follows is more reliable, because I reduced the number of conditions to five, while the number of cases was held constant to 17 (proportion: 0.294).

4.8—seem to indicate that the fact that tracking occurs at a particularly early age is not crucial. Indeed, among old immigration countries where early tracking occurs, the latter must be combined with marginalization, linguistic distance and a not-early-entry in the system, in order to produce the outcome. On the contrary, for the new immigration countries, the simple fact that pupils are tracked (for Italy at early age, for Portugal later), is sufficient to bring severe penalties, provided that entry-age is not early. In other words, EARLY-TRACKED—although being a subset of TRACKED, then already a more restrictive case of penalizing institution—emerges in the more complex path as opposed to the simple path characterized by TRACKED. Therefore, I decided to take EARLY-TRACKED out of the streamlined model. On the other hand, the joint presence of EARLY-ENTRY and LATE-ENTRY also appears redundant[24]. For the presence of the outcome, LATE-ENTRY seems to be the decisive factor, because it is the only institutional condition of the second path in Table 4.8, thus explaining the negative performance of the Scandinavian countries. The absence of EARLY-ENTRY emerges in all the components of the solution and was found as a quasi-necessary condition (consistency: 0.894, coverage: 0.649). However, this might also be due to the fact that 15 out of 17 countries are more out than in the set of EARLY-ENTRY. Moreover, as shown below, EARLY-ENTRY does not emerge as part of any path leading to the absence of the outcome. Therefore, I decided to take this condition out of my streamlined model, and to keep LATE-ENTRY only.

Table 4.9 displays the first results of the truth table analysis on this streamlined model, without any assumption on the logical remainders, i.e. by using the conservative strategy to deal with limited diversity. The corresponding truth tables for the presence and the absence of the outcome are reported in the Appendix B in Tables B.5 and B.11.

As expected, these results are very similar to those of the initial model, with two slight differences. Now, the mere tracking of students into differentiated curricula, rather than the age when this tracking occurs, is a component of two configurations that are sufficient to produce the outcome (path 1 and 3). The second difference concerns the importance of the dimension of entry age into the educational system: in the previous

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[24]As mentioned in Section 4.4, EARLY-ENTRY and LATE-ENTRY are the product of a dual calibration of the same source variable, "Entry-age". This choice was motivated by the fact that the distribution of "Entry-age" is not polarized: rather, in most of the countries children enter the educational system when aged 4 to 4.5, thus making it difficult to set a crossover point for a unipolar calibration. Hence, for EARLY-ENTRY the crossover was set at 4.00, with two countries (England and Wales and the Netherlands) more in than out of the set; for LATE-ENTRY, the crossover was set at 4.677, with four countries (Finland, Sweden, Denmark and Portugal) more in than out.

Path	cons.	cov.	Cases
(TRACKED * marginal) * NEW IMM * late entry	1.000	0.161	PRT, ITA
(LATE ENTRY * LANG DIST) * (MARGINAL * tracked) * NEW IMM	0.999	0.173	DNK, SWE
(TRACKED * MARGINAL) * LANG DIST * late entry * new imm	0.862	0.405	AUT, BELF, CHE, DEU, NLD
Whole solution	0.918	0.727	

Table 4.9: Conservative solution of the minimization of the truth table for the presence of the outcome. Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.85. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

results, all the paths of the solution shared the element of not-early entry; now, this dimension emerges only in the second path in the form of late-entry. Denmark and Sweden belong to a configuration of institutional and contextual elements sufficient in bringing about severe penalties: they are new immigration countries where the majority of immigrants speak a language that is distant from the national one. Their educational systems cannot counterbalance these negative structural factors, because they include immigrant children too late, and, subsequently, they marginalize them in low-quality schools, despite the fact that no tracking occurs in lower-secondary schooling.

From a theoretical point of view, some elements of the solution are superfluous. While it is interesting to have a descriptive account of the characteristics common to Denmark and Sweden, it is evident that, in the respective configuration, the absence of tracking should not be seen as a constitutive element of an institutional mix leading to severe penalties. It is reasonable to presume that if there existed a tracking system similar to Denmark and Sweden in all other respects, it would display at least equally severe migrant penalties. Hence, as before, I introduce directional expectations in the model and derive the intermediate solution by using the easy counterfactuals in the truth table minimization process. Table 4.10 displays the intermediate solution.

It should be noted that these intermediate and conservative solutions are much more similar than those based on the initial model (cf. Tables 4.6 and 4.7). This suggests that the results of the streamlined model are quite robust to the use of simplifying assumptions. This element derives from the fact that, even if limited diversity is still

Path	cons.	cov.	Cases
TRACKED * NEW IMM	0.977	0.220	PRT, ITA
(LATE ENTRY * LANG DIST) * MARGINAL * NEW IMM	0.999	0.185	DNK, SWE
(TRACKED * MARGINAL) * LANG DIST	0.851	0.405	AUT, BELF, CHE, DEU, NLD
Whole solution	0.911	0.786	

Table 4.10: Intermediate solution of the minimization of the truth table for the presence of the outcome. Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: TRACKED, LATE-ENTRY, MARGINAL, LANG DIST contribute to the presence rather than the absence of the outcome. Consistency cutoff: 0.85. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

present in the streamlined model, it is dramatically reduced: the number of logical remainders goes from 115 in the original model to 22 in the new model.

Unfortunately, model parsimony comes to the cost of a reduced accurateness of the solution. Indeed, when comparing the solution presented in Table 4.10 to the corresponding intermediate solution based on the initial model and displayed in Table 4.7, one can see that the explanatory model has lost in consistency. This is not so much due to the slight decrease of the consistency value (0.936 to 0.911), but rather to the fact that the third path of the streamlined model is based on a configuration of the truth table that constitutes a substantive contradiction. While Austria, Flemish Belgium, Switzerland, and Germany are positive instances of the outcome, the Netherlands is not, because its fuzzy-set membership score to the set of countries with severe penalties is lower than 0.5. This is apparent in the fuzzy-set plot shown in Figure 4.9, which displays the Netherlands as a clear inconsistency in kind, since it lies in the bottom-right part of the graph. This inconsistency directly derives from the exclusion of EARLY-ENTRY from the model. Indeed, in the Netherlands children enter school and preschool at a very early age, while this is not true for the other countries of the configuration. In the initial model, then, EARLY-ENTRY could single out the Netherlands from the cases displaying the outcome. However, when analyzing the combinations of factors sufficient for the *absence* of the outcome with the initial model, EARLY-ENTRY did not prove helpful and indeed the Netherlands remained unexplained as a negative case (see later in this section, in particular Table 4.14 and Figure 4.11). Therefore, getting back to the initial model is not the concluding strategy to overcome this inconsistency.
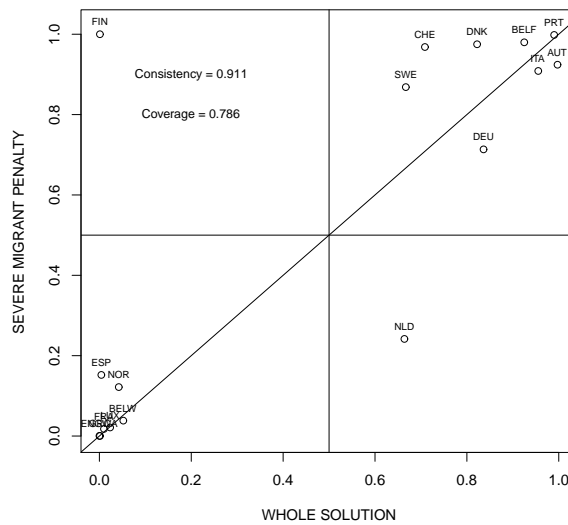
Figure 4.9: Fuzzy-set plot of the whole solution for the presence of the outcome. Solution: refer to Table 4.10

In order to solve the contradictory configuration, I reconsidered the calibration of the outcome, and in particular the fuzzy-set membership of the Netherlands. As discussed in Chapter 3 (see in particular Figure 3.1), the Netherlands is not a clear-cut case when considering the extent to which second-generation immigrants suffer from achievement penalties. In order to set the critical thresholds for the fuzzy-set calibration of the set SEVERE PENALTIES, I relied on meaningful breaks in the distribution of the source variable. While the thresholds of 30th and 40th percentiles came forth as rather good candidates for the cutoffs of full-membership and full-non-membership, respectively, the potential threshold for the cross-over was less discernible. Therefore, I performed cluster analysis in order to identify clear discontinuities in the data structure and concluded that the 35th percentile was the right threshold for the cross-over. This led Germany to be classified as a positive case with respect to the outcome, while the Netherlands became a negative case. However, as mentioned above, from an institutional point of view, the Netherlands is very similar to the positive cases of Austria, Flemish Belgium, Switzerland, and Germany, except for the fact that the previous belongs to the set of early-entry educational systems, while the latter do not. However, EARLY-ENTRY cannot explain the absence of severe penalties in the Netherlands (nor elsewhere). What is more, the country-level literature reviewed in Chapter 3 suggests that, when compared

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to their Dutch counterparts, second-generation immigrants perform rather poorly at school. Therefore, the classification of the Netherlands as an educational system where migrant achievement penalties are not severe can be reconsidered.

Table 4.11 displays the results of the truth table analysis for the streamlined model, where the outcome was defined in a more inclusive way, in order to include the Netherlands as a positive case[25]. The recalibration of the outcome has led to an improved

Path	cons.	cov.	Cases
TRACKED * NEW IMM	1.000	0.183	PRT, ITA
(LATE ENTRY * LANG DIST) * MARGINAL * NEW IMM	1.000	0.150	DNK, SWE
(TRACKED * MARGINAL) * LANG DIST	0.994	0.384	AUT, BELF, CHE, DEU, NLD
Whole solution	0.997	0.699	

Table 4.11: Intermediate solution of the minimization of the truth table for the presence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: TRACKED, LATE-ENTRY, MARGINAL, LANG DIST contribute to the presence rather than the absence of the outcome. Consistency cutoff: 0.99. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

consistency of the model, now reaching the extremely high level of 0.997. Moreover, given that the Netherlands is now a positive case, its configuration is not a substantive contradiction anymore. Hence, no contradictions in kind exist. However, the fact that the the outcome is more inclusive also means that there is more to explain. Consequently, the coverage score declined from 0.786 to 0.699. Most importantly, just like before the outcome recalibration, the model fails to explain the case of Finland, which is a perfect member of the outcome. By lowering the consistency threshold from the very restrictive value of 0.99 to the less stringent threshold of 0.779, it is possible to include the configuration corresponding to Finland in the analysis. I present the conservative and

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[25]In Table 4.11, the intermediate solution is shown. The conservative solution is reported in the Appendix B, Table B.7. The cross-over point for the fuzzy-set calibration of SEVERE PENALTIES was set to the 36th percentile. Thus, the last positive case becomes the Netherlands, while the first negative case is Spain. Figure B.3 in the Appendix B plots the recalibrated outcome against the source variable: membership scores are now more skewed towards 1 than before. As discussed below, this produces slightly less satisfying results of the analysis for the absence of the outcome. The truth tables for the presence and the absence of the outcome, given its more inclusive recalibration, are reported in the Appendix B, Tables B.6-B.12.

intermediate solutions resulting from the latter choice in the Section 4.6.4, dedicated to illustrate the final results of the fs-QCA. Indeed, compared with the other solutions presented in this section, they display the best balance of accurateness and explanatory power, both in terms of consistency and coverage values, and in terms of substantially explained cases.

Introducing directional expectations and streamlining the explanatory model are not the only strategies to deal with limited diversity. In their "two-step QCA" Schneider and Wagemann (2006) suggest to decompose the truth table analysis in two moments, hence limiting the logically possible combinations of conditions. First, by selecting only remote structural factors and by keeping the model deliberately underspecified; second, by looking for the proximate factors that trigger the causal mechanisms *within* the contexts identified in the first step as outcome-enabling. From a theoretical point of view, this strategy is very appropriate for my research question, since my explanatory model includes some conditions that refer to the structural context and can then be labeled as remote factors, and some others that refer to the educational system and are therefore more proximate to the outcome of severe penalties in educational achievement. Unfortunately, the remote conditions are just two (LANG DIST and NEW IMM). Hence, in the first step no limited diversity exists, because the four combinations of factors all display empirical instances. Moreover, the first step of the analysis identifies both LANG DIST and NEW IMM as outcome-enabling contexts. Consequently, in the second step no gain is made in terms of reduction of limited diversity. Therefore, the results of the two-step QCA (reported in Table B.8 in the Appendix B) do not constitute an improvement with respect to the conservative solutions displayed in Tables B.7 and 4.11.

Absence of the outcome

Since set-theoretical relations are asymmetrical by definition, results of the minimization for the absence for the outcome cannot simply be derived from the solution for its presence. Most importantly, from a substantive and theoretical point of view, it does not make sense to assume that the same underpinning causal mechanisms can be called for to explain why some in some educational systems children of immigrants dramatically lag behind their native peers, while in other ones they perform quite as well. Hence, I performed separate analyses on the configurations leading to the absence of the outcome. Like before, I move from a complex model and reach a solution with an acceptable coverage, and subsequently I streamline the model by taking out the conditions that prove

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less explanatory.

