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Ethnic composition of schools and school performances in secondary education of Turkish migrant students in 7 countries and 19 European educational systems

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Summary. This article examines the effect of the ethnic school composition on school performances in secondary education for Turkish students, using both cross-national PISA 2009 and Swiss national PISA 2009 data. We argue how social capital theory beside other theories can explain a part of the ethnic composition effect. We employ three indicators of the ethnic composition of a school: the native share, the share of co-ethnics and the ethnic diversity (we employ a residualized score of diversity on the proportion of migrants). Our results show no effect of the proportion of natives on math performances. Furthermore, we show a negative association between ethnic diversity and math performances. Nevertheless, we find a positive association between ethnic diversity and reading performances in The Netherlands. Children of Turkish decent have higher math performances if they are in an educational system with a larger community of co-ethnics and if they are in an educational system with native students with average higher school performances. Finally we find no association between an early comprehensive labor agreement and math performances.

Keywords: ethnic composition, Turkish migrant students, ethnic diversity, social capital

1. Introduction

The relationship between the ethnic school composition and pupils' achievement is of growing interest to European researchers (Agirdag, Van Houtte, & Van Avermeat, 2012). Recent studies use beside the *ethnic share* also *ethnic diversity* as an extra indicator of the ethnic school composition (Braster & Dronkers, 2012; Dronkers & Van der Velden, 2013;

Maestri, 2011b; Van Houtte & Stevens, 2009; Veerman, Van de Werfhorst, & Dronkers, 2013). Other studies also use the share of co-ethnics (Fleischmann, Phalet, Deboosere, & Neels, 2012; Halpern & Nazroo, 2000). The ethnic share refers to the proportion of migrant children in a school (independent of ethnic group), whereas the share of co-ethnics refers to the proportion of children from the own ethnic group in a school. Ethnic diversity refers to the composition in the school in terms of the number and size of different ethnic groups.

Researchers propose both positive and negative mechanisms that explain the relation between the ethnic school composition and school performances. First it has been argued that a higher proportion of migrants can lead to lower educational performances due to lowering the standards (Rosenthal & Jacobsen, 1968), or due to insufficient contact with the destination language (Driessen, 2002). Second a higher share of ethnic students may positively influence the educational performances of migrant students, because schools and teachers are likely to specialize to the needs of the ethnic minority students (Peetsma, Van der Veen, Koopman, & Schooten, 2006). Third, high proportions of migrants may negatively relate to educational outcomes, due to fewer access to social structures from which social ‘bridging’ capital can be acquired (Cheng, Martin, & Werum, 2007; Crosnoe, Cavanagh, & Elder Jr., 2003). Nevertheless, a network with more ethnic contacts of their own group may lead for some ethnic groups to ‘bonding’ benefits for educational performances, because stronger relationships within the ethnic group increase the sharing and exchange of resources (Crul and Domernik, 2003; Lin, 2001). However, these stronger ethnic contacts may also lead to more social control (Zhou, 1997). Strong social control may possibly lead for Turkish students to a more ambivalent vision to schooling (Crul & Domernik, 2003).

Ewijk and Slegers (2010) have found a negative association between the *ethnic share* and school performances, using a meta-analysis of both European and American data. However, the strength of this association might differ between different origin groups. Peetsma et al. (2006) have found for migrant students from Turkey and Morocco who are in primary education in The Netherlands even a positive association between the proportion of migrants and math scores. Finally, earlier research shows that relative size of immigrant communities in a destination country positively associates with the math performances of migrant students in secondary education (Levels, Dronkers, & Kraaykamp, 2008).

Although a higher proportion of migrants may lead to more Turkish students in the school, an earlier study showed that a higher proportion of migrants doesn’t necessarily lead to larger ethnic groups within the class (Veerman et al., 2013). *Ethnic diversity* measures this part of the ethnic composition, because ethnic diversity refers to the composition in the school

in terms of the number and size of different ethnic groups and to the relative number of interethnic contacts. Consequently, this variable is one of the indicators for the influence of the ethnic group size of the different ethnic groups, but also of the relative possible number of ties outside the peer group. Whereas Dronkers and Van der Velden (2013) and Veerman et al. (2013) have found that ethnic diversity leads for migrant students to lower school performances, Maestri (2011b) and Braster and Dronkers (2012) demonstrate a positive relationship between ethnic diversity and school performances in The Netherlands (c.f. for an explanation of the differences Braster and Dronkers, 2012; Maestri, 2011b; Veerman et al., 2013).

Finally, the *share of co-ethnics* is relevant, because this indicator is not influenced by the group size of other ethnic groups. Consequently, this variable refers more to the possible 'bonding' capital of the minority group in the social context than the ethnic share variable.

Although earlier studies reveal the effect of the ethnic composition on both migrants and natives, no earlier study measured the relationship between the proportion of co-ethnics in schools and school performances in multiple societies and more educational systems. This paper uses both cross-national Programme for International Student Assessment (PISA) and the Swiss PISA (PISA.ch, 2009) to investigate whether the ethnic composition of schools associate with educational performances of Turkish migrants at secondary schools in different European educational systems. We focus in this study on Turkish migrants because the Turks are the largest immigrant group in Europe and because they live in a large number of European countries (Crul & Vermeulen, 2003). Consequently we could measure beside the proportion of migrants also the proportion of co-ethnics both on school and country or educational system level, using cross-national data. Furthermore, Turkish students are very interesting, because earlier studies show both on country and school level strong ties in Turkish networks (Fennema & Tillie, 1999; Van Heelsum, 2005; Van der Veen & Meijnen, 2001). Moreover Crul and Vermeulen (2003) mention that the Turkish community in The Netherlands has more social capital than the Moroccan community in The Netherlands. Consequently influences of the ethnic composition might differ between origin groups.¹ Our main research question is how the ethnic composition associates with school performances for Turkish students in different European countries or educational systems.

¹ Besides these theoretical arguments, we also found empirical evidence that underpins the need of separate analysis of Turkish migrant students. Analysis show significant differences between the Turkish students and other migrant students for both the proportion of migrants and the residualized ethnic diversity. Turkish students have significant less benefit of a higher proportion of natives and significant more disadvantage of a higher residualized ethnic diversity for their math performances. Results available on request.

This study aims to contribute to the literature in three ways. First, we distinguish in this study the native share, the ethnic diversity and share of co-ethnics using seven countries and nineteen European educational destination systems². Consequently, this study determines whether origin composition effects for specific groups in single countries also occur in cross-educational system data. Second we argue how, social capital theory can also explain a part of the relation between ethnic school composition and school performances. Although there has been considerable research using social capital focusing on the triangular ties among parents, teachers and children in the United States, this research is relevant because less is known about the influence of peer group ties and interethnic ties as a resource for school performances in Europe (Cheng et al., 2007). We investigate beside the school level the influence of possible interethnic ties on country level. The relative size of immigrant communities positively associates with the math performances of migrant students (Levels, Dronkers, & Kraaykamp, 2008). The Turkish migrants are the largest migrant group in Europe. Therefore it is interesting whether differences between countries in the relative community size of this large ethnic group also leads to more social capital advances for this relative large group. Finally, this research shows whether different characteristics of *destination countries* or *educational systems* and migration paths of the people of Turkish origin to Europe influence the educational performances of the Turkish origin students. Therefore, we employ first cross-national PISA 2009 data for an analysis on country level and thereafter a combination of both cross-national PISA 2009 and Swiss PISA 2009 data for an analysis on educational system level.

2. The migration of Turkish residents to Europe

Different migration flows of Turkish residents to Europe occurred in the last century (Içduygu, 2009). During the 1960s, a big wave of migration from Turkey to European countries becomes visible. The main reason for this big migration wave of Turkish migrants to different European countries is the need for cheap labor workers by different European countries. The migration of Turkish migrants becomes formalized by the sign of labor recruitment agreements between Turkey and different European countries. These agreements specified the general conditions of recruitment, employment and wages. Turkey signed his first labor

² Our analysis contain 7 destination countries but 19 educational systems. Both Belgium, Germany and Switzerland contain more educational systems on sub nation level. Unfortunately, Germany made the PISA data for our sort of analyses only available on national level (c.f. Prokic-Breuer & Dronkers, 2012).

agreement with Germany in 1961. The United Kingdom also signed a labor agreement in 1961, however this agreement was less comprehensive. Later Austria, Belgium, France, The Netherlands and Sweden followed with agreements in the mid-1960s. Switzerland and Denmark signed less comprehensive agreements during the 1970s. Finally Norway signed an agreement in 1981 (Franz, 1994).

According to the Turkish statistics, nearly 800,000 workers were sent by the Turkish Employment Service (TES) between 1960 and 1974. 649,000 of these workers departed to West Germany, 56,000 to France, 37,000 to Austria and 25,000 to The Netherlands (İçduygu, 2009).

The need for cheap labor workers migration from Turkey to Europe declined due to the economic stagnation in 1974 in Europe. Nevertheless the population of Turkish migrants grew after 1974 due to family reunion, irregular labor migration and marriage migration (İçduygu, 2009). Besides the labor migrants, the statistics also include political refugees from Turkey to European countries. These political refugees contain beside ethnic Turks other ethnic groups from Turkey. A part of the labor workers from Turkey contains other ethnic groups like Kurdish and Armenian ethnicity. However, most available statistics only refer to Turkish origin and not to Turkish ethnicity. For instance, we could only trace in three of the seven countries with Turkish origin students data in PISA whether students of Turkish origin speak Kurdish. Language is according to Hutchinson and Smith (1996) one of the six main features of ethnicity. Consequently, the Kurdish speaking Turkish students might define themselves as ethnic Kurds. In Austria 2 percent, in Denmark 7 percent and in Germany 3 percent of the Turkish origin students in the PISA data speak Kurdish at home. The mean PISA math test scores of the Kurdish speaking Turkish origin students in Austria are 403 points, Denmark 423 points and in Germany 447 points. Because the test scores of non Kurdish speaking Turkish origin students are 420 in Austria, 415 in Denmark and 438 in Germany, the scores of the scores of the Kurdish speaking Turkish origin students are in Denmark and Germany higher and in Austria lower. However, we could not differentiate in our cross-national and educational system analyses on Kurdish ethnicity, because this information is not available for all destination countries. Furthermore, the study of Veerman and Weitenberg (2008) find that Kurdish speaking people define themselves not necessarily as being Kurdish. For instance, a part of the Kurdish speaking migrants in The Netherlands define themselves as Armenians.

3. Theory

3.1 Social capital

Since the 1990s, an increasing number of researchers explain differences in educational performances using the concept social capital (Dika and Singh, 2002). Users of the concept frequently refer to the work of Bourdieu, Coleman or Putnam. Although Bourdieu, Coleman and Putnam all refer to the importance of different resources within social networks, the work of Bourdieu focuses more on reproduction through social capital. Coleman especially considers social capital as access to institutional resources (Dika and Singh, 2002). Even though the studies of Coleman mainly used the family structure and parent child interaction as variables for access to resources, other studies also focus on the network of individual families in the ethnic community (Zhou, 1997) and on the networks of students as access to resources (Morgan and Sørensen, 1999; Stanton-Salazar and Dornbusch, 1995).

