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Speaking the Same Language – The Effect of Foreign Origin Teachers on Students' Language Skills

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Lisa Sofie Höckel[1]

Speaking the Same Language – The Effect of Foreign Origin Teachers on Students' Language Skills

Abstract

This study investigates whether foreign origin teachers causally affect their students language skills in secondary school. Exploring within-student variation in assignment to teachers, I find that teachers who are immigrants or descendants of immigrants significantly increase the reading comprehension of students. The effect is strongest for foreign origin students and can partly be explained by a role model effect. The positive effect of bilingual foreign origin teachers is particularly large. They significantly increase reading comprehension for native and foreign origin students. Given their own experience in language learning, bilingual teachers seem exceptionally well-equipped in teaching languages to both native and foreign origin students.

JEL-Code: J13, J15, I24

Keywords: Academic achievement; education economics; language skills; matching; migration; role model effect; teacher bias effect

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1 Introduction

International migration not only affects the labor force, it also increases diversity in classrooms around the world. In OECD countries, more than 25 percent of 15-34 year-olds report a foreign origin, and the share of foreign origin students continues to rise (OECD, 2018). Large and persistent achievement gaps between native and foreign origin students, meaning students who are either immigrants or descendants of immigrants, prevail in most countries (e.g., Schnepf, 2007; Algan *et al.*, 2010), and the economics literature has identified language as the single most important determinant associated with the achievement gap (e.g., Dustmann *et al.*, 2010, 2012; Geay *et al.*, 2013). Increasingly, policy makers consider the achievement gap as one of the most pressing problems of the education system with severe implications for income and other lifelong outcomes of foreign origin students (OECD, 2018).

Among teachers, those of foreign origin are often underrepresented. In the US, immigrants make up approximately 13 percent of the population, but they comprise only 11 percent of teachers (Furuya *et al.*, 2019). Considering second and higher generation immigrants, this gap even widens. In Germany, for example, whereas 33 percent of under-15 year-old students have a foreign origin, this is only true for 8 percent of primary and secondary school teachers (Statistisches Bundesamt, 2012, 2018). Therefore, policy makers promote the "fast and sustainable" recruitment of foreign origin teachers to facilitate the integration of foreign origin students (Bundesamt für Migration und Flüchtlinge, 2010). Yet, we know little about the effect of foreign origin teachers on students' academic achievements. Are foreign origin teachers better equipped in helping foreign origin children to overcome potential language barriers and socio-economic disadvantages? And how do they affect the achievement of native students? For the US, the literature shows that minority students benefit from same-race teachers (e.g., Dee, 2004; Fairlie *et al.*, 2014; Gershenson *et al.*, 2016), but it is unclear if these findings can be transferred to the context of immigration in Europe.

In this paper, I investigate whether having a foreign origin teacher causally affects

students' language skills in lower secondary school, holding constant both observed and unobserved factors related to academic outcomes. Using data from the German National Educational Panel Study (NEPS) with unique information on teachers' foreign origin and their teacher examination grade and exploiting within-student variation in assignment to teachers, I find that foreign origin teachers increase objective reading comprehension of their students. The effect is strongest for foreign origin students and can partly be explained by a positive role model effect. More specifically, foreign origin students perceive their foreign origin teachers more favorably. Foreign origin teachers who report a mother tongue other than German increase reading test scores for both native and foreign origin students the most. Ruling out alternative explanations and finding no effect of bilingual teachers on math test scores, I therefore argue that bilingual teachers are particularly well-equipped for teaching languages.

Theoretically, foreign origin teachers might affect students' academic achievement differently than native teachers for two reasons. First, *student-teacher matching* can influence students' academic achievement. Matching effects comprise two complementary channels that can make demographic matching of students and teachers particularly advantageous for matched students. A *role model effect* describes a positive reaction of foreign origin students to foreign origin teachers. Triggered by the teacher's presence, rather than an explicit behavior, foreign origin students' beliefs about their educational possibilities can enhance, making them more enthusiastic, confident, and engaged in class. A *teacher bias effect* refers to the teacher's behavior. Foreign origin teachers can display origin-specific patterns of behavior, they can allocate more class time to interacting with students of the same origin, they can prepare class material more oriented towards same-origin students, or they can simply favor them through grading (Dee, 2007).

Second, foreign origin teachers can have different *language skills* than native teachers. On the one hand, foreign origin teachers can be less proficient in the language of instruction. On the other hand, they can communicate course content to foreign origin students in a language or manner these students are more familiar with (Seah, 2018b). Given potential *student-teacher matching* and *language skills*, the effect of having a foreign origin teacher

on students' language skills is theoretically ambiguous.