Path	cons.	cov.	Cases
(late entry * early entry) * new imm * lang dist * (EARLY TRACKED * MARGINAL)	0.997	0.387	BELW
(late entry * early entry) * NEWIMM * tracked * marginal	0.966	0.481	ESP; GRC,NOR
late entry * lang dist * new imm * tracked * marginal	0.923	0.479	FRA; ENGWA
Whole solution	0.998	0.541	

Table 4.12: Conservative solution of the minimization of the truth table for the absence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.95. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

Table 4.12 displays the results for the first model, obtained by analyzing the truth table for the absence of the outcome (see Appendix B, B.9), and without making any assumption on the logical remainders. Again, the solution produced by the most conservative strategy to deal with limited diversity is quite a complex one. Moreover, while displaying an almost perfect consistency (0.998), it fails to account for roughly half of the outcome (coverage: 0.541). Once more, theoretical knowledge can improve our understanding of configurational analysis by helping us to distinguish "easy" from "difficult" counterfactuals[26]. For instance, the first solution path clearly contains some redundant elements. Severe penalties are avoided by Walloon Belgium—an old immigration country with limited linguistic distance, where children of immigrants enter the system at an intermediate age, and where early tracking into differentiated curricula is accompanied by a high degree of marginalization of immigrant students in low-quality schools. If this is the case, we can reasonably assume that severe penalties could also be avoided by a similar system where, however, no early tracking nor marginalization are in place. The same can be said for entry age: a system similar in all respects to Walloon Belgium

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[26]As mentioned above, there exists a strategy to deal with limited diversity without the need to rely on easy counterfactuals, i.e. two-step QCA. This procedure requires to identify first the remote conditions behind the outcome and then the proximate conditions in each of these outcome-enabling contexts. The application of the two-step procedure to my fs-QCA unfortunately did not prove helpful in reducing limited diversity, as documented in the Appendix B, Table B.14. Therefore, I do not discuss these results here.

except for the fact that children of immigrants enter it at early age is allegedly equally able to prevent severe penalties. Table 4.13 displays the intermediate solution, for which easy counterfactuals, defined by directional expectations, are used in the minimization procedure.

Path	cons.	cov.	Cases
late entry * new imm * lang dist	0.997	0.387	FRA; ENGWA; BELW
late entry * tracked * NEW IMM * marginal	0.962	0.288	ESP; GRC,NOR
Whole solution	0.982	0.665	

Table 4.13: Intermediate solution of the minimization of the truth table for the absence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: tracked, late entry, marginal, langdist contribute to the absence rather than the presence of the outcome. Consistency cutoff: 0.95. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

The use of theoretical assumptions has substantially improved the parsimony of the solution, which now displays only two pretty simple paths, and its explanatory power, since coverage has increased from 0.541 to 0.665. The causal paths to avoid migrant penalties appear here quite simple. The prerequisite to avoid them is the absence of a late entry system, as already emerged from the analysis of necessary conditions (consistency: 0.933, coverage: 0.602). Besides the dimension of entry age, two alternative paths exist. On the one hand, we find France, England and Wales, and Walloon Belgium as old immigration countries where linguistic distance is low. These countries mainly incorporated second-generation immigrants from former colonies where the host language is widely spoken. On the other hand, we find new immigration countries like Spain, Greece, and Norway, where tracking occurs after the age of 15 and pupils of immigrant origin are not marginalized in low-quality schools.

Although this solution is quite appealing in its simplicity, it still explains only a limited proportion of the outcome (coverage: 0.665). Most importantly, as can be seen in Figure 4.10, two cases are left substantially unexplained by the solution: the Netherlands and Luxembourg. Once again, it is worth to refer to the truth table (see Table B.9 in the Appendix B) in order to better understand the reasons behind this lack of coverage. The two unexplained cases belong to two configurations that are imperfect subsets of the negated outcome, i.e. the absence of severe penalties. However, while the configuration corresponding to the Netherlands has a very low row consistency score (0.581), the one corresponding to Luxembourg is more borderline (row consistency: 0.758). By setting

Figure 4.10: Fuzzy-set plot of the whole solution for the absence of the outcome. Solution: refer to Table 4.13

a less stringent row consistency threshold of 0.75, I code the second configuration as a belonging to a positive configuration (i.e., displaying the negated outcome), which makes it amenable to be minimized. Results of this additional analysis are reported in Table 4.14, which displays three possible paths to avoid severe migrant penalties[27].

Path	cons.	cov.	Cases
late entry * new imm * lang dist	0.997	0.387	FRA; ENGWA; BELW
late entry * tracked * marginal	0.966	0.481	FRA; ENGWA; ESP; GRC,NOR
late entry * marginal * new imm	0.923	0.479	FRA; ENGWA; LUX
Whole solution	0.937	0.843	

Table 4.14: Intermediate solution of the minimization of the truth table for the absence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: tracked, late entry, marginal, langdist contribute to the absence rather than the presence of the outcome. Consistency cutoff: 0.75. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

By comparing the fit parameters from Table 4.14 and Table 4.13, we can easily see that the gain in coverage (0.843 as opposed to 0.665) comes to the cost of a slight loss

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[27]The relative conservative solution is reported in Table B.10 in the Appendix B.

in consistency (0.937 as opposed to 0.982). However, the new consistency score is still sufficiently high to conclude that the overall solution represents an accurate subset of the negated outcome. It should be also noted that the complexity of the solution has increased: now three paths are detected and two cases (France and England and Wales) are overdetermined, in the sense that they can be explained by several paths.

From a substantive point of view, it is interesting to point out that EARLY-ENTRY—a condition that characterizes two countries that do not display the outcome (England and Wales and the Netherlands)—is not part of any sufficient configuration to avoid severe penalties. Therefore, in an attempt to reduce the complexity of the explanatory model, this condition could be easily taken out. On the contrary, it seems important to keep LATE-ENTRY, whose absence emerges in all the three paths. Like in the analysis for the presence of the outcome, the age at which students are tracked into differentiated curricula does not seem decisive. In other words, the absence of EARLY-TRACKING *per se* does not emerge as a relevant condition. Indeed, part of the second path to avoid severe penalties is the absence of tracking altogether. Instead, in paths 1 and 3, not-tracking systems like England and Wales and France are grouped together with countries that not only track their students, but they do so when they are quite young. Hence, in the streamlined model I keep TRACKED and exclude its subset EARLY-TRACKING. Given these premises, it should not be surprising that the streamlined model produces exactly the same results as those displayed in Tables 4.14 and B.10. However, the gain in robustness is considerable, because the intermediate solution derived from the streamlined model requires fewer simplifying assumptions. Overall, the number of logical remainders decreased from 115 to 22 when improving the parsimony of the model.

As shown in Figure 4.11, the intermediate solution of the streamlined model based on the less stringent consistency threshold of 0.75 does not display any inconsistency in kind. The model explains almost all the cases where the outcome is absent and indeed has a satisfactory coverage score (0.84). However, the Netherlands remains substantially unexplained by this model. As discussed earlier, the classification of the Netherlands as a negative case is not obvious. The fact that the models presented so far are not able to account for its position is a first hint that its fuzzy-set membership should be reconsidered. Most importantly, even if the analyses of sufficiency for the presence and the absence of the outcome must be carried out separately from each other, it is important that the calibration of the outcome and the conditions is consistent for the two analyses. Since the recalibration of the outcome in order to make it more inclusive was needed to solve a contradictory row in the analysis for the presence of the outcome, the same
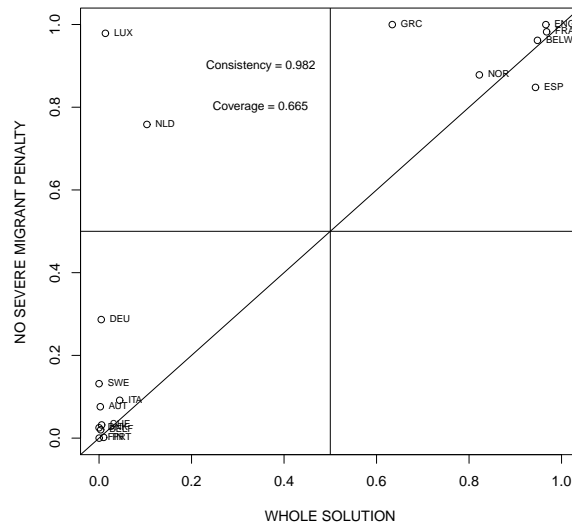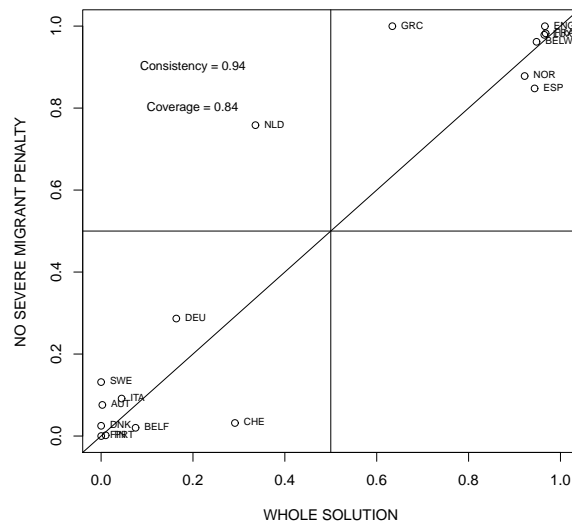
Figure 4.11: Fuzzy-set plot of the whole solution for the absence of the outcome, Solution: refer to Table 4.14

should be done when analyzing its absence.

First results of the truth table analysis where the Netherlands is classified as a negative case are reported in Table 4.15. For the relative truth table and conservative solution, refer respectively to Tables B.12 and B.13 in the Appendix B.

Path	cons.	cov.	Cases
late-entry * new imm * lang dist	0.897	0.467	FRA; ENGWA; BELW
late-entry * (tracked * marginal) * LANG DIST * NEW IMM	0.861	0.228	GRC,NOR
Whole solution	0.883	0.695	

Table 4.15: Intermediate solution of the minimization of the truth table for the absence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: tracked, late entry, marginal, langdist contribute to the absence rather than the presence of the outcome. Consistency cutoff: 0.85. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

As expected, with the recalibration of the outcome, the model is much less consistent in explaining its absence. Indeed, a more inclusive outcome facilitates the identification of a configurational explanation for its presence. The other side of the coin, however, is

that all cases display a lower membership score in the set of the negated outcome, while keeping the same memberships in the sets of the conditions. As a consequence, it is harder to find configurations that are consistent subsets of the negated outcome. Nevertheless, the solution reported in Table 4.15 is overall sufficiently consistent with the absence of the outcome (consistency score: 0.883). As can be seen in Figure 4.12, three cases belong to configurations that are not good subsets of the outcome, as opposed to England and Wales and Greece, which are perfectly consistent. As expected, the Netherlands is not an unexplained case anymore. However, two other substantially unexplained cases have surfaced: Luxembourg and Spain. This corresponds to a quite low value for coverage: more than 30% of the outcome is still unexplained by this solution.
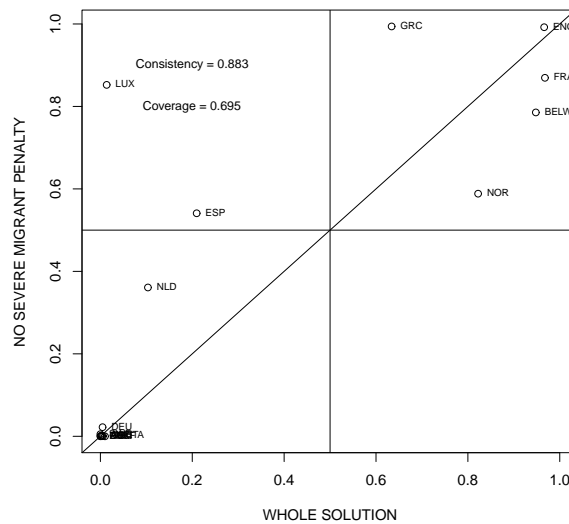
Figure 4.12: Fuzzy-set plot of the whole solution for the absence of the outcome (recalibrated), Solution: refer to Table 4.15

In order to improve the explanatory power of the model, it is possible to lower the consistency threshold for the inclusion of rows to be minimized in the truth table from 0.85 to 0.7. This allows to use the configuration corresponding to Spain in the truth table analysis. While such a threshold lies at the lower bound of acceptable consistency levels for sufficiency, the configuration does not correspond to a substantive contradiction, because it displays only one case, with membership higher than 0.5 in both the outcome and the configuration. Since the overall consistency of the corresponding solution is still

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rather good (0.825) and the improvement in coverage is significant, I decided to discuss this solution as a final result in the section 4.6.4. However, would the reader prefer to opt for a more conservative solution in terms of consistency, he or she can stick to the one presented above. In terms of sufficient configurations, the solution chosen is extremely similar to the one displayed in Table 4.15, but slightly more parsimonious. The second path, indeed, does not include the presence of LANG DIST anymore.

4.6.4   fs-QCA results and discussion

In this section, I address the main research questions of my dissertation: which kinds of educational systems produce severe achievement penalties for second-generation immigrants, and which kinds, on the contrary, are able to avoid them? The "dialogue between ideas and evidence" documented in the previous section brought forth some answers to these questions, which I will present in what follows.

Presence of the outcome

To start with, fsQCA revealed that very different educational systems can produce equally severe migrant penalties in educational achievement. However, not all institutional features are equally inegalitarian: there is a limited number of paths leading to severe penalties. As shown in Table 4.16, Western European countries displaying severe penalties can be grouped in three configurational clusters. In the simplest configuration, we

Path	cons.	cov.	Cases
(TRACKED * marginal) * NEW IMM * late-entry	1.000	0.131	PRT, ITA
(LATE ENTRY * LANG DIST) * NEW IMM * tracked	0.878	0.235	FIN; DNK, SWE
(TRACKED * MARGINAL) * LANG DIST * late-entry * new imm	0.994	0.379	AUT, BELF, CHE, DEU, NLD
Whole solution	0.955	0.736	

Table 4.16: Conservative solution of the minimization of the truth table for the presence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.77. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

find Portugal and Italy, two countries of recent immigration where children of immigrants

enter (pre)school at a relatively early age. Students are subsequently tracked into differentiated curricula, though this does not lead to a marginalization of immigrant students in low-quality sectors of the school system. This path is a perfect subset of the outcome (1.00). Hence, such combination of institutional and contextual factors is sufficient to generate severe penalties. However, it is not a necessary configuration of conditions, because only two countries are explained by it (coverage: 0.131), and, most importantly, two other paths are identified by the analysis. The second path groups some Scandinavian countries: Finland, Denmark and Sweden. Just like the two Southern European countries of the first path, they have experienced mass immigration only in the last decades. However, their educational systems—differently from Italy and Portugal—do not track students during lower-secondary education. However, compulsory schooling in this countries starts quite late, so that children of immigrants enter the educational system rather late. This aspect is likely to be detrimental to their school performance compared with their native peers, especially considering the fact that the languages spoken by most of the immigrants residing in those countries are very distant from the host-country languages. The consistency of this path with respect to the outcome is not perfect, but still considerably high (0.878). Moreover, the path explains a rather important proportion of the outcome (coverage: 0.235). Indeed, three cases are substantially explained, and these cases—and especially Finland—are particularly good instances of countries suffering from severe migrant penalties. Finally, the last path comprises the largest number of positive cases: three mainly German-speaking countries (Austria, Switzerland, and Germany) and two Dutch-speaking countries (Flemish Belgium and the Netherlands). The language is a relevant dimension, since in all of these countries there is a high linguistic distance between the languages spoken by the majority of immigrants on the one hand, and the national languages on the other hand. Another contextual aspect that these countries have in common is the fact that they have a considerable experience with mass immigration flows, which started already in the post-war period. Most importantly, these countries share three key aspects of the educational system: pupils generally do not enter (pre)school too late; however, towards the end of primary school, they are tracked into differentiated curricula. As a consequence, during lower-secondary education, students of immigrant origin end up being marginalized in schools with low-performing peers. This solution component shows again a very high consistency as a subset of the outcome (0.994) and, clearly, a very good coverage (0.387), since five out of ten positive cases are explained by this configuration.