The analytical distinction between bonding and bridging capital of Putnam (2000) also reveals the possible importance of both ties of the students outside and within the peer group. Ties of migrant students with native students in the school may bring bridging capital into the network of the migrant students. Bridging capital is the resource to 'get ahead' (Putnam, 2000) or to expand their horizon (Morgan, 2000). Bonding capital may explain a part of the advantages for the migrants of a higher proportion of migrants inside and outside the school, because according to the idea of bonding there is a greater opportunity of sharing resources between the students or parents from the same origin peer group (Lin, 2001). Furthermore social closure increases learning among elementary and middle school students through the creation of a norm-enforcing environment that compels diligence (Morgan, 2000: 294). Several studies found results that point in the bonding direction for Turkish students. For instance, Van der Veen and Meijnen (2001) find that successful Turkish students in secondary education in The Netherlands have a better relationship with their peer group than the less successful students. Furthermore, Peetsma et al. (2006) find that a higher proportion of migrants in a class is positive associated with math scores for Turkish and Moroccan pupils in The Netherlands. A higher proportion of migrants might also lead to better educational resources for the migrant students. Teachers in schools with a high number of migrant students have more expertise to adapt their teaching to the specific needs of the migrant students (Peetsma et al., 2006). Therefore, this specialization thesis may lead in terms of

social capital to more profitable bridging links to the teachers. Finally, the study of Levels, Dronkers and Kraaykamp (2008) shows that the proportion of immigrant communities also on community level positively associates with the math performances of migrant students.

However, a higher proportion of migrants in a school may not necessary lead to more or better contacts within the own ethnic peer group. For instance schools with a high proportion of migrants may have a high number of other ethnic groups and consequently have small ethnic peer groups (Veerman et al., 2013). Consequently, only the proportion of co-ethnics gives a valid indication of the relative possible number of ties within the ethnic peer group.

3.2. Other relevant theories

The number of other ethnic groups and the size of these ethnic group might also lead to negative influences on school performances. First, from a teaching perspective, a higher number of ethnic groups leads to cultural teaching problems concerning instructional time for a higher number of ethnic groups (Dronkers & Van der Velden, 2013; Maestri, 2011a). Moreover, teachers need to adapt their teaching style to the cultural needs of a diverse set of pupils (Ewijk & Slegers, 2010a). Second from the *peer group perspective* researchers propose that ethnic diversity can enrich students through communication, for instance if the information about the culture of one ethnic group is relevant for the other group (Lazear, 1998). Also the size of the ethnic groups may influence school performance, as smaller ethnic groups have stronger incentives to adapt to the majority culture (Lazear, 1999). Smaller ethnic groups may then lead to better understanding instructions because the instructional language is mostly determined by the majority (Maestri, 2011a). However, the existence of small ethnic groups may also lead to lower school achievement due to a mechanism of reduced feelings of ethnic identification (O'Reilly, Williams, & Barsade, 1997). More interethnic contacts may lead to more interethnic tensions, which may negatively influence academic performance (Hoxby, 2000). Finally, the pupils' language development may be inhibited by a higher number of interethnic contacts due to fewer contacts with pupils having host country language as their mother tongue (Driessen, 2002).

4. Hypotheses

Students of Turkish origin may benefit from bonding social capital within their own ethnic group and bridging social capital outside their ethnic group. According to the social capital theory, stronger relationships with your own ethnic group will lead to the sharing and

exchange of resources. We expect a higher chance on co-ethnic contacts and access to positive ethnic social capital in a school with a higher proportion of Turkish students. Furthermore, both parents and students have a higher opportunity to acquire also outside the school bonding capital in a country with a higher proportion of co-ethnics. This leads to the following *co-ethnics hypothesis*:

There is a positive association between the proportion of co-ethnics both in the school and the educational/ country system and the math scores of Turkish students

Besides the school level, ethnic groups may also acquire social capital on country level through the migration history. For instance, destination countries sign bilateral labor agreements with origin countries. These agreements indicate a part of the social capital of the origin groups, because a relative comprehensive agreement might give capital to invest in the cost of educating the children in a destination country due to the relative stronger job security. Furthermore, a relative early bilateral agreement indicates a longer time of acquiring capital in the destination country by the ethnic group. Consequently, we expect in the *labor agreement hypothesis*:

There is a positive association between relatively early comprehensive labor agreements and math scores of Turkish students.

We proposed native students as one of the possible social bridging resources in the network to ‘get ahead’ for the migrant students. Consequently, the average test scores of the native students indicates a part of the quality of the resources which the Turkish students can acquire by ‘bridging’ in the country or educational system. Furthermore, the average test score of the native students indicates a part of the quality of the education of the destination country. Finally, we expect in a school with a higher proportion of native students a higher chance of bridging contacts. We expect that this bridging mechanism is dominant to the specialization mechanism. This leads to the following *bridging social capital hypothesis*:

Both the proportion of native students and the mean test scores of the native students in the educational/ country system are positively associated with the math scores of Turkish students.

Besides the bridging capital between Turkish students and native students, the Turkish students might benefit from bridging contacts with other ethnic groups. A higher ethnic diversity index is related to relative more interethnic contacts (Veerman et al., 2013). Consequently, a higher origin diversity is associated with more diverse bridging social capital. According to Lazear (1998) more ethnic diversity can enrich students through communication, for instance if the information about the culture of one ethnic group is relevant for the other group. The information that other origin groups may supply is probably not relevant for the math performances of the Turkish students in most cases. Moreover, if the information is relevant for the other group the use of this information is only structural implemented in some curricula (Svalberg, 2007). Furthermore, more interethnic contacts may lead to a higher chance of incentives for interethnic tensions due to the higher chance of cultural differences. These tensions will negatively influence the school performances (Hoxby, 2000). Moreover, a higher ethnic diversity may lead to teaching problems concerning instructional time for a higher number of ethnic groups. Consequently, we expect in the *ethnic diversity hypothesis* a dominant influence of the negative mechanisms of ethnic diversity:

A higher ethnic diversity is negatively associated to school performances of Turkish migrant students.

5. Data and variables

5.1. Data

The analyses have been carried out using the cross-national Programme for International Student Assessment 2009 (PISA) and the Swiss PISA Plus 2009 survey datasets. The cross-national PISA contains social economic background information and school achievement test scores of 15 year old students with Turkish origin for all the European countries with big Turkish communities, except for France, because in France PISA contained no indicator of the origin country. Therefore, our analyses contain students with Turkish origin from Austria, Germany and The Netherlands. Besides these countries with big Turkish communities, information about students with Turkish origin is available for, Belgium, Denmark, Liechtenstein and Switzerland. Consequently, our dataset contains seven European countries with Turkish students. Besides the country level, cross-national PISA contains for Belgium the possibility to split between the Flemish region and the Walloon region. Because the educational system of Belgium is mainly organized on region level and due to the language

difference between the regions, we split our analysis for Belgium in two: the Walloon and Flemish region. Besides Belgium, the educational system of Switzerland is mainly organized on canton level. We could only separate the Swiss students on canton level if we employ the Swiss PISA Plus data. Instead of the cross-national PISA, the students in the Swiss PISA Plus dataset are selected at 9th grade. The 9th grade is in Switzerland the grade where most 15 year old students are expected. Consequently, we had to select in the Swiss PISA Plus data only the students which were 15 year during the test period and in the cross-national data only the grade of every destination country where most 15 year old students were expected, to make the students of both datasets comparable.

Our combination of PISA and Swiss PISA Plus data contains 19 educational destination systems of Turkish students³. We are interested in the ethnic school composition of the Turkish students. Consequently, our dependent variables are the school performances of 733 Turkish students in 19 educational destination systems in Europe. However, we employ for the calculation of the independent variables also information from the non-Turkish students in the school. If we employ only the cross-national data, our analyses contain 1461 Turkish students in 8 destination countries. We first show the results for analyses of this dataset that only includes 8 educational destination countries and then our analyses with the nineteen educational systems⁴. Consequently, we could show whether the design with a combination of PISA and Swiss PISA Plus influences our results.

We compare in our study two research designs on our third level: a design with *country level variables* and a design with *educational system level variables*. Our design with country level variables only contains eight countries and our model with educational system variables contains nineteen educational systems. Maas and Hox (2005) mention that regression coefficients are even unbiased if the sample size is as small as ten groups of five units. Nevertheless, the standard errors of the regression errors are smaller when the number of cases on a higher level are considerable lower than 100 (Maas & Hox, 2005). For instance, the standard errors decrease with approximately 15% when 30 groups are used instead of 100 groups (Maas & Hox, 2005). A design with 10 groups leads to unacceptable underestimated standard errors on the group-level (Maas & Hox, 2005). Furthermore, a low number of cases at a higher level also lead to overestimated group-level variance. Therefore, we expect that

³ Because we also want to show descriptive statistics, we only selected the cantons that at least have six Turkish students in the database. Consequently, we lost three cantons and 1 percent of our students.

⁴ Because we could split Belgium in two regions without losing cases we split also in our country analysis Belgium in two regions. Nevertheless we refer to country level to make the distinction between table 2 and 3 more clear. Consequently we distinguish in our analysis eight European ‘countries’ and in our dataset seven European countries.

associations have lower standard errors on the third level in a design that uses a country level than a design with the educational system on the third level.

5.2. Variables

Dependent Variables

The dependent variables in this study are the *math* and *reading* performances. To measure school skills accurately would make the test too long to be feasible. Hence, PISA created a large number of very similar but shorter tests. Because such different tests can never offer exactly the same degree of difficulty, *Item Response Modeling* (IRM) was used to achieve comparable results between students who took different tests. We averaged the five plausible values that were obtained from the IRM and computed the standard error of this average test score, in order to take into account the variance between these five plausible values. The skills scores were standardized for the Organisation for Economic Co-operation and Development (OECD) countries using an average of 500 and a standard deviation of 100. The mean scores of the students with a Turkish background per country are given in Table 1, along with the difference between the mean test scores of Turkish students and the native students.

Individual level

Origin. Using the method applied by Levels and Dronkers (2008), we took the country of birth of the child, the father and the mother as indicator for origin. If two of these three indicators had the same country of birth but not the country of test, we took that country as origin. However, when there were no two of the same classifications available, the country of birth of the mother was taken to represent the origin country.

Parental ESCS. The ESCS index of the parents is a composite index created within the PISA dataset of the parents' occupational status, measured with the International Socio-economic Index of Occupational Status (ISEI) scale (Ganzeboom et al, 1992), the educational level of the parents, measured with the ISCED (International Standard Classification of Education) classification (UNESCO, 2006), and the presence of any material or cultural resources at the students' homes.

Higher track refers to the track levels 2A and 3A of the International Standard Classification of Education (ISCED). The 2A and 3A programmes ultimately lead to tertiary education (OECD, 1999).

Female. We employ a dichotomous variable to classify gender. Boys are the reference group.

First Generation. Using information on the countries of birth of the students and their parents, we constructed a dichotomous variable. We define first generation migrants as students who were born in Turkey, just as at least one of the parents. We define second-generation migrants as students who were born in the destination country and of whom at least one parent was born in Turkey.

Grade. Since not all students attend the same grade, we have included a variable to account for this. As a result of between-country variance in the way grades are constructed, we have standardized the grade around the modal grade in a country.

Parents mixed marriage. Using information on the countries of birth of the parents, we constructed a dichotomous variable. We define mixed marriage parents as parents of whom one partner was born abroad

Other language at home than the destination language. Using information on the home language of the students, we constructed a dichotomous variable. We miss the language of 5% of the students. Therefore, we include the dummy ‘*language at home missing*’.

School level

Proportion of natives. We computed the proportion of natives using the percentage of native students in the school.

The *proportion of Turkish origin students* was computed using the percentage of students with Turkish origin in the school.

Origin diversity residual. Using the number of students per origin caught up in every school, we computed an inverted Herfindahl index of origin diversity. We calculated the index as follows: $1 - ((\text{percentage ethnic group 1})^2 + (\text{percentage ethnic group 2})^2 + \dots + (\text{percentage ethnic group n})^2)$. Although earlier studies showed that the proportion of migrants in a school and origin diversity are concepts which we should distinguish both theoretical and empirical, Veerman et al. (2013) showed that in an empirical model the use of both variables may lead to problems of multicollinearity, due to the strong Pearson correlation between proportion of migrants and the origin diversity. Using the method applied by Veerman et al. (2013), we estimated a quadratic regression model at the school level, predicting diversity as a function of the proportion of migrants. We then took the residuals of this regression model, thereby measuring the difference between origin diversity as is observed in a school relative to the predicted diversity (see furthermore appendix A). The advantage of this method is that the residualized diversity measure is independent of the proportion of students with a migration background, as independence of the residual with X-variables is an assumption of ordinary

least squares regression. This measurement thus does not assess diversity per sé, but the level of diversity given a particular proportion of migrant children.