Previous research has discussed matching effects with respect to demographic characteristics, mostly gender and race (e.g., Dee, 2004; Bettinger and Long, 2005; Hoffmann and Oreopoulos, 2009; Fairlie *et al.*, 2014; Antecol *et al.*, 2015). Dee (2004) examines test scores from the Project STAR class-size experiment, which randomly matches students and teachers within participating schools. He shows that assignment to own-race teachers significantly increases math and reading achievement of both black and white students. Fairlie *et al.* (2014) and Egalite *et al.* (2015) confirm these ethnicity/race matching effects using large administrative data. More recently, Seah (2018a) investigates the effect of immigrant teachers on 8th graders in the US and finds no adverse effect of immigrant teachers on the achievement of (native) students. However, the National Education Longitudinal Study of 1988 (NELS) data employed only allow him to use variation in student attainment across subjects.[1]

Empirically, role model and teacher bias effects are difficult to disentangle. Therefore, some studies directly test for teacher bias and discrimination effects. Dee (2005) exploits student-specific evaluations from teachers and shows that ethnic matching between student and teacher has large effects on teachers' perception of student performance. Similarly, Gershenson *et al.* (2016) find that non-black teachers have significantly lower educational expectations for black students, and studies by Hinnerich *et al.* (2015) and Alesina *et al.* (2018) show that immigrant students are graded significantly worse by their teacher in comparison to the blind grading of an external evaluator. Evidence from Germany finds teacher discrimination for essay grades for students with a Turkish-sounding first name (Sprietsma, 2013) and grade penalties in primary school for second generation immigrants (Kiss, 2013). Employing Chilean data to investigate gender matching effects on academic achievement, the study by Paredes (2014) uniquely tests for role model and teacher bias effects in the same setting. She finds that girls benefit from having female teachers and argues that her results are explained by a role model rather than a teacher bias effect.

[1] Another limitation of the NELS data is that they do not provide information on the immigrant status of the teacher. Instead, Seah (2018a) defines immigrant teacher as a teacher who reports being a native speaker of a language other than English.

More specifically, she shows that the effect is only significant for subjects with lower proportions of female teachers and for girls with less educated mothers.

A small strand of the literature discusses language skills of teachers. Early studies analyze the effect of foreign teaching assistants on the academic achievements of undergraduate students in university (Borjas, 2000; Asano, 2008). The ambiguous effects found by these studies can be explained by the non-random assignment of teaching assistants to students. In the study most closely related to this paper, Seah (2018b) examines the effect of having a linguistically similar teacher on the academic achievements of secondary school students in the United States. Using data from the NELS, he exploits within-student variation in test scores and the native language of teachers across two subjects. He finds no effect of being assigned to a linguistically similar teacher once the teacher's ethnicity is controlled for. In related work, Chin *et al.* (2013) evaluate the effect of a bilingual education program on the achievement of limited English proficient (LEP) students and their classmates. Employing a regression-discontinuity design, they find no impact on the achievement of students for whom the program was designed (LEP students), but estimate a positive effect for their classmates.

This study contributes to the literature in three ways. First, it adds to the scant evidence on the causal relationship between teachers' foreign origin and students' academic achievement. Given the large and persistent achievement gap between native and foreign origin students, this fills an important gap in the literature. Second, it contributes to the discussion on teacher bias versus role model effects. By exploiting information on objective test scores and subjective teacher grading as well as survey questions on students' perception of their teacher, I can uniquely test both effects in the same setting. Third, it investigates the particular role of bilingual teachers in the context of language acquisition, which has not been studied previously. My results point to a special ability of teachers who report a mother tongue other than German in teaching language skills to students.

The remainder of the study is organized as follows. Section 2 gives a short institutional overview of the German school system, and Section 3 introduces the empirical strategy. Section 4 discusses the data, and Section 5 presents the findings. Section 6 concludes.

2 Institutional Background

A key feature of the German education system is that students are typically tracked after four years of elementary schooling.[2] Students are sorted based on their academic ability and assigned to one of three secondary school tracks: lower-secondary track (*Hauptschule*), middle-secondary track (*Realschule*) and upper-secondary track (*Gymnasium*).[3] *Hauptschule* provides practical education and prepares students for vocational education (until grade 9); *Realschule* has a broader range of emphasis for intermediate students (until grade 10); and *Gymnasium* qualifies students for higher education (until grade 12 or 13).[4] Depending on the federal state, the track is determined by parental choice or a binding teacher recommendation based on the students' academic achievement and ability to work independently. Schooling is compulsory for nine or ten years, depending on the federal state. Students usually finish the track they have been assigned to, but switching tracks is possible and became more common in recent years.