By using theoretical knowledge, it is possible to get to a more parsimonious account

Path	cons.	cov.	Cases
TRACKED * NEW IMM	1.000	0.183	PRT, ITA
(LATE ENTRY * LANG DIST) * NEW IMM	0.886	0.254	FIN; DNK, SWE
(TRACKED * MARGINAL) * LANG DIST	0.994	0.384	AUT, BELF, CHE, DEU, NLD
Whole solution	0.958	0.793	

Table 4.17: Intermediate solution of the minimization of the truth table for the presence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: TRACKED, LATE-ENTRY, MARGINAL, LANG DIST contribute to the presence rather than the absence of the outcome. Consistency cutoff: 0.77. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

of the institutional configurations sufficient to produce severe penalties. The three paths displayed in Table 4.17 derive from a truth table minimization which made use of some logical remainders, i.e. configurations that lack empirical instances. However, only logical remainders that can be theoretically justified—the so-called "easy counterfactuals"—were used in the minimization process. In order to distinguish "easy" from "difficult" counterfactuals, I set some directional expectations on the role of explanatory conditions. More specifically, I assume that if they had any impact on the outcome, TRACKED, LATE-ENTRY, MARGINAL, and LANG DIST would lead to the presence, rather than the absence, of severe migrant penalties. With respect to the relevant truth table (refer to Table B.6 in the Appendix B), setting these directional expectations means that seven logical remainders—the easy counterfactuals, reported in Table B.15 in the Appendix B—were associated to a positive outcome. Instead, to the other remainders no outcome value was assigned. Hence, they were not used in the minimization process.

The three paths of this "intermediate solution" altogether are jointly sufficient for the occurrence of severe penalties. Indeed, as can be seen in Figure 4.13, the whole solution is a very good subset of the outcome (consistency: 0.958), and no inconsistencies in kind exist: all the cases belonging to one of the three configurations have a membership score higher than 0.5 in the outcome *and* in the respective path. In almost all cases, the fuzzy-set membership with respect to the configuration is higher than the fuzzy-set membership with respect to the outcome. Only the case of the Netherlands displays a slightly lower membership in the configuration than in the outcome. The proportional

reduction of inconsistency (PRI index)[28] is also very high (0.955), confirming that the solution is indeed a consistent subset of the outcome. The explanatory power of this solution is rather high. Beyond the high value of the coverage parameter (0.793), from Figure 4.13 we can see that all the cases are substantially explained by this intermediate solution. The empty upper-left corner of the plot indicates that there is no positive instance of the outcome that does not belong to one of the three configurations that constitute the solution.
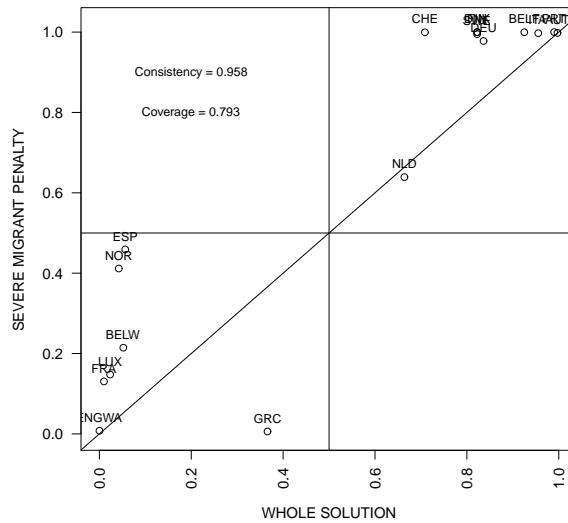
Figure 4.13: Fuzzy-set plot of the whole solution for the presence of the outcome (recalibrated), Solution: refer to Table 4.17

The scheme represented in Figure 4.15 summarizes the theoretical argument resulting from the truth table analysis presented above. Two dimensions of the educational system are of key importance for the emergence of severe achievement penalties among second-generation immigrants: on the one hand, the existence of a tracking system in primary or lower-secondary schooling. On the other hand, the delayed start of (pre)school. For

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[28]The PRI index, proposed by Ragin in unpublished works and reported by Schneider and Wagemann (2012, 242), is computed as $\frac{\sum min(x_i,y_i)-\sum min(x_i,y_i,\sim y_i)}{\sum (x_i)-\sum min(x_i,y_i,\sim y_i)}$ where x_i are membership scores in a given condition or configuration X, y_i are membership scores in the outcome Y, and $\sim y_i$ are membership scores in the negated outcome y. The index is especially useful to detect problematic simultaneous subset relations, i.e. when X appears to be a consistent subset of the outcome Y *and* of its negation y. The PRI varies from 0 to 1, with lower values corresponding to more problematic situations.

new immigration countries, tracking is sufficient in bringing about severe penalties. For post-war immigration countries, however, it should be combined with another contextual feature, i.e. the presence of a high linguistic distance between the immigrants' and the natives' languages. Moreover, for post-war immigration countries only, tracking leads to severe penalties only when it marginalizes second-generation immigrants into schools where the lowest performing students are concentrated. Among new immigration countries, late entry into the educational system broadly conceived constitutes an alternative path towards the outcome, though in a different context. If children of immigrants predominately speak a language that is very distant from the one of the host country, the simple fact that their entrance into preschool or compulsory schooling is delayed is sufficient to produce severe achievement penalties.

Absence of the outcome

Given the asymmetrical nature of set-theoretic methods, the results of truth table analysis for the absence of the outcome do not necessarily mirror those of the analysis for its presence. Indeed, my findings show that, while the elements of the causal paths leading to not-severe penalties are often the negation of the conditions leading to severe penalties, their interrelations differ.

Path	cons.	cov.	Cases
late entry * lang dist * (tracked * marginal)	0.872	0.373	FRA, ENGWA; ESP
late entry * (tracked * marginal) * NEW IMM	0.737	0.296	GRC,NOR; ESP
late entry * (TRACKED * MARGINAL) * lang dist * new imm	0.938	0.135	BELW
Whole solution	0.847	0.707	

Table 4.18: Conservative solution of the minimization of the truth table for the absence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.7. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

Table 4.18 depicts three causal paths sufficient to bring about the absence of the outcome. The three paths share a common condition: the fact that the entry into the (pre)school system for children of immigrants is not late. The first path groups France, England and Wales, and Spain, three countries where most immigrants speak the host

language or a language that is close to it. They are able to avoid severe penalties in reason of their comprehensive school systems, which do not separate students into tracks and do not marginalize second-generation immigrants in low-quality schools. Moreover, just like all the other countries not displaying the outcome, they are not late in including children of immigrants in the (pre)school system. This first path is quite consistent with respect to the outcome (0.872) and it explains more than a third of it (coverage: 0.373). The second path is considerably less consistent (0.737). As I have explained in Section 4.6.3, this is due to the low consistency of the configuration corresponding to Spain. I chose to use this configuration in the minimization process because it is not a true logical contradiction, and at the same time its inclusion permits to explain a greater proportion of the outcome. Spain, together with Norway and Greece, is a country of new immigration. The educational systems of these three countries include children of immigrants at a rather early age. Moreover, in these systems students are not tracked into differentiated curricula and no serious marginalization of immigrant students take place. Finally, the third path refers to a single case only. Hence, no parsimony is attained by truth table analysis in what concerns this configuration, which is the simple description of the relative case, Walloon Belgium. This is an old immigration region where most immigrants speak French or a similar language. In its educational system, children of immigrants do not enter (pre)school too late. In such a context, this factor is sufficient in order to avoid the emergence of severe migrant penalties (consistency: 0.938), despite the presence of a tracking and marginalizing system.

Path	cons.	cov.	Cases
late-entry * new imm * lang dist	0.897	0.467	FRA; ENGWA; BELW
late-entry * (tracked * marginal) * NEW IMM	0.737	0.296	GRC,NOR; ESP
Whole solution	0.825	0.767	

Table 4.19: Intermediate solution of the minimization of the truth table for the absence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: tracked, late entry, marginal, langdist contribute to the absence rather than the presence of the outcome. Consistency cutoff: 0.7. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

By making use of counterfactual thinking, it is possible to increase the parsimony of this solution. Table 4.19 reports the intermediate solution resulting from a truth table minimization that included some directional expectations derived from theory. In par-

ticular, I assume that the absence of tracking, late-entry, marginalization, and linguistic distance contribute to the absence—rather than the presence—of severe penalties. Including these assumptions in the model allows to classify plausible logical remainders as easy counterfactuals. Although only two easy counterfactuals were used in the minimization process (see Table B.16 in the Appendix B), the intermediate solution is a considerable improvement in terms of parsimony. Indeed, the third path—which was a mere description a single case—has disappeared. Walloon Belgium is now grouped together with France and England and Wales in the first path, which is additionally simplified. For these three countries, what appears to matter are not so much the characteristics of the educational system, but rather the structural context of immigration. Provided that entry age in (pre)school is not late, in order to avoid severe penalties it is sufficient to be a country of old immigration where linguistic distance is low. In effect, the student population of second-generation immigrants in Walloon Belgium, France, and England and Wales is mainly constituted by offspring of individuals who immigrated from former colonies, where the host language is widely spoken. Moreover, many of these parents are probably quite integrated because they have possibly arrived at young age, since in these three countries mass immigration started in the post-war period. The second path, involving Greece, Norway and Spain as new immigration countries with a not-tracking and not marginalizing system is left unchanged in the intermediate solution.

The fuzzy-set plot depicted in Figure 4.14 shows that this solution suffers from some inconsistencies in degree, represented by the distance of the cases of Spain, Norway, Walloon Belgium, and France from the bisector. However, such cases are not inconsistent in kind, because they all substantially belong to the set of the negated outcome. The overall consistency of the model is affected by these slight discrepancies but it has still an acceptable value (0.825). When many insufficiencies in degree arise, the model may be undermined by the existence of simultaneous subset relations. However, the PRI index relative to this solution is reasonably high (0.767), supporting its overall soundness[29]. The

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[29]More precisely, the second path of the solution (late-entry*tracked*marginal) has a PRI of 0.583. The value is quite low but still higher than 0.5. So far, in the QCA literature no indication has been set on the acceptable thresholds for the PRI. Hence, in order to interpret this parameter, I go back to the cases involved by this possibly problematic path: Spain, Greece, and Norway. By comparing the truth tables for the presence and the absence of the outcome (cf. Table B.6 and Table B.12 in the Appendix B), we notice that the configuration corresponding to Greece and Norway is clearly not a subset of the outcome (consistency: 0.383), while it is a subset of its negation (consistency: 0.861). The configuration corresponding to Spain is more problematic because formally its consistency values are both over 0.5 (0.588 for the outcome, 0.701 for its negation). However, as discussed earlier, the
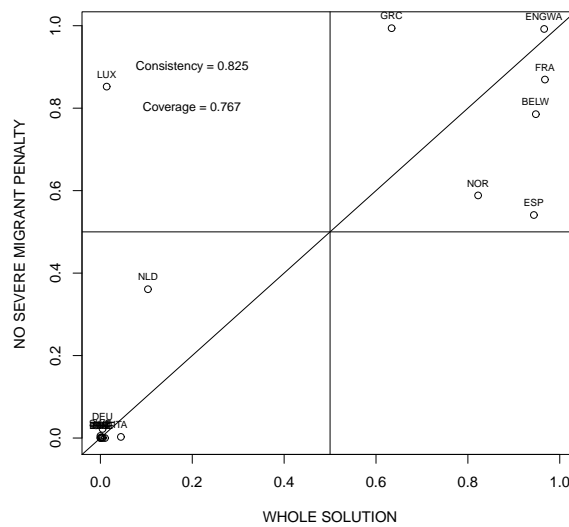
Figure 4.14: Fuzzy-set plot of the whole solution for the absence of the outcome (recalibrated), Solution: refer to Table 4.19

explanatory power of the solution is quite good, since it accounts for a great proportion of the negated outcome (coverage: 0.767), even if one case (Luxembourg) is substantially unexplained. All things considered, the solution for the absence of the outcome is less satisfying than the one for its presence, but still provides convincing configurational arguments.

Again, I represent the main theoretical arguments of this solution by means of a synthetic diagram in Figure 4.16. In Western Europe, there exist two alternative paths to avoid severe achievement penalties for students of immigrant origin. A prerequisite of both is the fact that children of immigrants should not enter the educational system broadly conceived when they are too grown up. Besides this aspect, the two paths diverge considerably according to the immigration history of the country involved. For old immigration countries, in order to avoid severe penalties, it is sufficient that most of the immigrant population speaks a language that is not too distant from the national one. However, this path is made of structural contextual factors that are less amenable to change than educational systems. From a policy-making perspective, the remaining

exclusion of this configuration from the minimization for the absence of the outcome does not produce substantially different results (cf. Table 4.15). Therefore, I believe that the issue of simultaneous subset relations poses no serious threat to the interpretation of these results.

path is more interesting. New immigration countries have to combine a wider range of institutional features not to end up with severe penalties. Besides the not-late entry system, they need to abstain from tracking their students into differentiated curricula, and to structure their educational systems in a way that second-generation immigrants are not relegated in marginalized schools where the great majority of students is low achieving.