The *mean ESCS* was calculated using the ESCS score of all students in the school..

Educational system level

The *average math score of the native pupils* was computed using only the math scores of native pupils in the educational system.

Proportion of migrants with Turkish origin in the educational system. We computed the proportion of Turks in the educational system using statistics of Eurostat and the Turkish Ministry of Labour and Social Security (2010). These statistics are confirmed by the German Federal Statistical Office (Krings, et al., 2010) and are comparable with the statistics of the Statistics Netherlands in 2008 (2012) and the Federal Statistical Office (2010) of Switzerland.

Early bilateral labor recruitment agreement. According to Franz (1994) Turkey first signed bilateral labor recruitment agreements first with Germany (1961) and later with Austria (1964) and Belgium and Netherlands (1965). These agreements specified the general conditions of recruitment, employment and wages. In the seventies the Swiss Confederation (1971) and Denmark (1973) also signed labor recruitment agreements. However these agreements are less comprehensive (Franz, 1994). A strong increase of Turks in Liechtenstein started after 1980 (Marxer, 2007). At that moment the increase of Turkish migrants to other countries was stagnated (Içduygu, 2009). Consequently, we distinguish five educational systems with an early comprehensive bilateral labor recruitment agreement and use twelve educational systems in the Swiss Confederation, Denmark and Liechtenstein as reference group.

Selection effect by design (due to the use of both Swiss Pisa and cross-national PISA). We computed the selection effect using the proportion of Turkish students that we lost due to our selection criteria that made the Swiss Pisa Plus and cross-national PISA comparable.

5.3. Descriptive statistics

Table 1 reports the means and standard deviations for Turkish students and the difference between the mean math scores of the Turkish pupils and the native pupils by destination country. As Table 1 show, Turkish students perform on average higher than 470 points for their math test in Liechtenstein and The Netherlands. The school performances of math are lower than the average of our total Turkish population in Austria, Denmark and Walloon Belgium. Furthermore, the results show the largest Turkish-Native gap in Flemish Belgium and the lowest gap in Liechtenstein.

Appendix B shows that the total mean math score is 18.6 points higher if we only use the selection of Turkish students instead of the only cross-national PISA data. Consequently, our selection of 15 year old Turkish students in the year where most 15 year old students occur leads to a selection of students with higher school performances. The students with lower test scores that we lost due to the selection are especially the students that probably repeated a school year. Appendix B shows a selection effect of 60% or higher for Walloon and Flemish Belgium, The Netherlands and Aargau. The mean results of these educational systems might have a positive influence of the selection effect.⁵ Furthermore, the relative low number of cases and the relative high standard deviation of Vaud show that we should be cautious to conclude whether the Turkish students in Vaud perform better than in other educational systems.

6. Models and results

6.1 Analytical design

Given the nested structure of the data, with individual pupils nested in schools, which are nested in educational systems, we employed multilevel analysis. At the lowest level we include the standard error of the average of the five plausible values on math test as an error term of the dependent variable. This procedure results in a measurement model of the next level of pupils (see Hox, 2002), which results into a more reliable estimation of the true score of the dependent variable.

We employed restricted maximum likelihood instead of full maximum likelihood due to the small number of available educational systems (Maas and Hox, 2005). We check for the

⁵ Table 3 shows a significant positive selection effect in all models (except in model 7). These results confirm our expectation that selection of the 15 year old Turkish students in the year where most 15 year old students occur lead to a selection of Turkish students with higher math scores.

robustness of our results in paragraph 6.3 and compare the results of our only cross-national data in Table 2 with the selected data of the combination of Swiss PISA and cross-national data in Table 3. Because the combination of Swiss PISA and cross-national data contain only one grade, we remove in all models in Table 3 the grade variable that measures the influence of the possible difference from the expected grade. Because we employed a selection procedure for our combination of Swiss PISA and cross-national data we only add the variable selection design effect to all models in Table 3. Furthermore we correct in cases of significant effects on the third level for expected underestimated standard errors (Maas and Hox, 2005) due to the low number of cases on country level or educational system level. Finally we compare our only cross-national results of Table 3 with a selection on the only cross-national results. Although we employ several procedures to measure possible measurement errors, we underpin that due to the low N on the country level conclusions about variables on country level should be made with caution⁶.

Our first Model in Table 2 contains all explaining variables on individual level and the proportion of natives and the ethnic diversity at school level. Consequently, our first Model is mainly comparable with most earlier research models (Braster and Dronkers, 2012; Dronkers and Van der Velden, 2012; Peetsma et al., 2006; Veerman et al., 2013). In Model 2 we have added the indicator for ‘bonding’ capital: the proportion of co-ethnics. We have employed in Model 3 only the proportion of Turkish students instead of both the proportion of natives and the proportion, because the proportion of natives and the proportion of Turkish students strongly correlate ($r=-0.64$). Consequently, we could show whether the use of two strongly correlated variables influence the results in Model 2. We have added in our fourth Model to the second Model our first country variable: bilateral labor agreement (we employ instead of the proportion of Turkish students again the proportion of natives). We have replaced in our fifth Model the bilateral labor agreement by indicator of bridging capital on educational system level: the mean math score of the native students. We have replaced in our sixth Model the mean math score of the native students by the proportion of Turkish students in the educational system. Finally, our seventh Model contains all explaining variables except the proportion of co-ethnics.

6.2 Results on country level

⁶ We checked also the robustness of our results on school level for our first model of our cross-national analysis, using a model with country fixed effects. Our check showed comparable results on school level. Results available on request.

Bonding social capital

Model 2 and 3 in Table 2 shows a non significant parameter estimates of 34.4 and 28.8 for the proportion of Turkish migrants at school level. Besides this variable at school level, we also use the proportion of Turkish students on country level for our co-ethnics hypothesis. We find in Table 2 Model 5 and 7 non significant associations between the proportion of Turkish students at educational system level and math performances. Therefore, we reject the *co-ethnics hypothesis* as a whole due to the non significant parameter estimates of the proportion of Turkish migrants both on school and country level.

Table 2 Model 4 and 7 show non-significant parameter estimates of 32.6 and 33.1 of the bilateral labor agreement. Consequently, we reject our *bilateral labor agreement hypothesis*.

Bridging social capital

We employ in our study two indicators of ‘bridging social capital’: the average test score of the natives of the country level and the proportion of natives in the school. Table 2 Model 5 and 7 show a non-significant parameter estimate of 1.1 of the average score of tests of native students on the math scores at the country level. Finally, all models in Table 2 show non significant parameter estimates between -10.0 and 4.9 of the proportion of natives in the school. We therefore reject the *bridging social capital hypothesis*.

Origin diversity

Table 2 Model 1 shows a significant association of -98.3 between residualized origin diversity and math scores. All other models are also significant and negative. Given these significant results, the *origin diversity hypothesis* is confirmed with regard to the math test scores of the Turkish students. Furthermore appendix C shows that we should also confirm the origin diversity hypothesis for reading scores.

6.3 Results on educational system level

Associations on school level

Most results on school level in Table 3 are comparable with the results in Table 2. Consequently, we also reject both the co-ethnics hypothesis and bridging social capital on school level and confirm the origin diversity hypothesis. Table 3 Model 2 and 3 show inverted results for the proportion of Turkish origin of school. However, all results are non significant.

Associations on educational system level

Table 3 Model 5 and 7 shows a significant association of 0.6 and 0.8 for the average math score of the native students and the math scores. Consequently, we confirm the *bridging social capital hypothesis* on educational system level. Furthermore we find in Table 3 Model 5 a non significant association and in Model 7 a significant association between the proportion of Turkish students at educational system level and math performances. Therefore we confirm the bonding social capital hypothesis only on educational system level and only if we use model 7. Furthermore our bilateral labor agreement variable is also in Table 3 non-significant. Therefore, we also reject the *bilateral labor agreement hypothesis*, using the educational system design.

We expect for Turkish students in Europe comparable associations on the highest⁷ level in a design that uses a country level or educational system level with higher standard errors for the educational system design on the highest level. Our results show different associations on the highest level. For instance, Model 4 in Table 2 shows an association of 32.6 between an early bilateral labor agreement and math performances and Model 4 in Table 3 shows an association of -8.0. Furthermore Model 7 in Table 2 shows even a higher standard error for the average math score of the native students than the standard error in Table 3. We evaluate at the end of our next section whether these unexpected differences are due to the selection in our design.

6.4 Robustness check

We checked for the robustness of our results by re-estimating the coefficients of Table 2 Model 7 by excluding in every analysis one of the eight destination countries. The robustness check in appendix E shows on individual level significant associations between the ESCS and math scores if we exclude Austria, Germany or The Netherlands. The robustness check in appendix E shows that most results of the school level are comparable, except for the model where we exclude Denmark. Table E1 shows that if we exclude Denmark the negative parameter of the residualized ethnic diversity on school performances becomes non significant. If we compare the results of both Denmark in appendix E with the cross-country results in Table 2, the results show that the association between the residualized ethnic diversity math scores in Denmark is higher. Furthermore, the robustness check of our only cross-national data shows for the reading scores that the significant association of -76.8 grows

⁷ We call the country or educational system level the highest level to make the text more readable.

to -117.6 if we exclude The Netherlands⁸. When we compare the results of The Netherlands in appendix E with the cross-country results in appendix C, the results reveals an inverted significant positive association of 357.4 between residualized ethnic diversity and reading test scores for The Netherlands. Finally, appendix E shows that all variables on country level become significant if we exclude Germany. Consequently, we reject our hypotheses on country level due to the unexpected different mechanisms in Germany.

Table 3 shows in Model 7 on the highest level a significant association of 0.8 between the mean math test scores of the natives and the math scores of the Turkish students. Although Maas and Hox (2005) expect a decrease of approximately 15% when 30 groups are used instead of 100 groups, the association between the mean math test scores of the natives and the math scores of the Turkish students stays even significant at $p < 0.05$ if we increase the standard error with 68%. Furthermore the association between the proportion of co-ethnics on educational system level and the math scores of the Turkish students stays significant at $p < 0.05$ if we increase the standard error with 18%.

The results at individual and school level of Table 2 are comparable to the results of the only cross-national analyses in Table 3. Consequently, the selection of only fifteen year old students in the year where we expect most of the students hardly influences our results at individual and school level. Our control variables probably intercept the selection effect. Nevertheless, Table 2 shows no significant variables on country level. This difference is inverted to the expectations of Maas and Hox (2005). Appendix F shows a table with our selection on the cross-national data. Model 7 in appendix F reveals no significant association between the average math score of the native students on country level and the math scores. This result suggest that the significant association in Table 3 on educational system level is not due to the selection of Turkish students that are in the grade where we expect most students.

6. Conclusion and discussion

We investigated the association between various indicators of the ethnic composition of schools and Turkish students' test scores at secondary schools, using both European cross-national and cross-educational system data. In this study, a further distinction was made between the proportion of migrants and the proportion of co-ethnics. We argue that besides

⁸ Robustness check available on request.

the specialization, instruction, ethnic tension and language thesis the social capital thesis may explain a part of the association between the ethnic composition of schools and school performances.

Our results demonstrated that the proportion of natives is not significant related to math scores. We found also no significant relation between the proportion of co-ethnics and math scores on school level. This result suggest that a higher opportunity on more bonding capital on school level for the Turkish students does not necessarily lead to a positive influence on math performances.

We demonstrated significant negative relations between the residualized origin diversity and both math and reading performances. Dronkers and Van der Velden found, using PISA2006 data a negative association between non-residualized ethnic diversity and school performances of migrant students. Therefore, these results of our single migrant group are comparable with the earlier cross-national findings of Dronkers and Van der Velden (2013) for the whole migrant group. Furthermore our results demonstrated significant positive relations between the residualized origin diversity and reading performances for The Netherlands. These results are comparable with the findings of Braster and Dronkers (2012) for migrant students in secondary education in the Dutch capital Rotterdam. Nevertheless, we reject the explanation of Braster and Dronkers that the positive effect of ethnic diversity on school performances is due to multi-ethnic metropolitan context, because our Dutch PISA data also contains non-metropolitan students. Therefore, the positive effect of residualized ethnic diversity should be explained by circumstances that are typical to the Dutch situation. Why would Turkish students in The Netherlands better understand and interpret written material (OECD, 2012) in schools with a higher ethnic diversity than we expect due to the proportion of migrants? One explanation might be the relatively long colonial past of The Netherlands. For instance, 19 percent of Dutch migrants in the database came from an origin country where they speak Dutch. These Dutch-speaking migrants might enrich the language understanding of the Turkish students. Furthermore, the positive association might be influenced by a combination of policies and different appreciations of ethnic diversity. Ersanilli and Koopmans (2011) also indicated recently The Netherlands as a multiculturalists regime with ‘easy access to individual legal equality combined with a high degree of accommodation of diversity’.

The positive results for ethnic diversity in the Netherlands are not the only deviant one. Our robustness check reveals that ethnic diversity has a stronger negative effect in Denmark. We do not want to speculate about the causes of this deviation. Here we only want to

underline that despite of the large similarities in the functioning of European educational systems, there exist also national differences between the European countries in their relation to Turkish migrants.

Our results reveal no significant influence of early comprehensive bilateral labor agreements on math performances of Turkish students. The longer the stay of a migrant group in the destination country and the trust in the labor security of the parents could not explain higher school performances. Other studies use instead of our bilateral labor agreement variable other indicators like the Migrant Integration Policy Index (MIPEX). Although the MIPEX measures the integration policy on country level, Manatschal (2011) finds a subnational variation in integration policy for Swiss cantons. Therefore, we prefer our bilateral labor agreement indicator, because all bilateral labor agreements were signed on national level and not on subnational level. Furthermore the bilateral labor indicator especially refers to our research group and not to migrants in general.

Children of Turkish decent had higher school performances if they were in an educational system with a larger community of co-ethnics and if they were in an educational system with native students with average higher school performances. These associations are only significant on educational system level and not on country level. Unfortunately the distinction between country level and educational system level is for Germany not accessible for research (Prokic-Breuer & Dronkers, 2012). Therefore, we could only use the educational system level if use a selection of 15 year old students that are in the year where most 15 year old students are expected in their country.

It must be noted that, with the cross-sectional data that we (and others) used, claims about causal effects of school composition on pupils' performance should be made with caution. It is possible that Turkish families with higher performing children are more concerned about the ethnic composition of schools than Turkish families with lower performing children. If better performing Turkish pupils are more likely to go to schools with large concentrations of native children, for example because their better educated parents are better informed or more concerned or live in neighborhoods with more native neighbors, it is possible that our observed positive relationship between the proportion of natives and Turkish school performances is flawed by this school selection process. Nevertheless, we could partly reject this selection process idea, because also our results with the partly positive selected Turkish students shows comparable results for the school level as the results for the whole Turkish group.

The PISA data has its limitations for a cross-country comparison. For instance, it is in the PISA data impossible to differentiate on origin region in Turkey. Therefore, a difference in educational outcomes between different countries might be influenced by a selection of Turks from a certain region to a certain destination country.

Future research can enrich these findings by focusing on other migrant groups, using cohort study data and an analysis for other non-cognitive school outcomes like active citizenship.

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References

Agirdag, O., Van Houtte, M. & Van Avermaet, P. (2012). Why Does the Ethnic and Socio-economic Composition of Schools Influence Math Achievement? The Role of Sense of Futility and Futility Culture. *European Sociological Review*, 28, 366-378. doi: 10.1093/esr/jcq070

Braster, S. & Dronkers, J. (2012) De positieve effecten van etnische verscheidenheid in de klas op de schoolprestaties van leerlingen in een multi-etnische grote stad. [The positive effects of ethnic diversity of classes on the educational performance of pupils in a multi-ethnic big city]. Paper presented at the Dutch-Flemish educational research meeting, Wageningen, 20-22 June 2012. Retrieved from: <http://www.eui.eu/Personal/Dronkers/Dutch/LMC.pdf>

Cheng, S., Martin, L. & Werum, R.E., (2007). Adult Social Capital and Track Placement of Ethnic Groups in Germany. *American Journal of Education*, 114, 41-74. doi: 10.1086/520691

Crosnoe, R., Cavanagh, S. & Elder Jr., G.H. (2003). Adolescent friendships as academic resources: the intersection of friendship, race, and school disadvantage. *Sociological Perspectives*, 46 , 331-352. Retrieved from: <http://www.jstor.org/stable/10.1525/sop.2003.46.3.331>

Crul, M. and Doomernik, J. (2003). The Turkish and Moroccan second generation in the

Netherlands: divergent trends between and polarization within the two groups. *International Migration Review*, 37: 1039-1064. doi: 10.1111/j.1747-7379.2003.tb00169.x

Dronkers, J. & Velden, R. van der. (2013). Positive but also negative effects of ethnic diversity in schools on educational performance? An empirical test using cross-national PISA data. In: *Integration and Inequality in Educational Institutions*, edited by M. Windzio. Dordrecht /Heidelberg/ London/New York: Springer.

Dika, S.L. & Singh, K. (2002). Applications of Social Capital in Educational Literature: A Critical Synthesis. *Review of Educational Research*, 72, 31-60. doi: 10.3102/00346543072001031

Ersanilli, E., & Koopmans, R. (2011). Do Immigrant Integration Policies Matter? A Three-Country Comparison among Turkish Immigrants. *West European Politics*, 34, 208-234. doi: 10.1080/01402382.2011.546568

Fennema, Meindert, & Jean Tillie (1999). Political Participation and Political Trust in Amsterdam: Civic Communities and Ethnic Networks. *Journal of Ethnic and Migration Studies*, 25, 703–26. doi: 10.1080/1369183X.1999.9976711

Fleischmann, F., Phalet, K., Deboosere, P. & Neels, K. (2012). Comparing Concepts of Ethnicity in Ethnic Composition Measures: Local Community Contexts and the Educational Attainment of the Second Generation in Belgium. *Journal of Ethnic and Migration Studies*, 10, 1531-1531. doi: 10.1080/1369183X.2012.711033

Federal Statistical Office (2010). Ständige und nichtständige Wohnbevölkerung nach Kanton, Staatsangehörigkeit, Geburtsstaat, Geschlecht und Alter. Neuchâtel: Federal Statistical Office.

Franz, E. (1994). *Population Policy in Turkey*, Hamburg: Deutsches Orient-Institut.

Ganzeboom, H. B.G., De Graaf, P., Treiman, D. J., (with De Leeuw, J.) (1992). A Standard International Socio-Economic Index of Occupational Status. *Social Science Research*, 21,1-56

Halpern, D. and Nazroo, J. (2000). The ethnic density effect: results from a national community survey of England and Wales, *International Journal of Social Psychiatry*, 46, 34-46. doi: 10.1177/002076400004600105

Heelsum, A. van (2005). Political Participation and Civic Community of Ethnic Minorities in Four Cities in the Netherlands. *Politics*, 25, 19-30. doi: 10.1111/j.1467-9256.2005.00225.x

Hox, J. (2002). *Multilevel Analysis. Techniques and Applications*. Mahwah (NJ)/ London: Lawrence Erlbaum.

Hutchinson, J. & A.D. Smith eds, (1996). *Ethnicity*. Oxford: Oxford University Press

İçduygu, A. (2009) International Migration and Human Development in Turkey. United Nations Development Programme: Human Development Research Paper 2009/52. Retrieved from: http://hdr.undp.org/en/reports/global/hdr2009/papers/HDRP_2009_52.pdf

Krings, S. et al. (2010) *Statistical Yearbook 2010*. Wiesenbaden: German Federal Statistical Office

Levels, M, Dronkers, J., & Kraaykamp, G. (2008). Immigrant Children's Educational Achievement in Western Countries: Origin, Destination, and Community Effects on Mathematical Performance. *American Sociological Review* 73: 835-853

Lin, N. (2001) *Social Capital: A Theory of Social Structures and Action*. Cambridge University Press: Cambridge.

Maas, C. J. M., & Hox, J. J. (2005). Sufficient Sample Sizes for Multilevel Modeling. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 85-91. doi: 10.1027/1614-2241.1.3.86

Maestri, V. (2011a). *A deeper insight into the ethnic make-up of school cohorts: Diversity and school achievement* (AIAS Working Paper 11–108). Amsterdam, The Netherlands: University of Amsterdam. Retrieved from http://www.uva-aias.net/uploaded_files/publications/WP108-Maestri.pdf

Maestri, V. (2011b). Een nadere beschouwing van de samenstelling van etnische minderheden op Nederlandse basisscholen. Diversiteit en leerprestaties [A further examination of the composition of ethnic minorities in Dutch primary schools. Diversity and learning performance]. In J. Dronkers (Ed.), *Goede bedoelingen in het onderwijs: Kansen en missers* [Good intentions in education: opportunities and misses] (pp. 155–178). Amsterdam, The Netherlands: Amsterdam University Press.

Manatschal, A. (2011). Taking Cantonal Variations of Integration Policy Seriously - or how to Validate International Concepts at the Subnational Comparative Level, *Swiss Political Science Review* 17, 336-357. doi: 10.1111/j.1662-6370.2011.02027.x

Marxer, W. (2007) *Migration und Integration - Geschichte – Probleme – Perspektiven*. BERN: Liechtenstein-Institut

Morgan, S.L., & Sørensen, A.B. (1999). Parental Networks, Social Closure, and Mathematics Learning: A Test of Coleman's Social Capital Explanation of School Effects. *American Sociological Review*, 64, 661-681. Retrieved from: <http://www.jstor.org/stable/2657368>

Morgan, S.L. (2000). Social capital, capital goods, and the production of learning. *Journal of Socio-Economics* 29, 591-595. Retrieved from: <http://www.soc.cornell.edu/faculty/morgan/papers/socialcapital.pdf>

Organisation for Economic Co-operation and Development (1999). *Classifying Educational Programmes. Manuel for ISCED-97 Implementation in OECD countries*. OECD: Publishing
Organisation for Economic Co-operation and Development (2012). *PISA 2009 Technical Report, PISA*. Paris: OECD Publishing. doi: 10.1787/9789264167872-en

PISA.ch: Measurement of skills and survey of 9th year students in Switzerland – (2009) [Dataset]. Service de la recherche en éducation - SRED, Genève; Institut de recherche et de documentation pédagogique - IRDP, Neuchâtel; Unité de recherche en système de pilotage - URSP, Lausanne; Institut für Bildungsevaluation - IBE, Zürich; Pädagogische Hochschule des Kantons St. Gallen, St. Gallen; Centro di innovazione e ricerca sui sistemi educativi - CIRSE, Locarno. Distributed by FORS, Lausanne, 2012.

Peetsma, T., Van der Veen, I., Koopman, P., & Van Schooten, E. (2006). Class composition influences on pupils' cognitive development. *School Effectiveness and School Improvement*, 17, 275-302. doi: 10.1080/13803610500480114

Prokic-Breuer, T & Dronkers, J. 2012. The high performance of Dutch and Flemish 15-year-old native pupils: Explaining country differences in math scores between highly stratified educational systems. *Educational Research and Evaluation* 18: 749-777. doi: 10.1080/13803611.2012.727359

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectations and student intellectual development*. New York, NY: Holt, Rinehart & Winston.