By reading these findings together with those relative to the minimization for the presence of the outcome, it is possible to reconsider the validity of the theoretical hypotheses that I put forward in Section 4.2. My first hypothesis was that low preschool rates and/or late entry into compulsory schooling contribute to the creation of severe migrant penalties. Indeed, fs-QCA results indicate that a late entry age in the (pre)school system is a possible path towards severe penalties. More specifically, this path concerns Sweden, Norway, and Finland, where compulsory schooling starts at age seven and preschool is far from universal. On the other hand, analyses have shown a not-late entry age is a essential element of all the institutional configurations able to avoid severe migrant penalties. Hence, *Hypothesis 1* on the importance of preschool and compulsory schooling start is empirically supported, although analyses indicate that the context may be decisive. Indeed, late entry contributes to severe penalties only in new immigration countries with high linguistic distance between the immigrants' languages and the national one. This finding is understandable if we consider that a delayed entry in the educational system is likely to be especially harmful to children who encounter linguistic difficulties. Contextual elements are even more important in order to assess my second hypothesis, in which I argued that early tracking brings forth severe penalties only when students of immigrant origin are marginalized in "bad" schools. In effect, the joint influence of tracking and marginalization explains no less than five out of ten positive cases. However, in new immigration countries such as Portugal and Italy, tracking is detrimental *per se*. Therefore, results from fs-QCA supported *Hypothesis 2*, but also allowed to define its scope conditions more precisely. *Hypothesis 2* can be then respecified as follows: "in post-war immigration countries, early tracking into differentiated curricula produces severe penalties through the marginalization of second-generation immigrants in second-tier tracks, and consequently low-performing schools". My third hypothesis was that a high proportion of immigrants speaking a language that is distant from that of the host society brings about severe penalties. Empirical evidence surely indicates that linguistic distance is an important contextual element to account for. Indeed, in almost all countries with severe penalties—with the exception of Portugal—the majority of im-

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migrants speak a distant language. However, this finding does not qualify high linguistic distance as a sufficient condition for the presence of severe penalties, but rather as an almost necessary condition. *Hypothesis 3* is then only partially supported and has to be restated as follows: "a high distance between the language spoken by most immigrants and the official one is an essential element of several configurational paths leading to severe migrant penalties". Finally, concerning the role of immigration history, I had a general expectation that migrant penalties would be different according to the timing of mass immigration start, although from a theoretical point of view it was unclear whether countries with a longer experience of immigration would perform better or worse than new immigration countries. *Hypothesis 4* also found empirical support, because history of immigration is a key discriminating factor between paths towards the outcome, as well as between paths towards its absence, as can be seen in Figures 4.15 and 4.16. The findings indicate that, although severe migrant penalties are found in both post-war immigration countries and new-immigration countries, the former generally have rather simple institutional explanations. On the contrary, it seems that, in order to avoid severe penalties, new immigration countries have to combine a multiplicity of institutional factors. Hence, history of immigration matters for the institutional capability of educational systems to promote the integration of second-generation immigrants. On the whole, it seems that tackling migrant learning disadvantage is more challenging for new immigration societies.
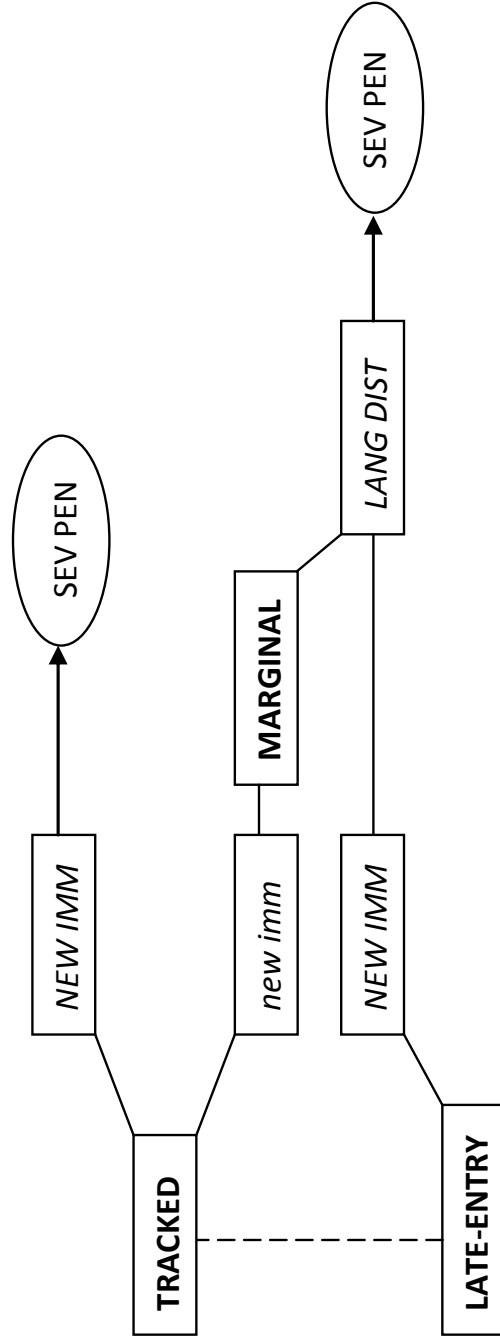
Figure 4.15: Paths to "SEVERE PENALTIES". Solution: refer to Table 4.17. Solid lines indicate conjunctural causation (logical AND), while dotted lines indicate equifinality (logical OR). Conditions in bold represent features of the educational system, conditions in italics represent features of the context.
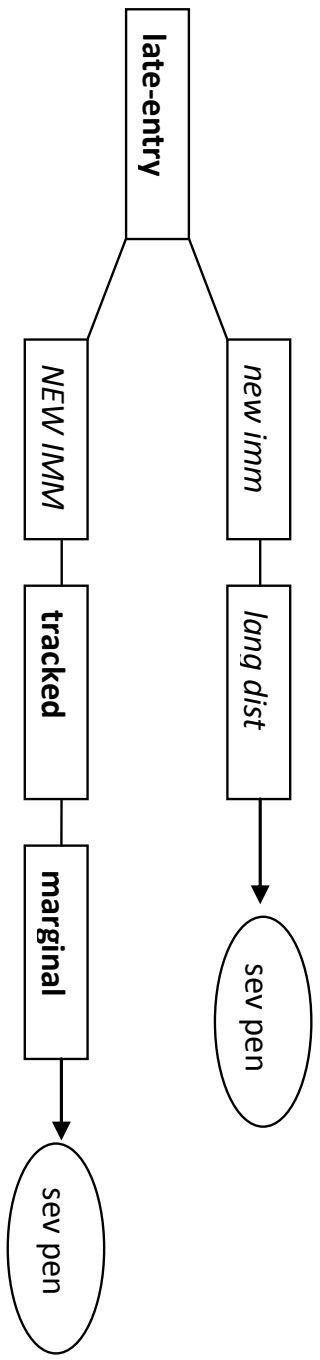
Figure 4.16: Paths to "severe penalties". Solution: refer to Table 4.19. Solid lines indicate conjunctural causation (logical AND). Conditions in bold represent features of the educational system, conditions in italics represent features of the context.

Chapter 5

Discussion and outlook

5.1 Substantive contributions

Migrant achievement penalties in Western Europe

A first order of contributions made by this dissertation relates to the descriptive empirical analyses. By examining standardized assessments of 15-year-old students on the literacy domains of mathematics, reading, and science, I have provided a detailed picture of the educational achievement of second-generation immigrants and natives in Western Europe near the end of compulsory schooling. Empirical findings indicate that, although they were born and socialized in the destination country—as well as fully exposed to its educational system—second-generation immigrants dramatically underachieve their native peers. In most countries, the average second-generation immigrant is positioned below the 30th percentile of the achievement distribution of natives. This underachievement can be partially explained by *traditional mechanisms of stratification* by social class broadly defined. Indeed, in some countries the relative educational disadvantage of second-generation immigrants is more than halved when accounting for social, economic, and cultural resources differentials. Moreover—as the novel procedure of fuzzy-set coincidence unveiled—second-generation immigrants disproportionately cumulate factors of socio-economic disadvantage compared to natives. This pattern is particularly evident in countries where their educational underachievement is more severe.

However, the relative disadvantage of students with an immigrant background cannot be completely explained by different socio-economic and cultural status (henceforth, *SES*). Therefore, *migrant-specific* penalties in educational achievement are in place. In some countries, second-generation immigrants experience negative differential returns to

SES. In other words, they benefit less than natives from favorable endowments in socio-economic or cultural resources. Possibly, in order to navigate these educational systems, country-specific cultural capital is particularly important, so that the cultural capital of immigrant parents is more easily devalued.

Yet, differential returns to *SES* are generally small in size. What really drives migrant-specific achievement penalties is the lack of *other kinds of resources* by students of immigrant origin. Drawing from theoretical and empirical literature on the social integration of children of immigrants, we can envisage what these resources might be. As suggested by "new assimilation" theorists, second-generation immigrants face an initial disadvantage deriving from a lack of linguistic skills (Esser, 2004, 2006) and of country-specific cultural capital, as well as from poor social networks in the host society (Alba and Nee, 1997; Perlmann and Waldinger, 1997; Farley and Alba, 2002). Conversely, according to "segmented assimilation" scholars, children of immigrants may experience a process of downward assimilation if they fail to preserve community values and to take advantage of their ethnic networks (Portes and Zhou, 1993; Zhou, 1997; Portes and Rumbaut, 2001; Rumbaut and Portes, 2001). Testing the appropriateness of either theory goes beyond the scope of this dissertation. Indeed, this task requires an in-depth inquiry of micro-level mechanisms that cannot possibly be attained by a comparative study. The point that I want to make is that, whatever the reason, my empirical analyses revealed that, in all Western European countries, second-generation immigrant students suffer from a form of educational underachievement that is specifically related to their migratory status. Moreover, the size of this migrant-specific achievement penalty is considerable: as for mathematics achievement—a literacy domain that is less affected by linguistic skills—in most countries second-generation immigrants lag behind the 35th percentile of natives with the same socio-economic and cultural resources. Equally alarming levels of migrant achievement penalties are found in the literacy domains of reading and science.

Another interesting aspect that emerged from my empirical analyses is the distinctive character of the relative educational disadvantage of second-generation immigrants. Among Western European countries, migrant-specific penalties are negatively related to *SES* penalties. Therefore, these two lines of stratification openly came forth as *distinct dimensions of educational inequalities*. By empirically documenting this dissimilarity, I contribute to the literature on migrant learning disadvantage, too often conceptualized as just another facet of educational inequalities by social class.

Cross-country differences

Through my comparative examination of educational achievement in 17 Western European countries, I have also provided new descriptive evidence on the *variability of migrant-specific penalties across countries.* Analyses reveal that—while all Western European countries experience some degree of migrant penalties—sharp cross-country differences exist in their intensity. Just to mention two extreme cases, in Finland the average second-generation immigrant achieves below the 22nd percentile of the distribution of comparable natives, while in England and Wales he scores only below the 44th percentile.

In principle, these cross-country differences may be attributable to the more or less favorable compositions of immigrant populations. In particular, immigrants have different origins—entailing different linguistic and cultural differences—and different reasons to migrate—influencing their skills and ambitions. Immigrants might also differ in terms of length of residence in the host society. In order to address these potential compositional issues, I have focused on second-generation immigrants strictly defined, i.e. those individuals who were born in the receiving society from parents born abroad. Hence, they have resided in the host society for the whole duration of their life. Moreover, Western European countries are fundamentally comparable in terms of history of immigration, since they did not experience mass immigration until the post-war period and they prevalently host economic migrants and their families. In order to deal with the different origin compositions of immigrant populations in Europe, I performed additional analyses by restricting my sample to children of Turkish immigrants only. These findings proved to be very consistent with those based on the whole sample of immigrants. Yet, since this robustness check was possible only for a limited number of destination countries, in the explanatory phase of my dissertation I introduced an aggregate indicator of linguistic distance between origin-country's and destination-country's official languages. Overall, my analytical strategy makes possible to conclude that cross-country differences in migrant-specific achievement penalties *cannot be reduced to compositional issues*, but rather reflect differences in the host-country capability of integrating children of immigrants in the school system.

I have empirically shown that migrant-specific penalties and *SES* penalties do not coincide, and instead are negatively related in my sample of countries. This finding contributes to a better understanding of the egalitarian character of Western European educational systems. Based on the kind and level of educational inequalities they pro-

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duce, I identified *four types of educational systems*. On one side of the spectrum, we have countries—such as Spain, Norway, Luxembourg, and Greece—that are able to limit migrant-specific penalties and *SES* penalties at the same time. On the other side of the spectrum, we find countries like Germany, Flemish-Belgium, Austria, and Sweden, where both kinds of educational inequalities are severe. The other two types regroup the majority of countries, and are most interesting because they combine severe migrant-specific penalties with mild *SES* penalties (Finland, Denmark, Switzerland, Italy, Portugal), or *vice versa* (England and Wales, France, Walloon-Belgium, the Netherlands). Despite its essentially descriptive character, this typology can contribute to the comparative literature on educational systems, because it unveils the interconnections between two apparently similar, yet distinct, dimensions of educational inequality.

Egalitarian and inegalitarian aspects of educational systems

In the second part of this dissertation, I moved from a descriptive perspective to an explanatory one, by investigating the macro-level determinants of the different achievement penalties experienced by second-generation immigrants in Western Europe. I developed a theoretical framework moving from the manifest functions of educational systems identified by Turner (1960) and their institutional traits disclosed by Sorensen (1970) and Allmendinger (1989). Within this framework, I singled out four dimensions of educational systems as especially relevant for migrant-specific penalties: (i) the *duration* of schooling, i.e. the amount of time pupils spend in the educational system; (ii) its degree of *stratification*, i.e. the structural differentiation of students within given grades; (iii) the allocation of human and financial *resources*; (iv) the degree of *standardization* in the quality of education provided nationwide.