Stanton-Salazar, R. D., & Dornbusch, S. M. (1995). Social capital and the reproduction of inequality: Information networks among Mexican-origin high school students. *Sociology of Education*, 68, 116–135. Retrieved from: <http://www.jstor.org/stable/2112778>

Statistics Netherlands. (2012). *Bevolking; geslacht, leeftijd en nationaliteit op 1 januari*. The Hague/ Heerlen: Statistics Netherlands.

Svalberg, A. M.-L., (2007). Language awareness and language learning. *Language Teaching*, 40, 287-308. doi:10.1017/S0261444807004491

Turkish Ministry of Labour and Social Security (2010). YURTDIŞINDAKİ VATANDAŞLARIMIZLA İLGİLİ SAYISAL BİLGİLER.

Van der Veen, I., & Meijnen, G.W. (2001). The Individual Characteristics, Ethnic Identity, and Cultural Orientation of Successful Secondary School Students of Turkish and Moroccan Background in The Netherlands. *Journal of Youth and Adolescence*, 30, 539-556. doi: 10.1023/A:1010496520767

Veerman, G.-J.M., Van de Werfhorst, H.G., & Dronkers, J. (2013). Ethnic composition of the class and educational performance in primary education in The Netherlands. *Educational Research and Evaluation*, 19, 370-401. doi: 10.1080/13803611.2013.788851

Zhou, M. (1997). Growing Up American: The Challenge Confronting Immigrant Children and Children of Immigrants. *Annual Review of Sociology*, 23, 63-95.
<http://www.jstor.org/stable/2952544>

Table 1: Means and standard-deviations for Turkish origin students

| | Total | | Austria | | Belgium Walloon | | Belgium Flemish | | Denmark | | Germany | | Liechtenstein | | Netherlands | | Switzerland | |
|-------------------------------------|-------|--------|---------|--------|-----------------|--------|-----------------|--------|---------|--------|---------|--------|---------------|--------|-------------|--------|-------------|--------|
| | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def |
| Individual level | | | | | | | | | | | | | | | | | | |
| Math performances | 435.9 | 83.1 | 419.4 | 74.4 | 426.5 | 88.2 | 441.5 | 85.0 | 415.5 | 80.3 | 439.3 | 82.2 | 498.3 | 76.6 | 470.6 | 73.4 | 457,3 | 89,0 |
| Reading perf. | 417.8 | 85.7 | 383.3 | 79.8 | 409.2 | 102.0 | 429.5 | 81.5 | 411.2 | 75.4 | 426.7 | 87.7 | 438.2 | 80.3 | 459.4 | 79.2 | 430,8 | 88,5 |
| Higher track | 0.8 | 0.4 | 0.5 | 0.5 | 0.7 | 0.5 | 0.6 | 0.5 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.2 | 0.4 | 1,0 | 0,1 |
| ESCS | -0.8 | 0.9 | -0.9 | 0.8 | -0.7 | 1.1 | -1.0 | 1.0 | -0.9 | 0.9 | -0.7 | 0.9 | -0.8 | 0.8 | -0.7 | 1.0 | -0,8 | 0,9 |
| Female | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 | 0.3 | 0.5 | 0.6 | 0.5 | 0,5 | 0,5 |
| First generation | 0.1 | 0.3 | 0.2 | 0.4 | 0.1 | 0.3 | 0.2 | 0.4 | 0.0 | 0.2 | 0.1 | 0.3 | 0.6 | 0.5 | 0.1 | 0.3 | 0,2 | 0,4 |
| Grade | 2.5 | 0.7 | 1.9 | 0.8 | 2.2 | 0.7 | 2.1 | 0.7 | 2.8 | 0.4 | 2.9 | 0.7 | 2.8 | 0.4 | 2.3 | 0.5 | 2,7 | 0,6 |
| Parents mixed marriage | 0.1 | 0.4 | 0.1 | 0.3 | 0.3 | 0.5 | 0.2 | 0.4 | 0.1 | 0.3 | 0.2 | 0.4 | 0.1 | 0.2 | 0.1 | 0.3 | 0,2 | 0,4 |
| Other language at home | 0.5 | 0.5 | 0.6 | 0.5 | 0.7 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.9 | 0.3 | 0.5 | 0.5 | 0,5 | 0,5 |
| language at home missing | 0.2 | 0.4 | 0.2 | 0.4 | 0.0 | 0.0 | 0.4 | 0.5 | 0.2 | 0.4 | 0.2 | 0.4 | 0.1 | 0.2 | 0.2 | 0.4 | 0,2 | 0,4 |
| School level | | | | | | | | | | | | | | | | | | |
| % natives* | 45.7 | 25.4 | 50.2 | 25.6 | 36.4 | 26.3 | 46.7 | 24.1 | 36.3 | 25.0 | 53.5 | 22.5 | 28.0 | 5.2 | 51.5 | 31.6 | 45.5 | 17,7 |
| Residuals Origin diversity | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0,1 | 0,1 |
| Mean ESCS | -0.3 | 0.5 | -0.3 | 0.5 | -0.4 | 0.4 | -0.4 | 0.6 | -0.3 | 0.4 | -0.2 | 0.5 | -0.2 | 0.3 | -0.2 | 0.6 | -0,1 | 0,3 |
| Proportion of Turkish origin* | 21.8 | 21.2 | 23.7 | 21.5 | 19.4 | 15.0 | 20.2 | 13.7 | 34.3 | 30.1 | 19.5 | 12.9 | 11.8 | 6.2 | 16.1 | 10.7 | 8.2 | 4.9 |
| Country level | | | | | | | | | | | | | | | | | | |
| % of Turkish origin* | 4.3 | 1.6 | 4.6 | 0.0 | 2.2 | 0.0 | 1.9 | 0.0 | 6.1 | 0.0 | 5.7 | 0.0 | 5.2 | 0.0 | 3.5 | 0.0 | 1.9 | 0.0 |
| Average math score native stud.* | 525.2 | 16.6 | 510.8 | 0.0 | 518.4 | 0.0 | 550.0 | 0.0 | 508.0 | 0.0 | 527.2 | 0.0 | 531.3 | 0.0 | 541.8 | 0.0 | 549.9 | 0.0 |
| Early bilateral labor agreement | 0.6 | 0.5 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 |
| Difference Turkish Native mean math | -89.3 | 10.0 | -91.4 | 0.0 | -91.9 | 0.0 | -108.5 | 0.0 | -92.5 | 0.0 | -87.9 | 0.0 | -33.0 | 0.0 | -71.3 | 0.0 | -92.5 | 0.0 |
| Test level | | | | | | | | | | | | | | | | | | |
| Error math perf. | 809.1 | 660.1 | 807.0 | 611.9 | 698.8 | 535.3 | 770.0 | 537.1 | 932.1 | 728.0 | 692.2 | 523.6 | 359.2 | 145.1 | 583.0 | 408.1 | 1009.2 | 877.3 |
| Error reading perf. | 526.7 | 437.7 | 629.4 | 539.3 | 505.7 | 474.7 | 519.7 | 380.6 | 464.9 | 368.4 | 496.4 | 391.9 | 312.3 | 174.8 | 489.2 | 328.1 | 575.7 | 496.3 |
| N students | 1461 | | 297 | | 82 | | 85 | | 349 | | 248 | | 17 | | 164 | | 219 | |
| N schools | 594 | | 119 | | 32 | | 33 | | 110 | | 99 | | 6 | | 72 | | 123 | |

*grand mean centered in analyses Source PISA 2009, own computation

Table 2: Regression of the school origin compositions on math scores of Turkish students in cross-national PISA data.

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 |
|--|---------------------------------|-------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|--------------------------------|
| Constant | 456.7** (16.1) | 457.7** (16.1) | 458.0** (16.1) | 435.6** (25.0) | 451.7** (16.1) | 456.5** (16.8) | 430.3** (25.6) |
| Individual level | | | | | | | |
| ESCS | 3.6 (1.9) | 3.6 (1.9) | 3.5 (1.9) | 3.6 (1.9) | 3.6 (1.9) | 3.6 (1.9) | 3.6 (1.9) |
| Higher track | 66.9** (6.5) | 66.6** (6.5) | 66.5** (6.5) | 67.4** (6.5) | 66.9** (6.5) | 67.1** (6.5) | 67.6** (6.5) |
| Female | -26.0** (3.2) | -26.0** (3.2) | -26.0** (3.2) | -26.0** (3.2) | -26.0** (3.2) | -26.0** (3.2) | -26.0** (3.2) |
| First generation | 0.9 (5.0) | 1.2 (5.0) | 1.1 (5.0) | 1.0 (5.0) | 0.9 (5.0) | 0.8 (5.0) | 0.9 (5.0) |
| Grade | 41.7** (2.8) | 42.1** (2.8) | 42.1** (2.8) | 41.9** (2.8) | 41.7** (2.8) | 41.9** (2.8) | 41.9** (2.8) |
| Parents mixed marriage | 13.0** (4.8) | 13.0** (4.8) | 13.0** (4.8) | 13.0** (4.8) | 13.0** (4.8) | 13.0** (4.8) | 13.0** (4.8) |
| Other language at home | -6.1 (3.9) | -5.9 (3.9) | -6.0 (3.9) | -6.1 (3.9) | -6.1 (3.9) | -6.1 (3.9) | -6.1 (3.9) |
| language at home missing | -28.1** (4.7) | -28.1** (4.7) | -28.1** (4.7) | -28.1** (4.7) | -28.2** (4.7) | -28.1** (4.7) | -28.1** (4.7) |
| School level | | | | | | | |
| proportion natives of school | -9.5 (12.0) | 4.9 (16.7) | | -10.0 (12.0) | -9.6 (12.0) | -9.4 (12.0) | -10.0 (12.0) |
| Residuals Origin diversity of school | -98.3** (26.7) | -61.8 (39.7) | -69.1* (31.0) | -97.8** (26.7) | 98.9** (26.7) | -98.5** (26.7) | 98.6** (26.7) |
| Proportion of Turkish origin of school | | 34.4 (27.8) | 28.8 (19.9) | | | | |
| Mean ESCS of school | 55.7** (6.2) | 58.2** (6.5) | 58.6** (6.4) | 55.8** (6.2) | 55.7** (6.2) | 55.6** (6.2) | 55.6** (6.2) |
| Educational system level | | | | | | | |
| Proportion of Turkish origin | | | | | | 12.1 (21.1) | 12.2 (20.0) |
| Average math score native students | | | | | 1.1 (0.9) | | 1.1 (0.9) |
| Early bilateral labor agreement | | | | 32.6 (30.0) | | | 33.1 (30.4) |
| Variance | | | | | | | |
| Country level | 1642.2 (856.4) | 1633.9 (853.5) | 1636.6 (854.0) | 1571.0 (819.6) | 1505.5 (788.1) | 1813.4 (935.4) | 1615.1 (838.2) |
| School level | 1081.1** (156.1) | 1083.3** (156.2) | 1077.3** (155.8) | 1080.3** (156.0) | 1079.8** (156.0) | 1081.0** (156.1) | 1078.8** (155.9) |
| Individual level | 2763.2** (158.7) | 2763.2** (158.6) | 2762.5** (158.6) | 2763.7** (158.7) | 2763.5** (158.7) | 2763.6** (158.7) | 2764.5** (158.7) |
| Test level | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Log likelihood | 16220.3 | 16218.7 | 16218.8 | 16219.0 | 16218.6 | 16220.1 | 16217.2 |
| N students | 1461 | | | | | | |
| N schools | 594 | | | | | | |
| N countries | 8 | | | | | | |

Significance: **p<0,01; *p<0,05

Source PISA 2009, own computation

Standard errors in brackets

Table 3: Regression of the school origin compositions on math scores of Turkish students in cross-educational system PISA data.