My empirical findings indicate that all these *institutional dimensions* are to some extent important in explaining the existence of severe migrant-specific penalties. However, in some contexts the dimension of stratification is preponderant, while in others that of duration prevails. Still, in other contexts the dimension of stratification interacts with those of standardization and resources to produce severe penalties. Likewise, in the examination of systems able to avoid the occurrence of severe penalties, I found a complex interplay of the four dimensions altogether. *Contextual elements*—and in particular the history of immigration and the degree of linguistic distance—emerged as relevant aspects to account for, since they set the conditions under which different kinds of educational systems are beneficial or detrimental to children of immigrants.

More specifically, I found several pathways leading to the *presence of severe migrant achievement penalties* in Western European countries. For the new-immigration countries, tracking students into differentiated curricula before the age of 15 is sufficient to create an institutional environment where second-generation immigrants suffer from severe educational disadvantage relative to their native peers. In this path, exemplified by the cases of Italy and Portugal, the dimension of stratification is clearly preeminent. Conversely, another explanatory configuration pertaining to new-immigration countries is primarily characterized by the importance of the school duration dimension. In Finland, Denmark, and Sweden, the delayed entry into the (pre)school system brings about severe achievement penalties. This institutional aspect is critical, given that in these countries immigrants prevalently speak a language that is very distant from the national one. The dimension of stratification comes back as central for the pathway involving Germany, Austria, Switzerland, Flemish-Belgium and the Netherlands. In these post-war immigration countries characterized by high linguistic distance, severe migrant penalties are the product of an educational system that, by tracking students into differentiated curricula, marginalizes second-generation immigrants in the worst schools. Hence, these systems are not only highly stratified, but they also distribute human and financial resources unevenly across schools, so that the overall system suffers from a lack of standardization in the provision of schooling.

The systematic comparison of countries where *migrant achievement penalties are not severe* led to the identification of two pathways for the integration of second-generation immigrants in the school system. These are alternative pathways which nevertheless share an institutional element connected to duration: in order to avoid severe penalties, educational systems should be organized in a way to include children at a relatively young age. Indeed, having not-late entry system also emerged in previous analyses as a necessary condition for not-severe migrant penalties. Besides this factor, the first path does not comprise any other institutional element. What appears to matter for England and Wales, France, and Walloon-Belgium are rather contextual elements: in these post-war immigration countries, a large proportion of immigrants originates from former colonies where the host language is widely spoken. Presumably, their offspring do not suffer from serious underachievement risks in the first place, so that the structure of the educational system is less relevant. At the same time, this prevalently contextual explanation may suggest that in England and Wales, France, and Walloon-Belgium immigrant parents are relatively well integrated in the host society. For new-immigration countries, avoiding severe migrant penalties seems to be more complicated. In Spain, Greece, and Norway too,

children enter (pre)school at a relatively young age. However, these countries combine two additional institutional characteristics: students are not tracked into differentiated curricula up to the age of 16, and second-generation immigrants do not disproportionately end up in marginal sectors of the school system. Hence, in this second path towards not-severe penalties, we can see surfacing school duration, lack of stratification, national standardization, and resources as meaningful institutional dimensions.

All things considered, my findings on the role played by educational systems in producing more or less severe migrant achievement penalties are innovative in several respects. First of all, empirical analyses are based on an explicit theoretical framework. In order to derive my working hypotheses, I focused on institutional dimensions that might be specifically relevant for the relative educational disadvantage of second-generation immigrant students. In this perspective, the present work contributes to the emerging literature on the macro-level determinants of migrant learning disadvantage, so far mainly driven by empirical concerns. Secondly, by unveiling the complex interactions leading to more or less severe penalties, I have called attention to the structure of educational systems as configurations of institutional elements embedded in given national contexts. Again, this is important given that comparative research in general considers educational systems as a sum of independent features, with additive effects on students' achievement. Thirdly, by focusing on a limited number of cases and keeping an eye on the countries to which the configurational explanations were applicable, I have shown that country specificities matter. For instance, for Scandinavian countries the dimension of school duration proved especially relevant to explain severe penalties, while for Mediterranean countries the preeminent dimension was that of stratification. This attention to specific cases also allowed me to refine my theoretical argument on the role of educational systems in a way that is not context-blind.

5.2 Methodological contributions

Research design

In this dissertation, I adopted a two-step, mixed-methods research design. In the first step, I examined migrant achievement penalties in Western Europe and documented how, in different countries, second-generation immigrants fare differently at school relative to their native peers. The different degrees of migrant achievement penalties constituted the *explanandum* for the second step of the analysis, when I investigated potential *explanantes*

of severe penalties focusing on the institutional configurations of Western European educational systems, embedded in national contexts. At each step of the analysis, I relied on methodological triangulation—by using statistical and set-theoretic analysis—in order to improve the overall robustness of the empirical findings. Despite this deliberately pluralistic strategy, each analytical moment saw a clear prevalence of one methodological approach over the other, as better suited to address the research questions at stake.

First step

In the first step, I mainly relied on *multivariate regression analysis* in order to define the relative educational achievement of second-generation immigrant students compared to their native peers. This approach fits the data structure best, since analyses were based on a *large-N* comparative survey of randomly-sampled individuals. Moreover, it is coherent with the research goal of identifying the effect of migratory status on educational achievement *net of* other background differences existing between the two categories of students. Based on the estimates obtained with multilevel regressions, I put forward a *new measure of migrant-specific penalty*, revealing the relative position of immigrant students within the achievement distribution of natives sharing the same socio-economic background. Thanks to the straightforward metric of this measure, I could easily convey the magnitude of migrant educational disadvantage in Western Europe. Moreover, by accounting for the variability in natives' performances, this index is consistent with the concept of integration in the host society, and could be employed also to assess integration in other policy domains.

Although much of the analyses carried out in the first step were based on regression analysis, in this phase I also partially relied on set-theoretic methods. In particular, I developed the *novel procedure of fuzzy-set coincidence analysis* in order to systematically assess the degree to which immigrants and natives cumulate factors of socio-economic advantage and disadvantage. This procedure allowed to uncover an asymmetrical pattern that was invisible to correlational analysis. Fuzzy-set coincidence analysis is likely to be particularly helpful in social stratification studies, but could also be employed in other research fields.

Second step

Conversely, in the second step of analysis, statistical methods played a limited role. I adopted a variable-oriented approach only in order to explore whether theoretically

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relevant dimensions of educational systems are associated with a higher degree of migrant achievement penalty. More specifically, with ordinary-least-squares regressions I have looked for net effects of institutional variables, while with *regression-tree analysis* I have looked for interaction patterns between these variables in affecting the degree of migrant penalties. Regression trees proved useful in hinting at the complex interplay operating between institutional features of educational systems, whose role I then systematically assessed with fuzzy-set Qualitative Comparative Analysis (fs-QCA).

By resorting to comparative configurational methods, I shifted my perspective from a variable-oriented to a *diversity-oriented approach*. In doing so, I recognized that Western European countries are not homogeneous units with respect to the different institutional mechanisms that might produce inequalities in educational achievement. Therefore, in order to discern the causal paths leading to severe migrant achievement penalties, it is essential to consider each case in its specificity. In my analyses, educational systems were conceived as *configurations of institutional and contextual attributes*. In the definition of these attributes, not all variation was considered as equally meaningful; rather, they were qualified based on substantive and theoretical knowledge. Beyond the attention devoted to the kinds of cases and their qualitative properties, the application of fuzzy-set Qualitative Comparative Analysis (fs-QCA) constitutes an improvement for comparative educational research, because it allows to systematically assess the role of institutional configurations as leading to a given outcome, by unveiling patterns of complex causation. In effect, my analyses showed that different combinations of institutional and contextual factors can lead to equally severe migrant penalties (*equifinality*). Moreover, I found that no single condition is decisive *per se*. On the contrary, features of educational systems combine with each other in order to produce severe penalties. Moreover, some institutional characteristics proved to be relevant in some contexts, but not in others (*conjunctural causation*). Finally, my findings also indicate that the institutional configurations to avoid severe penalties do not merely mirror those leading to severe penalties (*causal asymmetry*). Although statistical techniques could partially detect the interplay between explanatory variables, only with fs-QCA I could provide the comprehensive picture necessary to understand the role of institutional and contextual elements in the creation of migrant achievement penalties.

Overall, in the explanatory phase of my dissertation, I have used several methods to investigate the role played by educational systems for migrant learning disadvantage in Western Europe. Strictly speaking, all these methods are descriptive and exploratory, and should be seen as aiding causal interpretation, rather than testing specific hypotheses.

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In fact, generally we cannot infer causal relations between institutional characteristics and policy outcomes from cross-country investigations. More in-depth research on single cases is necessary in order to discern the causal impact of educational systems in different receiving societies. However, given the large institutional variability at the international level, cross-country analyses based on international data constitute an important first step towards the identification of policy effects. In particular, in the present dissertation, I have shown that diversity-oriented methods are especially apt to suggest credible and convincing causal arguments to account for the different degrees of educational disadvantage experienced by second-generation immigrants.

5.3 Policy implications

In Europe, the social investment strategy is becoming increasingly popular as way to recalibrate the welfare state from compensation towards prevention. In this framework, educational policy is crucial because it can anticipate social risks by investing in individual skills and capabilities, and at the same time address the demands of the knowledge-based economy. According to the social investment perspective, educational systems should provide equal learning opportunities to all, and adequate investments should target vulnerable groups, including students of immigrant origin (European Commission, 2013). In a life-course perspective, a successful integration of children of immigrants in the school system is likely to increase collective well-being for several reasons. First, education plays an important role in the process of socialization of individuals and would therefore facilitate the active participation of second-generation immigrants into the society they live in. Second, such process could indirectly benefit immigrant parents by helping children of immigrants to bridge the gap between their families and the host society. Third, in industrialized societies educational attainment is one of the most important predictors of labor-market participation and occupational status; socio-economic integration, in turn, is an important precondition for further social, cultural and political integration of immigrants.

But how can educational systems be actually improved in order to ensure a better integration of children of immigrants? This dissertation provides a first series of answers to this question by comparatively assessing the relative performance of second-generation immigrants in 17 Western European countries.

Possibly, the most important indication emerging from my results is that—when designing institutional instruments to facilitate the educational integration of children

of immigrants—*context* should be adequately taken into account. A general contextual element that emerged from this dissertation is that *history of immigration matters* to a great deal. Indeed—although both egalitarian and inegalitarian countries include countries with different migration histories—tackling migrant learning disadvantage was found to be more challenging for newer immigration societies. Indeed, in order to protect second-generation immigrants from severe penalties in educational achievement, they have to combine a multiplicity of institutional factors. For instance, in Norway, Spain, and Greece, where second-generation immigrants do not suffer from severe penalties, the educational systems include children at a relatively young age; moreover, in these systems students are tracked into differentiated curricula only after the age of 16 and second-generation immigrants are not disproportionally concentrated in bad schools. At the same time, in new-immigration countries where migrant penalties are particularly severe, often a single institutional element emerges as a decisively detrimental factor: in Portugal and Italy, it is the simple fact that students are tracked before the age of 15, while for Finland, Denmark, and Sweden, it is the late entry of pupils into (pre)school. On the contrary—despite the many criticisms made to the various "modes of integration" adopted by *post-war labor immigration countries*—the latter, when compared to new-immigration countries, *enjoy a comparative advantage* that could be exploited by policy makers. In England and Wales, France, and Walloon-Belgium, second-generation immigrants are well integrated in the school system, while in other Continental European countries with a long history of immigration the relative bad performance of immigrant students can be explained by the cumulation of a number of inegalitarian aspects of the school system. From a policy-learning perspective, this means that governments that want to improve their institutional setting in order to better integrate second-generation immigrants should look for successful cases among the countries with a similar immigration history to their own.

A second order of reasons why policy makers should devote appropriate attention to the context relates to the finding that some features of the educational system can become disruptive for children of immigrants if they find themselves in already *adverse conditions with respect to linguistic difficulties*. In particular, despite the extremely comprehensive character of Scandinavian school systems, here second-generation immigrants suffer from severe achievement penalties because these systems do not offer sufficient opportunities to learn the host languages at young age. Hence, even when dealing with individuals who were born in the host country, policy makers should make sure that the educational system is designed in a way to *include children as soon as possible*, especially if the

immigrant population is mainly composed by individuals who speak a language that is very distant from the national one.

Yet, when linguistic distance is high, the simple fact of including children at a relatively young age is not sufficient to prevent severe penalties for second-generation immigrants if the latter are subsequently marginalized in low-performing schools. Indeed, the final indication for policy makers concerns the *structure of lower-secondary education*. It is generally assumed that systems where students are already separated in different tracks during lower-secondary schooling are inherently inegalitarian. While this is most likely to be the case when talking about class-driven educational inequalities, my empirical analyses show that this is only partially true when focusing on educational inequalities associated with migratory status. Sure enough, in Italy and Portugal educational systems should be redesigned in a more comprehensive way to enhance the educational opportunities of children of immigrants. In their case, tracking students at early age produces severe migrant penalties. However, *the simple postponement of tracking does not warrant mild penalties*. Indeed, in new-immigration societies like Spain, Greece, and Norway, mild penalties correspond not only to a tracking at later ages, but also to a low degree of marginalization of second-generation immigrants in bad schools. Therefore, even if the moment students are tracked into differentiated curricula is undoubtedly very important for equality of educational opportunity, *standards of teaching quality, disparity in the allocation of resources, and school segregation* are equally important aspects to be monitored in the lower-secondary school system.

5.4 Outlook

From the work presented so far, some potentially interesting issues surfaced but were not properly developed, as being beyond the scope of this dissertation. In this last section, I will briefly recall some of these topics in order to build bridges for future research.

In this dissertation I have taken a country-level perspective to examine the relation between the relative performance of second-generation immigrants in a given school system on the one hand, and its institutional structure on the other hand. In deriving my theoretical hypotheses on the role of different characteristics of the school system, I have tried to focus on the behavior of individual actors, notably students, parents, and teachers. However, in the empirical analyses I did not directly test these micro-level mechanisms, but rather assessed the extent to which the related institutional configurations systematically led to a given outcome. *Testing the micro foundations of my country-level*

findings could be the task for future research, possibly based on other sources of data, providing more information on the micro-level actors (e.g. previous achievement levels of students). For instance, a promising line of research could be the investigation of possible micro-level mechanisms underlying the negative impact of marginalization in schools with low-performing peers. If these schools really suffer from a deprivation of human and material resources, to what extent can the lower achievement of second-generation immigrants be ascribed to low-quality teaching, and to what extent are instead peer-effects responsible? Can compensatory policies targeting disadvantaged schools even up the situation of marginalized students, or does the stigma associated to such schools discourage learning anyway?

Along the same line, *the causes of marginalization deserve more attention.* In Germany, Austria, Switzerland, Flemish-Belgium, and the Netherlands, due to early tracking, the structure of lower-secondary schooling is rather differentiated between low-performing and highly performing schools. In some of these countries the sorting of pupils into tracks is almost completely driven by ability (e.g. the Netherlands), while in others this is only partially the case (e.g. Germany). Nevertheless, previous research has shown that migrant/native differences in track placement are prevalently ascribable to ability differences (Van De Werfhorst and Van Tubergen, 2007; Kristen et al., 2008; Cebolla Boado, 2011; Jackson et al., 2012). Hence, it is reasonable to conclude that in Germany, Austria, Switzerland, Flemish-Belgium, and the Netherlands the marginalization of second-generation immigrants in schools with low-performing peers is a product of the early tracking system. However, also Sweden and Denmark—two extremely comprehensive systems—came out as highly marginalizing. Given the high levels of residential segregation experienced by immigrants in these countries (Szulkin and Jonsson, 2007; Andersen et al., 2013), I suspect that here marginalization in low-performing schools is mainly due to school segregation by immigrant background. Another—possibly concurring—explanation could be related to a lack of standardization in the provision of high-quality schooling. Future research—taking a deeper look at national and regional specificities—could further investigate the roots of school marginalization.

Finally, we have seen that the empirical findings of this dissertation also speak to broader debates on the overall egalitarian or inegalitarian character of educational systems. More precisely, the negative correlation between *SES* penalties and migrant penalties in educational achievement has revealed that educational systems that are more successful in reducing traditional forms of inequality are generally less capable to deal with inequalities associated to migratory status. This negative correlation could signal

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a negative tradeoff between the impact of given features of educational systems on different students' categories, or it could instead be spurious. While this was not the focus of the present dissertation, my empirical results suggest that the second hypothesis is more realistic. Indeed, the dimensions of stratification, standardization, resources, and school duration affect the relative disadvantage of immigrant students in a way that is similar to what previous research has found for socio-economically disadvantaged students. However, a closer examination of single *educational policies potentially having opposite effects* on immigrant and socio-economically disadvantaged students constitutes a promising direction for future research.

I conclude with a note on the potential and limitations of the data sources used. In order to measure migrant-specific penalties in educational achievement, I relied on the information provided by the *Programme for International Student Assessment* (PISA). PISA is an extremely valuable data source to compare students' performance across countries because of its highly comparable framework, of the rich information collected on students' background, and of the number of countries involved. Moreover, its focus on 15-year-old individuals is especially appealing for scholars interested in the competences acquired by students through the whole period of compulsory schooling. Nevertheless, as advocated by a number of scholars, the potential of the PISA surveying scheme is not fully developed. First of all, as noted earlier, cross-country comparisons are limited if one is interested in policy outcomes, because the *ceteris paribus* conditions usually does not hold. This limitation could be addressed if the PISA scheme contained some longitudinal elements—notably, students' performance at previous point(s) in time. In this dissertation, I investigate the role of the context, rather than treating it as noise. However, if international panel data were made available in the future, scholars could raise and address new research questions, more specifically connected to the identification of the causal effects of educational systems. More modestly, the potential of the PISA data could be improved if more information, currently collected only on a voluntary basis, were made completely available. From the point of view of this dissertation, the most striking example of this lack of information is that the question on birth place is specific to national questionnaires and consequently missing in many countries. If forthcoming waves of PISA made this information available for all countries, it would be possible to contrast immigrant students from the same origin country across several destination countries, thus extending the "divergent strategy" presented in this dissertation to the whole Western Europe.

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Appendix A

Appendix to chapter 3

country	Natives	*G2* migrants (all origins)	Turkish *G2* migrants
Austria	9838	869	330
Bel. Flanders	8859	380	104
Bel. Wallonia	5277	683	123
Switzerland	18333	3066	368
Germany	7692	763	370
Denmark	8633	1109	375
England+Wales	13117	556	
Spain	41778	396	
Finland	10228	69	
France	7722	831	
Greece	9004	194	
Italy	18729	306	
Luxembourg	5658	1910	
Netherlands	8414	764	124
Norway	8606	307	
Portugal	10701	247	
Sweden	7900	609	

Table A.1: Source: PISA 2006-2009, unweighted. Sample sizes used for individual-level analyses in Chapter 3, by country and migratory status.

country	Natives		G2 (all origins)		Turkish G2	
	Mean	SD	Mean	SD	Mean	SD
Austria	511.1	89.8	444.2	88.9	406.5	77.9
Bel. Flanders	547.7	92.0	465.1	88.9	451.7	85.8
Bel. Walonia	507.3	96.2	453.0	95.6	430.7	84.2
Switzerland	548.3	86.3	489.8	91.0	454.0	88.9
Germany	521.8	91.2	450.3	92.4	425.6	80.4
Denmark	514.6	78.6	450.3	79.9	423.9	73.3
England+Wales	497.4	82.1	480.0	82.5		
Spain	487.5	83.7	457.3	81.2		
Finland	546.3	75.4	490.3	79.9		
France	505.2	90.5	451.8	93.1		
Greece	467.4	83.8	449.7	86.5		
Italy	506.3	82.9	459.3	95.1		
Luxembourg	509.9	83.1	459.5	84.5		
Netherlands	536.3	83.6	474.3	77.7	462.9	69.9
Norway	498.3	81.8	456.7	90.6		
Portugal	480.1	86.0	440.6	97.4		
Sweden	506.5	83.6	456.2	83.2		

Table A.2: Source: PISA 2006-2009, weighted. Mean and standard deviations of math score, by country and migratory status.

country	Natives		G2 (all origins)		Turkish G2	
	Mean	SD	Mean	SD	Mean	SD
Austria	0.226	0.8	-0.477	0.8	-0.850	0.8
Bel. Flanders	0.256	0.9	-0.637	1.0	-0.978	0.9
Bel. Wallonia	0.291	0.9	-0.285	1.0	-0.773	0.9
Switzerland	0.208	0.8	-0.340	0.9	-0.688	0.9
Germany	0.367	0.9	-0.476	1.0	-0.703	0.9
Denmark	0.370	0.8	-0.446	1.0	-0.885	0.9
England+Wales	0.221	0.8	0.056	0.9		
Spain	-0.278	1.1	-0.366	1.1		
Finland	0.322	0.8	0.246	0.9		
France	-0.032	0.8	-0.627	1.0		
Greece	-0.041	1.0	-0.258	0.9		
Italy	0.053	1.0	-0.500	1.1		
Luxembourg	0.489	0.9	-0.487	1.1		
Netherlands	0.361	0.8	-0.515	1.0	-0.656	0.9
Norway	0.482	0.7	0.036	0.9		
Portugal	-0.459	1.2	-0.321	1.3		
Sweden	0.334	0.8	-0.043	0.8		

Table A.3: Source: PISA 2006-2009, weighted. Mean and standard deviations of ESCS, by country and migratory status.

country	$(\alpha_M - \alpha_N)$	β_N	$(\beta_M - \beta_N)$
Austria	-37.13** (7.00)	43.81** (1.95)	
Bel. Flanders	-61.31** (8.63)	42.43** (1.76)	-15.61** (5.77)
Bel. Wallonia	-25.71** (7.51)	51.84** (1.96)	-20.39** (5.91)
Swizterland	-26.06** (2.64)	34.28** (1.25)	
Germany	-40.08** (5.25)	44.14** (1.96)	-8.92** (3.92)
Denmark	-31.40** (5.14)	32.20** (1.29)	
England+Wales	0.74 (5.14)	43.83** (1.46)	
Spain	-6.75 (8.27)	27.18** (1.00)	
Finland	-47.66** (11.76)	27.65** (1.07)	
France	-25.27** (6.41)	51.66** (2.00)	-21.14** (4.79)
Greece	-10.89 (8.25)	35.13** (1.58)	
Italy	-36.84** (9.39)	27.78** (1.44)	
Luxembourg	-27.95** (3.00)	32.63** (1.09)	
Netherlands	-25.00** (6.44)	38.42** (1.54)	-12.13* (5.18)
Norway	-23.56** (7.06)	36.48** (1.80)	
Portugal	-32.25** (7.48)	31.77** (1.27)	
Sweden	-26.20** (4. 69)	36.39** (1.73)	

Table A.4: Source: PISA 2006-2009. Country-specific regressions of reading scores estimated using replicate weights and plausible values. ** Sig. at 0.01 level * Sig. at 0.05 level. Standard errors in parentheses. Model: refer to Equations 3.7 and 3.8. Controls: female, *ESCS, ESCS*G2*.

country	$(\alpha_M - \alpha_N)$	β_N	$(\beta_M - \beta_N)$
Austria	-53.67** (5.73)	42.24** (1.82)	
Bel. Flanders	-66.25** (7.90)	43.39** (1.54)	-19.92** (6.15)
Bel. Walonia	-29.58** (7.48)	51.44** (2.02)	-23.43** (5.57)
Swizterland	-45.42** (2.87)	35.58** (1.28)	
Germany	-57.03** (4.87)	44.25** (1.70)	-11.62** (3.45)
Denmark	-48.85** (5.28)	36.00** (1.40)	
England+Wales	-10.32* (4.73)	47.61** (1.64)	
Spain	-13.68 (7.13)	28.54** (0.97)	
Finland	-59.81** (13.47)	28.85** (1.16)	
France	-34.92** (6.79)	54.03** (1.74)	-21.21** (4.26)
Greece	-16.83** (6.05)	33.79** (1.55)	
Italy	-46.63** (8.68)	25.39** (1.29)	
Luxembourg	-33.78** (3.01)	32.15** (0.96)	
Netherlands	-42.77** (7.93)	42.02** (1.49)	-16.73** (4.45)
Norway	-41.90** (7.27)	35.17** (1.59)	
Portugal	-33.69** (7.65)	29.61** (1.13)	
Sweden	-41.22** (5.08)	36.98** (1.46)	

Table A.5: Source: PISA 2006-2009. Country-specific regressions of science scores estimated using replicate weights and plausible values. ** Sig. at 1% level * Sig. at 5% level. Standard errors in parentheses. Model: refer to Equations 3.7 and 3.8. Controls: female, *ESCS, ESCS*G2*.

country	HISEI				HISCED				CULTPOSS				WEALTH			
	Nat		G2		Nat		G2		Nat		G2		Nat		G2	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Austria	49.66	16.25	39.31	14.45	4.33	1.17	3.80	1.45	0.00	0.97	-0.44	0.88	0.22	0.76	-0.26	0.69
Belgium Flanders	50.29	16.50	38.04	14.96	4.79	1.15	3.39	1.93	-0.21	0.96	-0.63	0.86	0.19	0.81	-0.06	0.81
Belgium Wallonia	52.11	16.87	43.70	16.99	4.91	1.18	4.14	1.76	-0.29	0.94	-0.42	0.88	-0.07	0.79	-0.35	0.77
Switzerland	51.79	15.42	43.41	15.62	4.34	1.43	3.68	1.79	-0.20	0.96	-0.36	0.94	0.01	0.71	-0.16	0.68
Germany	50.62	15.64	39.54	14.25	4.35	1.40	3.46	1.96	0.05	0.94	-0.30	0.87	0.28	0.75	-0.23	0.65
Denmark	50.89	16.63	41.78	17.18	4.70	1.11	3.71	1.79	-0.19	1.05	-0.82	0.98	0.68	0.98	-0.12	0.91
England+Wales	50.47	15.51	48.87	17.06	4.53	1.28	4.44	1.61	-0.14	0.95	-0.17	0.95	0.37	0.82	0.13	0.82
Spain	45.84	17.08	45.85	17.39	3.83	1.84	4.08	1.84	0.18	0.86	-0.24	0.91	-0.13	0.75	-0.34	0.77
Finland	51.03	16.53	52.68	17.40	5.09	1.15	5.06	1.50	0.17	1.00	-0.14	0.96	0.32	0.75	0.12	0.80
France	48.78	16.52	40.87	16.60	4.29	1.39	3.26	1.89	-0.20	1.00	-0.33	0.96	-0.05	0.75	-0.22	0.76
Greece	49.53	16.49	43.62	16.49	4.41	1.49	4.64	1.33	0.24	0.96	0.12	0.94	-0.25	0.80	-0.55	0.76
Italy	49.23	15.98	40.57	17.59	4.21	1.44	4.11	1.69	0.01	0.82	-0.38	0.89	0.16	0.74	-0.37	0.77
Luxembourg	51.90	15.21	39.99	15.79	4.52	1.34	3.10	2.03	0.27	0.97	-0.19	0.99	0.54	0.76	0.21	0.76
Netherlands	52.44	15.19	42.89	15.78	4.80	1.20	3.51	2.01	-0.26	1.03	-0.74	0.97	0.61	0.77	0.13	0.77
Norway	54.62	15.13	48.93	17.38	4.92	0.90	4.51	1.46	0.29	1.04	-0.12	1.06	0.72	0.82	0.40	0.96
Portugal	43.13	16.12	42.58	17.73	2.89	2.07	3.65	2.07	0.04	0.98	0.08	0.95	0.20	0.92	0.04	0.89
Sweden	51.97	15.82	46.76	16.35	4.99	1.25	4.71	1.67	0.23	1.11	-0.12	1.14	0.64	0.80	0.28	0.74

Table A.6: Source: PISA 2006-2009. Means and standard deviations of *HISCED, HISEI, CULTPOSS and WEALTH*.