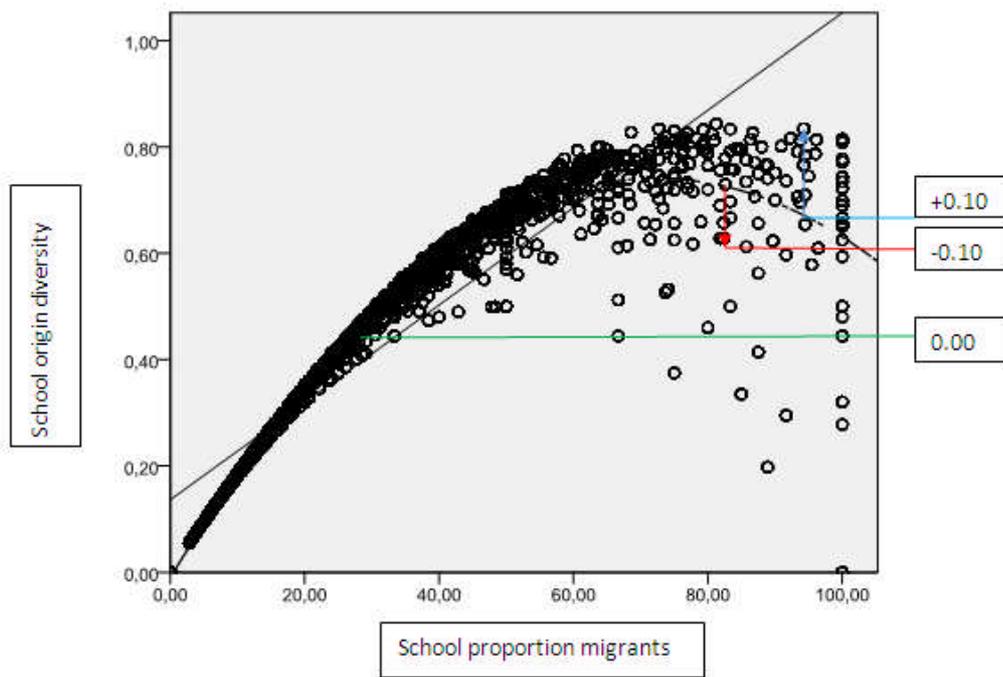
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Constant | 444.9** (14.1) | 443.2** (14.3) | 442.9** (14.3) | 448.5** (15.5) | 440.3** (13.4) | 445.6** (14.1) | 436.0** (15.0) |
| Individual level | | | | | | | |
| ESCS | 5.1 (2.9) | 5.2 (2.9) | 5.4 (2.9) | 5.3 (2.9) | 5.3 (2.9) | 5.1 (2.9) | 5.0 (2.9) |
| Higher track | 59.3** (6.7) | 58.7** (11.7) | 59.7** (11.5) | 58.7** (11.8) | 53.9** (11.4) | 60.8** (11.7) | 55.1** (11.3) |
| Female | -24.2** (4.8) | -24.0** (4.8) | -24.0** (4.8) | -24.0** (4.8) | -24.1** (4.8) | -24.0** (4.8) | -23.9** (4.8) |
| First generation | -0.7 (8.8) | -0.8 (8.8) | -0.7 (8.8) | -0.7 (8.8) | 1.2 (8.8) | -1.2 (8.8) | 0.8 (8.7) |
| Parents mixed marriage | 15.4* (7.8) | 15.3* (7.8) | 15.3* (7.8) | 14.9 (7.8) | 14.0 (7.8) | 15.5 (7.8) | 13.9 (7.8) |
| Other language at home | -1.5 (5.7) | -1.5 (5.7) | -1.5 (5.7) | -1.9 (5.7) | -2.1 (5.7) | -1.5 (5.7) | -2.4 (5.7) |
| language at home missing | -35.2** (6.9) | -35.3** (6.9) | -35.4** (6.9) | -35.5** (6.9) | -35.9** (6.9) | -35.3** (6.9) | -36.3** (6.9) |
| School level | | | | | | | |
| proportion natives of school | -2.9 (15.8) | -9.4 (18.4) | | -2.8 (15.8) | -4.3 (15.7) | -4.2 (15.8) | -6.8 (15.6) |
| Residuals Origin diversity of school | -98.5** (34.7) | -126.4* (52.9) | -115.5* (48.3) | -99.3** (34.8) | -99.7** (34.7) | -98.2** (34.6) | -99.6** (34.6) |
| Proportion of Turkish origin of school | | -25.7 (36.6) | -16.2 (31.5) | | | | |
| Mean ESCS of school | 55.3** (8.8) | 53.7** (9.1) | 52.0** (8.5) | 55.2** (8.9) | 56.2** (8.8) | 55.4** (8.8) | 56.6** (8.8) |
| Educational system level | | | | | | | |
| Selection effect | 1.3** (0.4) | 1.3** (0.4) | 1.2** (0.4) | 1.4* (0.5) | 1.0** (0.3) | 1.2** (0.4) | 0.8 (0.5) |
| Proportion of Turkish origin | | | | | | 1531.9 (1107.5) | 1960.5* (845.9) |
| Average math score native students | | | | | 0.6** (0.2) | | 0.8** (0.3) |
| Early bilateral labor agreement | | | | -8.0 (19.1) | | | 7.8 (16.9) |
| Variance | | | | | | | |
| Educational system level | 525.1* (266.5) | 517.9* (263.9) | 527.1* (267.5) | 553.3* (276.8) | 267.4 (167.7) | 502.8* (260.0) | 169.4 (125.9) |
| School level | 1031.3** (244.1) | 1033.0** (244.5) | 1032.7** (244.3) | 1035.9** (244.6) | 1045.7** (244.7) | 1031.3** (244.0) | 1038.8** (243.5) |
| Individual level | 2945.0** (263.0) | 2954.5** (263.0) | 2951.1** (263.0) | 2946.0** (263.0) | 2937.4** (262.3) | 2939.4** (262.7) | 2927.6** (261.9) |
| Test level | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Log likelihood | 8201.2 | 8200.7 | 8201.0 | 8201.8 | 8194.4 | 8199.2 | 8187.6 |
| N students | 733 | | | | | | |
| N schools | 386 | | | | | | |
| N educational systems | 19 | | | | | | |

Significance: **p<0,01; *p<0,05

Source PISA 2009 and Swiss PISA 2009, own computation

Standard errors in brackets

Appendix A



Appendix B: Means and standard-deviations for Turkish origin students

| | total | | Austria | | Belgium Walloon | | Belgium Flemish | | Denmark | | Germany | | Liechtenstein | | Netherlands | | Vaud | | St. Gallen | |
|-------------------------------------|-------|-----------|---------|-----------|--------------------|-----------|--------------------|-----------|---------|-----------|---------|-----------|---------------|-----------|-------------|-----------|--------|-----------|------------|-----------|
| | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def |
| Individual level | | | | | | | | | | | | | | | | | | | | |
| Math performances | 454.5 | 82.5 | 458.6 | 79.6 | 480.1 | 73.6 | 494.3 | 74.5 | 424.1 | 79.2 | 444.4 | 74.6 | 491.8 | 81.0 | 516.7 | 61.8 | 512.3 | 136.0 | 483.7 | 86.8 |
| Reading perf | 439.9 | 84.1 | 425.2 | 84.2 | 470.3 | 84.6 | 485.1 | 70.2 | 420.1 | 73.8 | 428.5 | 86.5 | 430.6 | 87.5 | 504.7 | 70.6 | 466.8 | 133.3 | 424.4 | 93.7 |
| Higher track | 0.9 | 0.3 | 0.4 | 0.5 | 0.8 | 0.4 | 0.7 | 0.5 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.3 | 0.5 | 1.0 | 0.0 | 1.0 | 0.0 |
| ESCS | -0.8 | 0.9 | -0.9 | 0.8 | -0.3 | 0.9 | -1.0 | 1.1 | -0.9 | 0.9 | -0.7 | 0.9 | -1.0 | 0.7 | -0.4 | 1.0 | 0.0 | 0.9 | -1.0 | 1.2 |
| Female | 0.6 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.7 | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 | 0.2 | 0.4 | 0.6 | 0.5 | 0.3 | 0.5 | 0.2 | 0.4 |
| First generation | 0.1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.3 | 0.0 | 0.2 | 0.1 | 0.3 | 0.6 | 0.5 | 0.1 | 0.3 | 0.2 | 0.4 | 0.1 | 0.3 |
| Parents mixed marriage | 0.1 | 0.3 | 0.1 | 0.3 | 0.3 | 0.5 | 0.1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.4 | 0.1 | 0.3 | 0.1 | 0.3 | 0.2 | 0.4 | 0.4 | 0.5 |
| Other language at home | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.8 | 0.4 | 0.4 | 0.5 | 0.7 | 0.5 | 0.4 | 0.5 |
| language at home missing | 0.2 | 0.4 | 0.3 | 0.5 | 0.0 | 0.0 | 0.3 | 0.5 | 0.2 | 0.4 | 0.2 | 0.4 | 0.1 | 0.3 | 0.2 | 0.4 | 0.2 | 0.4 | 0.4 | 0.5 |
| School level | | | | | | | | | | | | | | | | | | | | |
| % natives* | 46.0 | 25.7 | 68.6 | 14.1 | 43.5 | 29.8 | 44.5 | 27.1 | 36.3 | 25.8 | 50.6 | 22.5 | 26.3 | 7.8 | 56.0 | 31.7 | 31.6 | 28.8 | 56.2 | 17.8 |
| Residuals Origin diversity | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | -0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 |
| Mean ESCS | -0,2 | 0,5 | -0,1 | 0,3 | -0,2 | 0,5 | -0,3 | 0,7 | -0,3 | 0,5 | -0,2 | 0,5 | -0,2 | 0,2 | 0,0 | 0,6 | -0,1 | 0,3 | -0,2 | 0,4 |
| % of Turkish origin* | 22.5 | 23.1 | 11.1 | 64.3 | 23.7 | 17.7 | 25.0 | 13.8 | 35.1 | 30.9 | 21.6 | 12.0 | 11.7 | 43.0 | 13.7 | 82.0 | 74.1 | 44.2 | 91.1 | 36.6 |
| Educational sytem | | | | | | | | | | | | | | | | | | | | |
| % of Turkish origin* | 4.1 | 1.9 | 2.0 | 0.0 | 1.4 | 0.0 | 0.9 | 0.0 | 5.7 | 0.0 | 5.8 | 0.0 | 5.6 | 0.0 | 2.2 | 0.0 | 1.0 | 0.0 | 2.2 | 0.0 |
| Average math score native students | 531.7 | 24.8 | 526.5 | 0.0 | 555.0 | 0.0 | 575.9 | 0.0 | 513.6 | 0.0 | 512.9 | 0.0 | 530.6 | 0.0 | 564.4 | 0.0 | 548.8 | 0.0 | 582.3 | 0.0 |
| Early bilateral labor agreement | 0.4 | 0.5 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Selection effect | 41.1 | 20.3 | 76.3 | 0.0 | 67.1 | 0.0 | 65.9 | 0.0 | 20.3 | 0.0 | 43.2 | 0.0 | 23.5 | 0.0 | 68.3 | 0.0 | 36.4 | 0.0 | 54.8 | 0.0 |
| Difference Turkish Native mean math | -77.3 | 16.3 | -67.9 | 0.0 | -74.9 | 0.0 | -81.7 | 0.0 | -89.5 | 0.0 | -68.5 | 0.0 | -38.8 | 0.0 | -47.7 | 0.0 | -36.5 | 0.0 | -98.6 | 0.0 |
| Test level | | | | | | | | | | | | | | | | | | | | |
| Error Math perf. | 844.2 | 690. 6 | 699.8 | 499. 2 | 811.5 | 628. 8 | 712.8 | 612. 2 | 931.7 | 765. 2 | 735.6 | 543.6 | 367.7 | 154.7 | 588.7 | 412.4 | 1879.1 | 647.5 | 851.9 | 581.3 |
| Error reading perf. | 488.8 | 377. 5 | 511.2 | 398. 3 | 560.2 | 388. 9 | 440.2 | 311. 6 | 457.3 | 367. 5 | 478.5 | 365.5 | 317.0 | 194.4 | 521.2 | 298.5 | 547.0 | 505.4 | 712.8 | 467.8 |
| N students | 733 | | 66 | | 27 | | 29 | | 272 | | 141 | | 13 | | 52 | | 6 | | 14 | |
| N schools | 386 | | 40 | | 18 | | 13 | | 103 | | 73 | | 6 | | 40 | | 4 | | 8 | |