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Source variable	Fuzzy set	Qualitative thresholds	Criteria
Highest occupational level among parents on Ganzeboom's index (*HISEI*)	High status	Country-specific	Internal distribution (80,60,40 percentiles)
	Low status		Internal distribution (20,40,60 percentiles)
Highest educational level among parents on ISCED 1997 scale (*HISCED*)	Highly educated parents	1 if ISCED $>=5$; 0.5 if ISCED $= 4$; 0 if ISCED $<=3$	Substantive knowledge: 0-2 = None, primary, lower-secondary; 3 = Vocational secondary; 4-5= Generalist secondary, Post-secondary non tertiary; 6 = Tertiary
	Low educated parents	1 if ISCED $<=2$; 0.5 if ISCED $= 3$; 0 if ISCED $>= 4$	*idem*
Home possessions of classical literature, books of poetry and pieces of art (*CULTPOSS*)	High cultural capital	Country-specific	Internal distribution (80,60,40 percentiles)
	Low cultural capital		Internal distribution (20,40,60 percentiles)
Home possessions of comfort items (*WEALTH*)	Rich	Country-specific	Internal distribution (80,60,40 percentiles)
	Poor		Internal distribution (20,40,60 percentiles)

Table A.7: Source: PISA 2006-2009. Source variables, thresholds and criteria for the fuzzy-set calibration of factors of advantage and disadvantage used in the fuzzy-set coincidence analyses.

Appendix B

Appendix to chapter 4

Country	Age at tracking	Relative risk of marginalization	(Pre)school entry	G2 with high linguistic distance	Mass immigration
Austria	10	5.54	4.25	98.0	1950s
Bel. Flanders	12	3.81	4.17	96.4	1950s
Bel. Walonia	12	3.09	4.19	37.2	1950s
Switzerland	14	3.14	4.26	93.8	1950s
Germany	10	3.45	4.43	94.8	1950s
Denmark	16	7.07	5.39	86.7	1970s
England+Wales	16	2.44	3.39	33.0	1950s
Spain	16	1.51	4.26	51.8	1980s
Finland	16	1.21	5.28	84.5	1970s
France	15	2.10	4.11	32.5	1950s
Greece	15	1.22	4.58	87.7	1990s
Italy	14	2.02	4.40	80.2	1980s
Luxembourg	12	1.91	4.18	88.7	1950s
Netherlands	12	3.05	3.29	76.5	1950s
Norway	16	2.20	4.21	92.3	1970s
Portugal	15	2.48	4.65	10.3	1990s
Sweden	16	3.06	5.54	84.0	1970s

Table B.1: Distribution of the source variables by country. Age at tracking: age at tracking into differentiated curricula (Eurydice, 2009, 2-7); Relative risk of marginalization: relative risk for $G2$ (*vs.* natives) of attending the worst-performing group of schools (situated in the 10th percentile of the achievement distribution according to PISA average scores on all literacy domains); (Pre)school entry: average entry age of $G2$ in the school or preschool system (PISA 2006-2009 and Eurydice (2000, 65-66); (iv) $G2$ with high lang distance: proportion of $G2$ with high linguistic distance (refer to footnote 5 in Chapter 4); Mass immigration: starting decade of mass immigration (Freeman, 1995; Bauer et al., 2000).
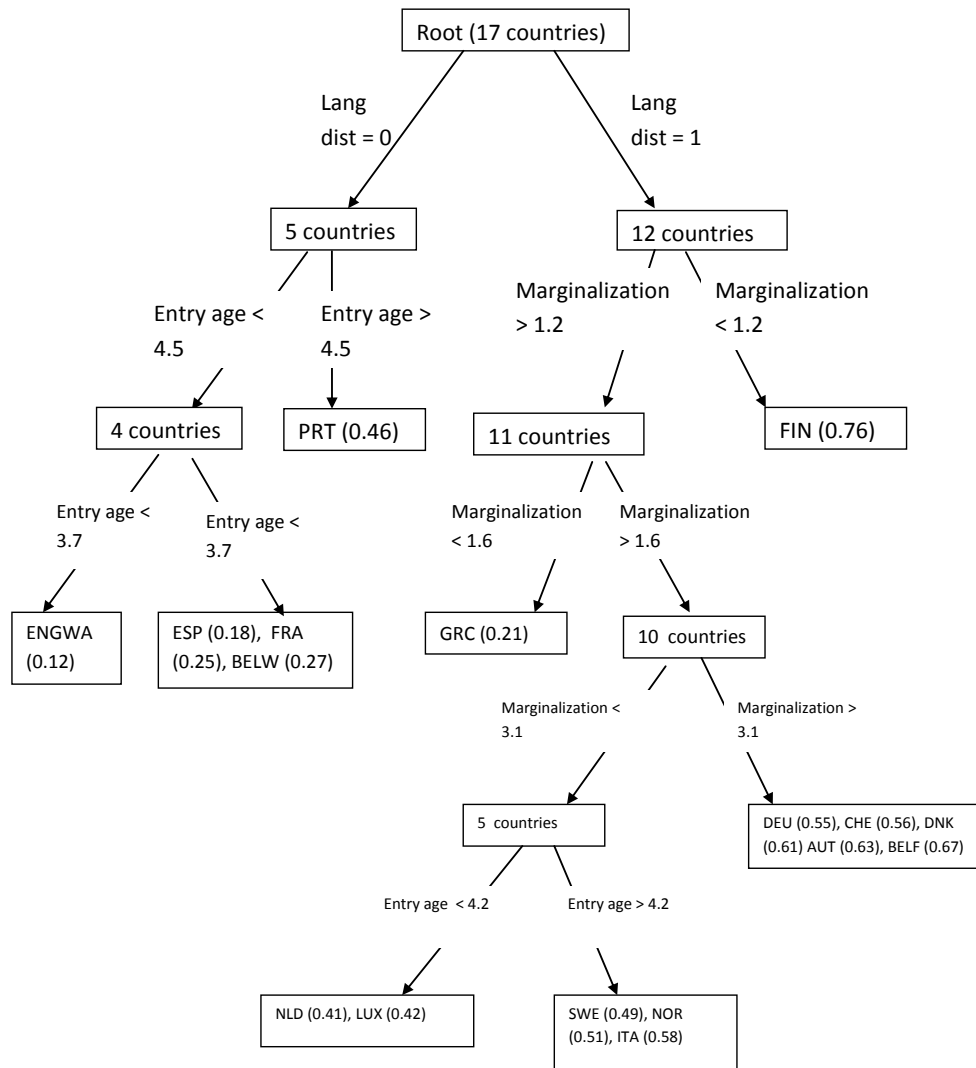
Figure B.1: Results of regression tree analysis of "Migrant achievement penalty in science literacy" on "Age at tracking", "*G2* average (pre)school entry age", "Marginalization in low-performing schools", "Proportion of *G2* with high linguistic distance". Analyses performed with the R package rpart. Method: "anova", complexity parameter 0.01. To improve the readability of the graph, migrant achievement penalties are reported as absolute values.
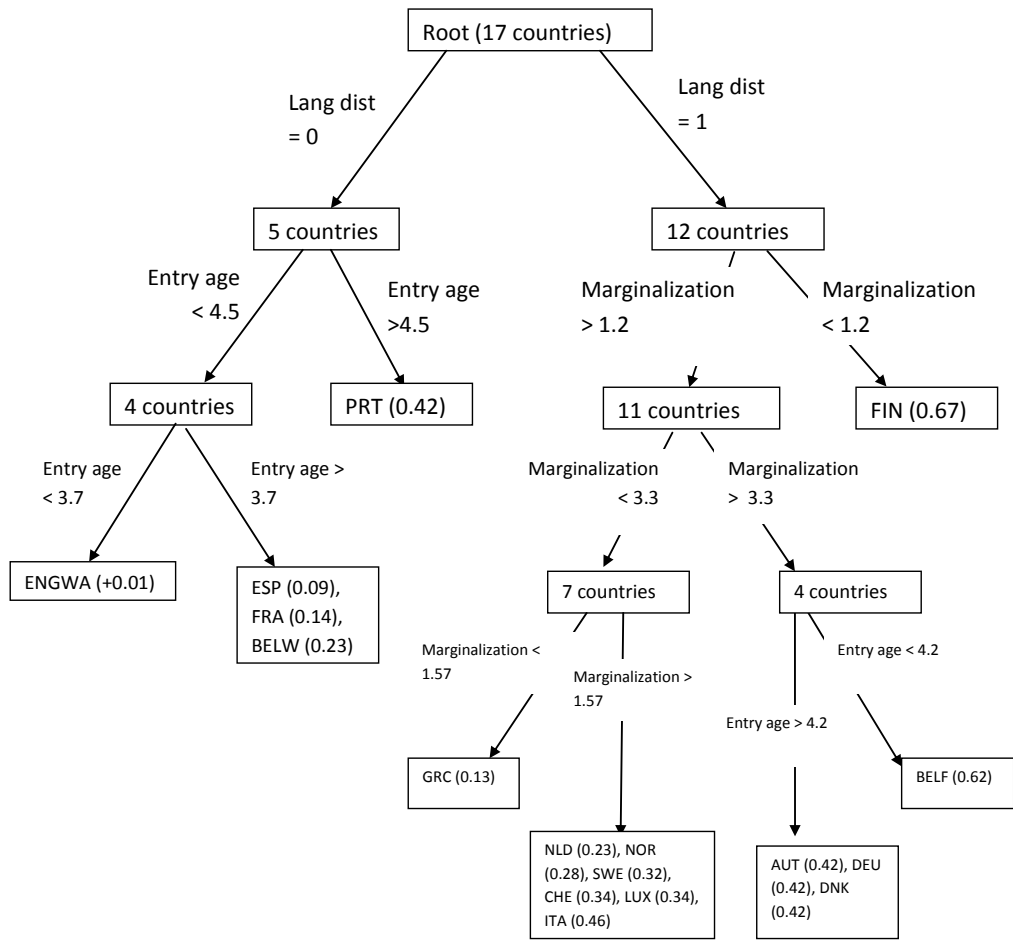
Figure B.2: Results of regression tree analysis of "Migrant achievement penalty in reading literacy" on "Age at tracking", "*G2* average (pre)school entry age", "Marginalization in low-performing schools", "Proportion of *G2* with high linguistic distance". Analyses performed with the R package rpart. Method: "anova", complexity parameter 0.01. To improve the readability of the graph, migrant achievement penalties are reported as absolute values.

SEVERE PENALTIES			severe penalties		
Configuration	Consistency	Coverage	Configuration	Consistency	Coverage
early entry + new imm	0.999	0.549	marginal +new imm	0.999	0.535
early entry + LANG DIST	0.999	0.605	tracked + new imm	0.994	0.535
LANGDIST+ NEWIMM	0.996	0.645	EARLY TRACKED + marginal	0.972	0.533
late entry+ early entry	0.994	0.539	TRACKED + marginal	0.969	0.521
early entry + EARLY TRACKED	0.992	0.598	early tracked + new imm	0.963	0.514
marginal+LANG DIST	0.975	0.558	late entry	0.933	0.602
early entry + MARG	0.971	0.634	tracked + EARLY ENTRY + MARGINAL+ lang dist	0.919	0.500
early tracked + LANGDIST	0.965	0.572	marginal + lang dist	0.915	0.674
late entry + NEW IMM	0.952	0.535	tracked + EARLY ENTRY + marginal	0.908	0.559
EARLY TRACKED + NEW IMM	0.950	0.588	EARLY ENTRY + marginal +NEW IMM	0.900	0.567
late entry + early tracked	0.947	0.542	EARLY ENTRY + early tracked + marginal	0.900	0.566
late entry + LANGDIST	0.943	0.519			
LATE ENTRY + LANG DIST	0.942	0.668			
MARGINAL+ NEW IMM	0.939	0.674			
early entry + marginal	0.920	0.559			
LATE ENTRY + EARLY TRACKED	0.918	0.676			
EARLY TRACKED + LANG DIST	0.917	0.599			
MARGINAL+ LANG DIST	0.910	0.621			
early entry + lang dist	0.905	0.573			

Table B.2: Results of systematic necessity assessment for the presence and the absence of the outcome. Configurations are shown only if consistency score is higher than 0.9 and coverage score is higher than 0.5. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. The sign + indicates the logical OR.

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Tracked	Late-entry	Early-entry	Early-tracked	Marginal	Lang dist	New imm	Out	Cons.	Cases
1	0	0	0	0	0	1	1	1.000	PRT
1	0	0	1	0	0	1	1	1.000	ITA
0	1	0	0	1	1	1	1	0.999	DNK,SWE
1	0	0	1	1	0	0	1	0.956	AUT, BELF, CHE, DEU
0	1	1	0	0	1	1	1	0.776	FIN
1	0	1	1	1	1	0	C	0.740	NLD
1	0	0	1	0	1	0	C	0.502	LUX
0	0	0	0	0	1	1	0	0.210	ESP
0	0	0	0	0	1	1	0	0.182	GRC,NOR
1	0	0	1	1	0	0	0	0.175	BELW
0	0	1	0	0	0	0	0	0.117	FRA
0	0	0	0	0	0	0	0	0.052	ENGWA

Table B.3: Truth table for the presence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Presence of conditions and outcome marked by 1, absence marked by 0. C: contradiction. Cons.: row consistency value. The table does not display the 115 logical remainders. No true logical contradiction exists.

Path	cons.	cov.	Cases
(late entry * early entry * lang dist) * NEW IMM * (TRACKED * marg * early tracked)	1.000	0.065	PRT
(late entry * early entry * LANG DIST) * NEW IMM (TRACKED*marg*EARLY TRACKED)	1.000	0.103	ITA
(LATE ENTRY*LANG DIST) * NEWIMM * tracked	0.876	0.288	FIN; DNK,SWE
(early entry*late entry*LANG DIST) * (MARGINAL * EARLY TRACK)	0.956	0.328	AUT, BELF CHE, DEU
Whole solution	0.932	0.766	

Table B.4: Conservative solution of the minimization of the truth table for the presence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.75. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis perfomed with the R package QCA (Enhanced Quine McCluskey algorithm).

Tracked	Late-entry	Marginal	Lang dist	New imm	Out	Cons.	Cases
1	0	0	0	1	1	1.000	PRT
1	0	0	1	1	1	1.000	ITA
0	1	1	1	1	1	0.999	DNK,SWE
1	0	1	1	0	TLC	0.862	AUT,BELF,CHE,DEU,NLD
0	1	1	1	1	C	0.776	FIN
1	0	0	1	1	C	0.456	LUX
1	0	1	0	0	C	0.253	BELW
0	0	0	0	1	0	0.204	ESP
0	0	1	1	1	0	0.169	GRC,NOR
0	0	0	0	0	0	0.039	ENGWA,FRA

Table B.5: Truth table for the presence of the outcome. Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Presence of conditions and outcome marked by 1, absence marked by 0. C: contradiction, TLC: true logical contradiction. Cons.: row consistency value. The table does not display the 22 logical remainders.

Tracked	Late-entry	Marginal	Lang dist	New imm	Out	Cons.	Cases
0	1	1	1	1	1	1.000	DNK,SWE
1	0	0	0	1	1	1.000	PRT
1	0	0	1	1	1	1.000	ITA
1	0	1	1	0	1	0.994	AUT,BELF,CHE,DEU,NLD
0	1	0	1	1	1	0.779	FIN
0	0	0	0	1	C	0.588	ESP
1	0	0	1	0	C	0.577	LUX
1	0	1	0	0	0	0.456	BELW
0	0	0	1	1	0	0.383	GRC,NOR
0	0	0	0	0	0	0.108	ENGWA,FRA

Table B.6: Truth table for the presence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Presence of conditions and outcome marked by 1, absence marked by 0. C: contradiction. Cons.: row consistency value. The table does not display the 22 logical remainders. No true logical contradiction exists.

Severe migrant penalty
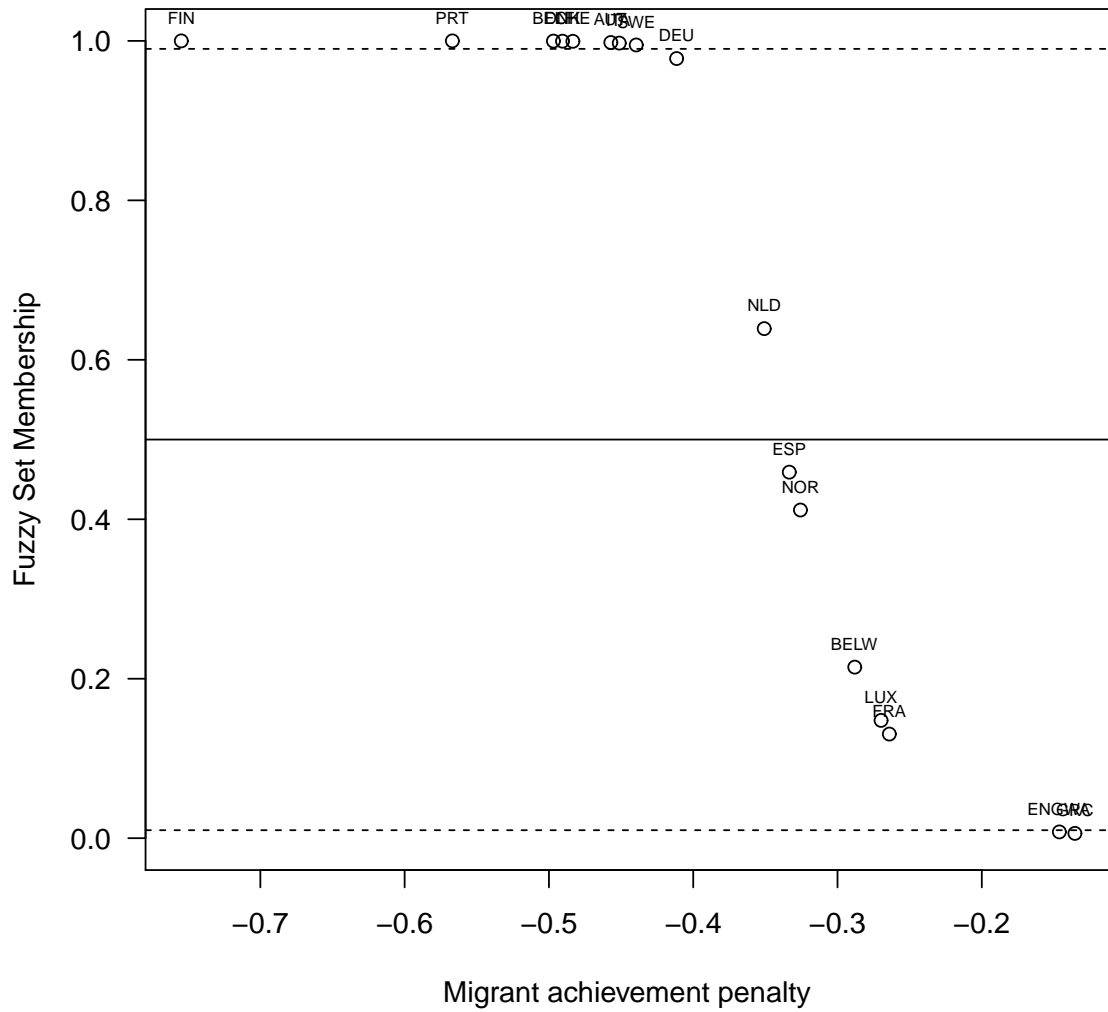
Figure B.3: Recalibration of outcome. Source variable against fuzzy-set. Solid lines indicate critical thresholds for cross-over (0.5). Dotted lines indicate critical thresholds for full membership (0.99) and full non-membership (0.01).

Path	cons.	cov.	Cases
(TRACKED * marginal) * NEW IMM * late entry	1.000	0.131	PRT, ITA
(LATE ENTRY * LANG DIST) * (MARGINAL * tracked) * NEW IMM	1.000	0.141	DNK, SWE
(TRACKED * MARGINAL) * LANG DIST * late entry * new imm	0.994	0.379	AUT, BELF, CHE, DEU, NLD
Whole solution	0.996	0.642	

Table B.7: Conservative solution of the minimization of the truth table for the presence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.99. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis perfomed with the R package QCA (Enhanced Quine McCluskey algorithm).

Step 1			
Remote factors	cons.	cov.	Cases
LANG DIST	0.776	0.850	AUT, BELF, CHE, DEU, LUX, NLD; DNK, FIN, GRC, ITA, NOR, SWE
NEW IMM	0.740	0.490	ESP, PRT; DNK, FIN, GRC, ITA, NOR, SWE

Step 2				
Remote factors	**Proximate factors**	cons.	cov.	Cases
LANG DIST * new imm	EARLY-TRACKED * MARGINAL	0.994	0.379	AUT, BELF, CHE, DEU; NLD
LANG DIST * NEW IMM	tracked * MARGINAL * LATE-ENTRY * LANG DIST * late-entry	1.000	0.141	DNK, SWE
lang dist * NEW IMM	TRACKED * early-tracked * marginal * late-entry * early-entry	1.000	0.053	PRT
LANG DIST * NEW IMM	EARLY-TRACKED * marginal * late-entry * early-entry	1.000	0.084	ITA
Whole solution		0.996	0.642	

Table B.8: Solution from two-step procedure for the presence of the outcome (recalibrated). Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. First step: parsimonious solution, consistency cutoff: 0.7, frequency cutoff: 1. Second step: conservative solution, consistency cutoff: 0.9, frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

Tracked	Late-entry	Early-entry	Early-tracked	Marginal	Lang dist	New imm	Out(abs)	cons.	cases
0	0	1	0	0	0	0	1	1.000	ENGWA
0	0	0	0	0	1	1	1	1.000	GRC,NOR
0	0	0	0	0	0	1	1	1.000	ESP
0	0	0	0	0	0	0	1	1.000	FRA
1	0	0	1	1	0	0	1	0.989	BELW
1	0	0	1	0	1	1	1	0.758	LUX
1	0	1	1	1	1	0	C	0.581	NLD
0	1	0	0	0	1	1	0	0.372	FIN
1	0	0	1	1	1	0	0	0.178	AUT, BELF, CHE, DEU
1	0	0	1	0	1	1	0	0.168	ITA
0	1	0	0	1	1	1	0	0.138	DNK,SWE
1	0	0	0	0	0	1	0	0.112	PRT

Table B.9: Truth table for the absence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Presence of conditions and outcome marked by 1, absence marked by 0. C: contradiction. Cons.: row consistency value. The table does not display the 115 logical remainders. No true logical contradictions exist.

Path	cons.	cov.	Cases
late entry * new imm * lang dist * (tracked * marginal)	1.000	0.196	FRA; ENGWA
(late entry * early entry) * tracked * NEW IMM * marginal	1.000	0.263	ESP; GRC,NOR
(late entry * early entry)* new imm * LANG DIST * EARLY TRACKED * marginal	0.758	0.673	LUX
(late entry * early entry)* new imm * lang dist * EARLY TRACKED * MARGINAL	0.989	0.092	BELW
Whole solution	0.942	0.647	

Table B.10: Conservative solution of the minimization of the truth table for the absence of the outcome. Model: TRACKED, EARLY-TRACKED, MARGINALIZING, EARLY-ENTRY, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Consistency cutoff: 0.75. Frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis perfomed with the R package QCA (Enhanced Quine McCluskey algorithm).

Tracked	Late-entry	Marginal	Lang dist	New imm	Out	Cons.	Cases
0	0	0	0	0	1	1.000	ENGWA,FRA
0	0	0	1	1	1	1.000	GRC,NOR
0	0	0	0	1	1	1.000	ESP
1	0	1	0	0	1	0.991	BELW
1	0	0	1	0	C	0.837	LUX
0	1	0	1	1	C	0.372	FIN
1	0	1	1	0	TLC	0.285	AUT,BELF,CHE,DEU,NLD
1	0	0	0	1	0	0.169	PRT
1	0	0	1	1	0	0.168	ITA
0	1	1	1	1	0	0.138	DNK,SWE

Table B.11: Truth table for the absence of the outcome. Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Presence of conditions and outcome marked by 1, absence marked by 0. C: contradiction, TLC: true logical contradiction. Cons.: row consistency value. The table does not display the 22 logical remainders.

Tracked	Late-entry	Marginal	Lang dist	New imm	Out	Cons.	Cases
0	0	0	0	0	1	0.957	ENGWA,FRA
1	0	0	0	0	1	0.938	BELW
0	0	1	0	0	1	0.861	GRC,NOR
0	0	0	1	1	1	0.701	ESP
1	0	0	1	0	C	0.656	LUX
0	1	0	1	1	0	0.294	FIN
1	0	0	1	1	0	0.111	AUT,BELF,CHE,DEU,NLD
1	0	1	1	0	0	0.064	PRT
1	0	0	1	1	0	0.049	ITA
0	1	1	1	1	0	0.041	DNK,SWE

Table B.12: Truth table for the absence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Presence of conditions and outcome marked by 1, absence marked by 0. C: contradiction. Cons.: row consistency value. The table does not display the 22 logical remainders. No true logical contradiction exists.

Path	cons.	cov.	Cases
TRACKED * MARG * late entry * lang dist * new imm	0.938	0.135	BELW
late entry * NEWIMM * tracked * marginal * LANG DIST	0.861	0.228	GRC,NOR
late entry * lang dist * new imm * tracked * marginal	0.957	0.289	FRA; ENGWA
Whole solution	0.915	0.652	

Table B.13: Conservative solution of the minimization of the truth table for the absence of the outcome (recalibrated). Model: TRACKED, MARGINALIZING, LATE-ENTRY, LANG DIST, NEW IMM. Lower-case letters indicate the absence, while upper-case letters the presence of the condition. Simplifying assumptions: tracked, late entry, marginal, langdist contribute to the absence rather than the presence of the outcome. Consistency cutoff: 0.85. Frequency cutoff: 1. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

Step 1

Remote factors		cons.	cov.	Cases
lang dist * new imm		0.989	0.393	BEIW,ENGWA,FRA

Step 2

Remote factors	Proximate factors	cons.	cov.	Cases
lang dist * new imm	(tracked * marginal) * late-entry	1.000	0.196	ENGWA,FRA
lang dist*new imm	(EARLY-TRACKED * MARGINAL)* (late-entry * early-entry)	0.989	0.092	BEIW
NEW IMM	(tracked * marginal) * (late-entry * early-entry)	1.000	0.263	ESP; GRC,NOR
Whole solution		1.000	0.452	

Table B.14: Solution from two-step procedure for the absence of the outcome (recalibrated). Lower-case letters indicate the absence, while upper-case letters the presence of the condition. First step: parsimonious solution, consistency cutoff: 0.7, frequency cutoff: 1. Second step: conservative solution, consistency cutoff: 0.9, frequency cutoff: 1. Logical remainders were not used in the minimization. Analysis performed with the R package QCA (Enhanced Quine McCluskey algorithm).

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Tracked	Late-entry	Marginal	Lang dist	New imm	*Reference configuration*
1	0	1	0	1	100-1 (PRT, ITA)
1	0	1	1	1	100-1 (PRT, ITA)
1	1	0	0	1	01-11 (SWE, DNK, FIN)
1	1	0	1	1	01-11 (SWE, DNK, FIN)
1	1	1	0	1	1 01-11 (SWE, DNK, FIN)
1	1	1	1	0	10110 (AUT, BELF, CHE, DEU, NLD)
1	1	1	1	1	01-11 (SWE, DNK, FIN)

Table B.15: Easy counterfactuals used in the truth table minimization to produce the intermediate solution for the presence of the outcome. Solution: refer to Table 4.17. Reference configuration defined as the most similar configuration leading to the outcome in the conservative solution (Table 4.16).

Tracked	Late-entry	Marginal	Lang dist	New imm	*Reference configuration*
0	0	1	0	0	0000- (ENGWA, FRA, ESP)
1	0	0	0	0	10100 (BELW)

Table B.16: Easy counterfactuals used in the truth table minimization to produce the intermediate solution for the absence of the outcome.Solution: refer to Table 4.19. Reference configuration defined as the most similar configuration leading to the outcome in the conservative solution (Table 4.18).

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