| | Schaffhausen | | Bern (German) | | Other German Swiss | | Bern (French) | | Fribourg | | Zurich | | Italian Swiss | | Aargau | | Neuenbrug | | Geneva | |
|---|--------------|--------|---------------|--------|--------------------|--------|---------------|--------|----------|--------|--------|--------|---------------|--------|--------|--------|-----------|--------|--------|--------|
| | mean | St def | mean | St def | Mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def | mean | St def |
| Individual level | | | | | | | | | | | | | | | | | | | | |
| Math performances | 546.3 | 53.8 | 452.9 | 69.4 | 477.2 | 81.3 | 448.2 | 58.6 | 507.7 | 48.1 | 464.6 | 86.0 | 437.8 | 69.3 | 501.5 | 78.7 | 488.8 | 78.4 | 464.2 | 50.1 |
| Reading performances | 530.7 | 43.5 | 449.7 | 86.2 | 433.7 | 103.8 | 437.3 | 66.8 | 518.5 | 29.7 | 449.7 | 77.4 | 408.0 | 49.9 | 485.8 | 84.9 | 455.9 | 136.5 | 459.3 | 53.8 |
| Higher track | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 |
| ESCS | -0.6 | 0.5 | -0.7 | 0.8 | -0.7 | 0.9 | -0.5 | 0.3 | -1.1 | 0.7 | -0.5 | 0.7 | -0.7 | 1.1 | -0.5 | 0.9 | -1.1 | 0.9 | -0.6 | 1.0 |
| Female | 0.6 | 0.5 | 0.6 | 0.5 | 0.2 | 0.4 | 0.6 | 0.5 | 0.8 | 0.4 | 0.5 | 0.5 | 0.8 | 0.5 | 0.8 | 0.4 | 0.6 | 0.5 | 0.4 | 0.5 |
| First generation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.1 | 0.3 | 0.0 | 0.0 | 0.1 | 0.3 | 0.6 | 0.5 | 0.1 | 0.4 |
| Parents mixed marriage | 0.1 | 0.4 | 0.3 | 0.5 | 0.1 | 0.3 | 0.3 | 0.5 | 0.2 | 0.4 | 0.2 | 0.4 | 0.0 | 0.0 | 0.3 | 0.4 | 0.1 | 0.4 | 0.1 | 0.4 |
| Other language at home | 0.4 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 0.9 | 0.4 | 0.7 | 0.5 | 0.6 | 0.5 | 0.4 | 0.5 | 0.6 | 0.5 | 0.7 | 0.5 | 0.4 | 0.5 |
| language at home missing | 0.1 | 0.3 | 0.1 | 0.4 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.5 | 0.0 | 0.0 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| School level | | | | | | | | | | | | | | | | | | | | |
| % natives* | 53.4 | 20.8 | 41.9 | 14.4 | 60.1 | 21.9 | 48.8 | 8.9 | 55.9 | 7.0 | 42.0 | 13.3 | 30.7 | 21.2 | 59.9 | 11.7 | 52.3 | 12.0 | 20.5 | 8.3 |
| Residuals Origin diversity | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| Mean ESCS | 0,1 | 0,2 | -0,2 | 0,2 | -0,1 | 0,4 | 0,1 | 0,2 | 0,2 | 0,2 | 0,0 | 0,3 | -0,1 | 0,3 | 0,0 | 0,2 | 0,0 | 0,2 | 0,0 | 0,3 |
| % of Turkish origin* | 6.7 | 3.0 | 7.1 | 2.0 | 9.1 | 6.6 | 3.1 | 7.9 | 2.7 | 1.1 | 7.5 | 3.1 | 8.4 | 2.7 | 7.7 | 4.0 | 2.6 | 9.6 | 4.1 | 2.0 |
| Educational system level | | | | | | | | | | | | | | | | | | | | |
| % of Turkish origin* | 2.9 | 0.0 | 1.0 | 0.0 | 2.2 | 0.0 | 1.2 | 0.0 | 1.0 | 0.0 | 2.9 | 0.0 | 1.4 | 0.0 | 2.4 | 0.0 | 1.1 | 0.0 | 1.1 | 0.0 |
| Average math score native students | 587.0 | 0.0 | 563.6 | 0.0 | 566.7 | 0.0 | 556.0 | 0.0 | 577.9 | 0.0 | 565.0 | 0.0 | 524.8 | 0.0 | 573.8 | 0.0 | 541.7 | 0.0 | 532.8 | 0.0 |
| Early bilateral labor agreement | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Selection effect | 51.7 | 0.0 | 50.0 | 0.0 | 50.0 | 0.0 | 0.0 | 0.0 | 45.5 | 0.0 | 41.0 | 0.0 | 46.7 | 0.0 | 55.6 | 0.0 | 30.0 | 0.0 | 36.4 | 0.0 |
| Difference Turkish and Native mean math | -40.6 | 0.0 | -110.6 | 0.0 | -89.5 | 0.0 | -107.8 | 0.0 | -70.2 | 0.0 | -100.4 | 0.0 | -87.0 | 0.0 | -72.3 | 0.0 | -52.9 | 0.0 | -68.6 | 0.0 |
| Test level | | | | | | | | | | | | | | | | | | | | |
| Error Math perf. | 918.9 | 578.0 | 1132.7 | 826.0 | 1584.6 | 1126.6 | 1376.5 | 598.3 | 1059.1 | 1051.0 | 675.1 | 472.2 | 1080.1 | 1123.4 | 715.0 | 681.4 | 798.1 | 571.1 | 1178.3 | 812.1 |
| Error Reading perf. | 483.0 | 244.7 | 746.9 | 550.9 | 583.6 | 641.0 | 828.8 | 392.2 | 588.7 | 367.0 | 405.2 | 367.0 | 529.1 | 491.8 | 396.7 | 269.2 | 715.5 | 472.6 | 494.5 | 385.6 |
| N students | 14 | | 8 | | 17 | | 7 | | 6 | | 23 | | 8 | | 16 | | 7 | | 7 | |
| N schools | 10 | | 5 | | 12 | | 4 | | 5 | | 14 | | 7 | | 12 | | 6 | | 6 | |

*grand mean centered in analyses Source PISA 2009 and Swiss PISA 2009, own computation

Appendix C: Regression of the school origin compositions on reading scores of Turkish students in cross-national PISA data.

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 |
|--|---------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Constant | 413.3** (14.8) | 413.1** (14.9) | 413.1** (14.8) | 389.9** (21.9) | 413.2** (15.6) | 408.4** (14.4) | 392.6** (23.3) |
| Individual level | | | | | | | |
| ESCS | 6.2** (1.9) | 6.2** (1.9) | 6.2** (1.9) | 6.2** (1.9) | 6.2** (1.9) | 6.2** (1.9) | 6.1** (1.9) |
| Higher track | 65.1** (6.7) | 65.2** (6.7) | 65.2** (6.7) | 65.7** (6.7) | 65.4** (6.7) | 65.2** (6.7) | 66.0** (6.7) |
| Female | 25.3** (3.3) | 25.2** (3.3) | 25.2** (3.3) | 25.2** (3.3) | 25.2** (3.3) | 25.2** (3.3) | 25.2** (3.2) |
| First generation | -2.6 (5.1) | -2.6 (5.1) | -2.6 (5.1) | -2.4 (5.1) | -2.6 (5.1) | -2.5 (5.1) | -2.5 (5.1) |
| Grade | 36.3** (2.9) | 36.3** (2.9) | 36.3** (2.9) | 36.5** (2.9) | 36.4** (2.9) | 36.1** (2.9) | 36.5** (2.9) |
| Parents mixed marriage | 9.9* (4.9) | 9.9* (4.9) | 9.9* (4.9) | 9.8* (4.9) | 9.9* (4.8) | 9.8* (4.9) | 9.9* (4.9) |
| Other language at home | -10.9** (4.0) | -10.9* (4.0) | -10.9* (4.0) | -10.9* (4.0) | -10.9* (4.0) | -10.9* (4.0) | -10.9* (4.0) |
| language at home missing | -24.0** (4.8) | -24.0** (4.8) | -24.0** (4.8) | -24.0** (4.8) | -24.0** (4.8) | -24.1** (4.8) | -24.0** (4.8) |
| School level | | | | | | | |
| proportion natives of school | 0.6 (12.5) | -1.8 (17.4) | | 0.2** (12.5) | 0.7** (12.5) | 0.4** (12.5) | -0.1** (12.5) |
| Residuals Origin diversity of school | -76.9** (28.2) | -83.2* (41.7) | -80.5* (32.7) | -76.0** (28.2) | -77.0** (28.2) | -77.2** (28.2) | -76.8** (28.2) |
| Proportion of Turkish origin of school | | -6.0 (29.0) | -3.9** (20.9) | | | | |
| Mean ESCS | 57.7** (6.4) | 57.3** (6.8) | 57.1** (6.6) | 57.9** (6.4) | 57.6** (6.4) | 57.8** (6.4) | 57.7** (6.4) |
| Cross-national level | | | | | | | |
| Proportion of Turkish origin | | | | | 743.8 (1918.7) | | 1146.6 (1835.5) |
| Average math score native students | | | | | | 1.2 (0.9) | 1.1 (1.0) |
| Early bilateral labor agreement | | | | 36.1 (25.7) | | | 25.2 (29.4) |
| Variance | | | | | | | |
| Country level | 1297.0 (687.0) | 1302.8 (688.8) | 1299.1 (688.7) | 1120.7 (598.6) | 1472.9 (774.4) | 1107.3 (591.0) | 1286.7 (682.0) |
| School level | 1279.5** (170.7) | 1280.3** (170.8) | 1445.2** (183.3) | 1278.7** (170.7) | 1279.6** (170.8) | 1276.9** (170.6) | 1276.9** (170.6) |
| Individual level | 2863.3** (161.2) | 2863.1** (161.2) | 1444.3** (757.9) | 2863.4 (161.2) | 2863.5 (161.2) | 2864.2** (161.3) | 2864.6** (161.3) |
| Test level | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Log likelihood | 16268.6 | 16268.6 | 16313.6 | 16266.6 | 16268.6 | 16266.4 | 16265.6 |
| N students | 1461 | | | | | | |
| N schools | 594 | | | | | | |
| N countries | 8 | | | | | | |

Significance: **p<0,01; *p<0,05

Source PISA 2009, own computation

Standard errors in brackets

Appendix D: Regression of the school origin compositions on reading scores of Turkish students in cross-educational system PISA data.

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 |
|--------------------------------------|--------------------------------|----------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Constant | 400.8** (14.6) | 397.6** (14.8) | 396.9** (14.8) | 400.0** (16.1) | 400.0** (13.2) | 401.1** (14.6) | 401.3** (13.6) |
| Individual level | | | | | | | |
| ESCS | 10.0** (3.0) | 10.1** (3.0) | 10.3** (3.0) | 9.9** (3.0) | 9.7** (3.0) | 9.9** (3.0) | 9.3** (3.0) |
| Higher track | 60.7** (12.2) | 59.3** (12.2) | 60.3** (12.0) | 61.2** (12.3) | 54.9** (11.6) | 61.9** (12.2) | 55.2** (11.3) |
| Female | 30.2** (5.0) | 30.5** (5.0) | 30.5** (5.0) | 30.1** (5.0) | 29.9** (5.0) | 30.2** (5.0) | 30.1** (4.9) |
| First generation | -2.9 (9.1) | -3.2 (9.1) | -3.1 (9.1) | -3.0 (9.1) | -0.9 (9.0) | -3.4 (9.1) | -1.4 (9.0) |
| Parents mixed marriage | 6.2 (8.0) | 6.0 (8.0) | 6.1 (8.0) | 6.2 (8.0) | 5.0 (8.0) | 6.3 (8.0) | 5.0 (8.0) |
| Other language at home | -3.9 (5.9) | -4.2 (5.9) | -4.0 (5.9) | -3.9 (5.9) | -4.2 (5.9) | -3.9 (5.9) | -4.4 (5.8) |
| language at home missing | -29.8** (7.1) | -30.2** (7.1) | -30.1** (7.1) | -29.8** (7.1) | -30.2** (7.1) | -29.9** (7.1) | -30.6** (7.1) |
| School level | | | | | | | |
| proportion natives of year | 5.0 (16.6) | -8.8 (19.3) | | 5.2 (16.7) | 5.7 (16.4) | 4.6 (16.7) | 3.8 (16.3) |
| Residuals Origin diversity of year | -96.3* (37.6) | -155.7** (57.5) | 145.8** (51.6) | -96.3* (38.7) | -94.3* (37.2) | -96.3* (37.6) | -95.3* (36.9) |
| Proportion of Turkish origin of year | | -54.2 (38.6) | -45.9 (33.3) | | | | |
| Mean ESCS of school | 53.8** (9.3) | 50.6** (9.6) | 48.8** (8.9) | 53.6** (9.3) | 55.1** (9.2) | 53.6** (9.3) | 55.3** (9.1) |
| Educational system level | | | | | | | |
| Selection effect | 1.1** (0.4) | 1.2** (0.4) | 1.2** (0.4) | 1.1* (0.5) | 0.8* (0.3) | 1.1** (0.4) | 0.8* (0.3) |
| Proportion of Turkish origin | | | | | | 1009.5 (1141.9) | 2008.0** (755.2) |
| Average math score native students | | | | | 1.0** (0.3) | | 1.1** (0.2) |
| Early bilateral labor agreement | | | | 1.8 (19.5) | | | -5.8 (12.3) |
| Variance | | | | | | | |
| Educational system level | 503.5 (267.1) | 499.0 (265.0) | 507.7 (268.0) | 559.3 (287.5) | 161.9 (127.6) | 523.3 (274.1) | 64.1 (76.6) |
| School level | 1285.4** (237.0) | 1272.0** (272.0) | 1272.2** (271.7) | 1281.0** (273.0) | 1281.7** (272.0) | 1282.2** (272.6) | 1256.6** (269.0) |
| Individual level | 3021.5** (276.4) | 3034.2** (276.5) | 3030.1** (276.1) | 3020.7** (276.1) | 3020.4** (276.5) | 3022.0** (276.3) | 3044.0** (276.0) |
| Test level | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Log likelihood | 8254.8 | 8252.8 | 8253.0 | 8254.9 | 8254.9 | 8253.9 | 8253.9 |
| N students | 733 | | | | | | |
| N schools | 386 | | | | | | |
| N educational systems | 19 | | | | | | |

Significance: **p<0,01; *p<0,05

Source PISA 2009 and Swiss PISA 2009, own computation

Standard errors in brackets

Appendix E

Table E1: robustness check

| | Minus Austria | Minus Walloon | Minus Flemish | Minus Denmark | Minus Germany | Minus Liechtenstein | Minus Netherlands | Minus Switzerland |
|--|----------------------------------|---------------------------------|----------------------------------|-------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------------------------|
| Constant | 437.0** (27.0) | 432.9** (28.4) | 431.8** (29.4) | 439.6** (40.8) | 417.6** (8.9) | 414.6** (31.9) | 436.7** (26.6) | 431.2** (36.5) |
| Individual level | | | | | | | | |
| ESCS | 4.5* (2.1) | 3.8 (2.0) | 3.6 (2.0) | 0.5 (2.1) | 5.2* (2.1) | 3.6 (1.9) | 4.4* (2.1) | 3.0 (1.9) |
| Higher track | 62.5** (8.6) | 63.3** (7.2) | 67.8** (7.1) | 69.0** (6.6) | 73.7** (6.5) | 67.8** (6.5) | 66.5** (7.4) | 72.6** (6.4) |
| Female | -23.8** (3.7) | -25.9** (3.3) | -25.9** (3.3) | -24.9** (3.5) | -27.4** (3.6) | -25.9** (3.2) | -27.1** (3.5) | -27.5** (3.4) |
| First generation | 0.8 (6.1) | -0.1 (5.2) | -0.4 (5.3) | 0.8 (5.1) | -0.2 (5.5) | -0.3 (5.1) | 4.3 (5.5) | 3.1 (5.4) |
| Grade | 41.9** (3.3) | 41.1** (3.0) | 41.8** (3.0) | 41.1** (3.0) | 44.6** (3.3) | 42.3** (2.8) | 40.8** (3.1) | 42.2** (2.9) |
| Parents mixed marriage | 11.7** (5.4) | 14.2** (5.1) | 14.6** (5.1) | 13.0* (5.0) | 16.6** (5.5) | 12.8** (4.8) | 11.0* (5.2) | 10.7* (5.1) |
| Other language at home | -7.8 (3.9) | -4.1 (4.1) | -5.9 (4.1) | -8.4 (4.4) | -3.8 (4.4) | -6.0 (3.9) | -8.0 (4.3) | -4.4 (4.1) |
| language at home missing | -32.9** (5.4) | -27.1** (4.8) | -28.9** (4.9) | -21.5** (5.4) | -29.3** (5.2) | -28.2** (4.7) | -28.9** (5.1) | -27.0** (4.9) |
| School level | | | | | | | | |
| proportion natives of school | -21.5 (14.0) | -11.8 (12.5) | -7.4 (12.5) | -6.8 (14.5) | 1.5 (12.6) | 9.0 (12.0) | 3.0 (12.9) | -18.4 (12.3) |
| Residuals Origin diversity of school | -116.1** (32.8) | -94.4** (27.5) | -102.6** (26.9) | -69.9 (39.5) | -90.0** (26.0) | -102.3** (26.5) | -118.6** (27.5) | -79.0** (26.2) |
| Proportion of Turkish origin of school | | | | | | | | |
| Mean ESCS of school | 65.6** (7.3) | 56.5** (6.5) | 56.6** (6.5) | 59.8** (6.9) | 39.3** (6.8) | 54.9** (6.2) | 59.3** (6.6) | 53.3** (6.3) |
| Country level | | | | | | | | |
| Proportion of Turkish origin | 1080.6 (2042.6) | 1508.9 (2543.2) | 1620.8 (2808.5) | 989.2 (2279.9) | 2679.4** (522.0) | 149.7 (2399.5) | -51.4 (2508.4) | 907.4 (2405.5) |
| Average math score native students | 1.6 (1.1) | 1.2 (1.1) | 0.9 (1.3) | 0.7 (1.3) | 1.0** (0.2) | 1.1 (1.0) | 0.8 (1.0) | 1.4 (1.3) |
| Early bilateral labor agreement | 23.3 (33.0) | 28.8 (35.6) | 29.0 (42.4) | 20.5 (42.4) | 61.5** (7.3) | 48.9 (36.2) | 20.6 (33.7) | 27.0 (43.3) |
| Variance | | | | | | | | |
| Country level | 1688.0 (938.7) | 2003.3 (1109.5) | 2167.4 (1189.1) | 1994.3 (1104.3) | 18.0 (28.9) | 1732.4 (940.4) | 1708.1 (949.6) | 2078.2 (1144.2) |
| School level | 1058.5** (180.1) | 1127.2** (164.3) | 1074.6** (161.6) | 1272.6** (181.5) | 982.8** (166.8) | 1054.1** (154.9) | 1073.1** (169.1) | 972.7** (153.9) |
| Individual level | 2938.5** (188.5) | 2802.7** (164.8) | 2805.5** (165.9) | 2422.4** (162.5) | 2879.3** (179.4) | 2755.9** (159.6) | 2912.0** (176.7) | 2587.2** (159.1) |
| Test level | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) |
| Log likelihood | 12982.6 | 15324.3 | 15331.1 | 12255.6 | 13481.4 | 16020.7 | 14446.1 | 13683.3 |
| N students | 1164 | 1379 | 1376 | 1112 | 1213 | 1444 | 1297 | 1242 |
| N schools | 475 | 562 | 561 | 484 | 495 | 588 | 522 | 471 |

Significance: **p<0,01; *p<0,05

Source PISA 2009, own computation

Standard errors in brackets

Table E2: Regression of the school origin compositions on school performances of Turkish students in single-national PISA data.

| | Math scores | | Reading scores | |
|--|----------------------------|--|----------------------------|--|
| | Denmark | | Netherlands | |
| Constant | 471.8** (9.1) | | 440.3** (13.2) | |
| Individual level | | | | |
| ESCS | 13.6** (4.2) | | -0.6 (4.6) | |
| Higher track | 0.0 (0.0) | | 103.6** (11.4) | |
| Female | -32.3** (7.4) | | 17.4** (7.5) | |
| First generation | 7.5 (17.0) | | -20.9 (12.5) | |
| Grade | 46.5** (8.5) | | 45.4** (7.0) | |
| Parents mixed marriage | 21.2 (13.2) | | 26.8* (12.2) | |
| Other language at home | 2.7 (8.3) | | 3.7 (8.4) | |
| language at home missing | -48.4** (9.6) | | -1.8 (11.2) | |
| School level | | | | |
| proportion natives of school | 0.1 (24.3) | | 73.6 (38.0) | |
| Residuals Origin diversity of school | -115.5** (34.5) | | 357.4** (137.3) | |
| Proportion of Turkish origin of school | | | | |
| Mean ESCS of school | 38.3** (13.5) | | 18.7 (15.7) | |
| Variance | | | | |
| School level | 662.5** (285.8) | | 524.8* (255.5) | |
| Individual level | 3760.8* (399.6) | | 2014.2* (298.4) | |
| Test level | 0.0 (0.0) | | 0.0 (0.0) | |
| Log likelihood | 3916.7 | | Not available | |
| N students | 349 | | 164 | |
| N schools | 110 | | 72 | |

Significance: **p<0,01; *p<0,05

Source PISA 2009, own computation

Standard errors in brackets

Appendix F

Table F: Regression of the school origin compositions on math scores of selected Turkish students in cross-national system PISA data.

| | Model 7 |
|--|---------------------------------|
| Constant | 345.7** (38.5) |
| Individual level | |
| ESCS | 7.6** (2.9) |
| Higher track | 69.4** (12.6) |
| Female | -22.47* (4.9) |
| First generation | -11.6 (8.5) |
| Parents mixed marriage | 19.6* (8.0) |
| Other language at home | -2.0 (5.9) |
| language at home missing | -36.1** (7.0) |
| School level | |
| proportion natives of school | 38.9* (15.2) |
| Residuals Origin diversity of school | -114.5* (37.3) |
| Proportion of Turkish origin of school | |
| proportion parents with tertiary education of school | 95.3** (20.9) |
| Cross-national level | |
| Selection effect | 2.5* (1.1) |
| Proportion of Turkish origin | 2819.2 (1526.1) |
| Average math score native students | 1.0 (0.6) |
| Early bilateral labor agreement | -53.2 (43.3) |
| Variance | |
| Individual level | 3460.0** (247.1) |
| School level | 1257.1** (269.7) |
| Educational system level | 651.5 (386.7) |
| Log likelihood | 8308.1 |
| N students | 739 |
| N schools | 391 |
| N countries | 8 |

Significance: **p<0,01; *p<0,05

Source PISA 2009, own computation

Standard errors in brackets