A second relevant feature of the German education system is that teaching is organized in classes rather than courses. More specifically, class refers to a group of up to 30 students who are allocated by their school's headmaster to the same classroom upon entry into secondary school. All students in one class share the same teacher for a given subject. In contrast to the US, students do not take different courses in the same subject based on their proficiency.[5] Further, teachers do not specialize in teaching a particular grade but the school's headmaster assigns them to classes on a yearly basis. Typically, the composition of students in a class rarely changes throughout the school years.

Most German teachers are graduates of a formal teaching education program (*Lehramtstudium*). Conditional on having earned a degree that qualifies for tertiary education, teacher training for secondary education comprises two components. First, teacher candidates complete four to six years of university courses covering the two subjects they later

[2] In the federal states of Berlin and Brandenburg, students are tracked after six years of schooling.

[3] Additionally, there are comprehensive schools (*Gesamtsschulen*) that combine all education types and amount to 12 percent of all German secondary schools (Malecki *et al.*, 2014).

[4] See Figure A1 for an illustration of the German education system.

[5] This study focuses on German language classes that are compulsory in German schools. Students are obliged to take them and cannot choose courses based on their preferences for teachers.

want to teach in combination with some pedagogical training. At the end of the first phase, the candidate takes exams on pedagogic and theoretical knowledge of the subjects studied. In addition to the grades earned at the university level, these exams comprise the first state examination grade. Second, candidates participate for 18-24 months in a practical program of teaching seminars (*Referendariat*) at a teaching training school. During this phase, candidates have teaching positions, complete a thesis, and deliver demonstration lessons rated by head teachers. The combination of assessments of the demonstration lessons, the thesis grade and exams sum up to the second state examination.

The second state examination is compulsory for entry into civil service.[6] Candidates who have studied abroad can only become civil servants by exhibiting comparable educational attainment, or by obtaining the second state examination. Ultimately, the grade of the second state examination, in combination with the local demand for teachers, determines the school a teacher is assigned to. Federal states can hire teaching candidates without the second state examination on regular salaried positions without awarding them civil servant status.

3 Empirical Strategy

An ideal empirical setting to study the effect of having a foreign origin teacher on students' academic achievement requires random allocation of teachers across classes. Otherwise, simple OLS regressions might lead to biased estimates due to two main threats to identification: First, native and foreign origin teachers might select into schools with students who systematically differ with respect to their proficiency. In most German federal states, teachers are allocated to schools partly based on their second state examination grade. Additionally, residential sorting by socio-economic status produces significant quality differences between school catchment areas even within small geographical areas (Noreisch, 2006). If foreign origin teachers were better teachers and had better grades, they could, for example, be more likely to be sent to schools with better performing students.

[6] In most federal states, teachers become civil servants. Nevertheless, approximately one in four teachers is hired as an employee rather than a civil servant.

Consequently, this allocation would lead to an overestimation of the effect of foreign origin teachers.

Second, within schools, the headmaster could allocate teachers to more or less proficient classes based on their origin or confounding factors correlated with origin. For example, foreign origin teachers could be allocated to classes with a high share of foreign origin students, and, thus more heterogeneous classes. If class heterogeneity is negatively correlated with student performance, the effect of foreign origin teachers would be underestimated.

In order to address these biases, I follow the teacher value-added literature, which decomposes students' test scores into components related to student heterogeneity and components related to teacher quality (e.g., Rothstein, 2010). More specifically, I use longitudinal data with class fixed effects to estimate the "gain" in student achievement if a foreign origin teacher teaches a student using variation in teacher assignment over time.

For the class fixed effects specification, I estimate the model

$$y_{iclt} = \beta FT_{ct} + \phi' X_{it} + \gamma' C_l + \rho_c + \delta_t + \varepsilon_{iclt} \tag{1}$$

where y_{iclt} is the outcome of student i in class c with teacher l in year t. FT_{ct} is a dummy variable for the German language teacher being of foreign origin and X_{it} is a vector of observed student characteristics. C_l denotes a vector of observed teacher characteristics and ρ_c is a class fixed effect. δ_t are year dummies and ε_{iclt} is the error term.

Eq. (1) represents the return to both individual and teacher inputs. The main variable of interest is FT_{ct}, whose parameter β captures the effect of having a foreign origin teacher. Employing class fixed effects allows me to implicitly standardize test scores across classes as within classrooms students experience the same class-level shocks and take exactly the same tests. The key assumption is that there are no unobserved factors in ε_{iclt} that correlate with students' outcomes and teacher assignment to classes.

One major threat to identification is non-random teacher assignment with respect to students' foreign origin.[7] If foreign origin teachers are assigned to classes where foreign

[7]To test for systematic sorting of teachers to classrooms, I regress student characteristics that are likely to be correlated with unobserved ability on a dummy variable indicating a foreign origin teacher.

origin students perform better relative to native students and this performance is not due to the foreign origin interaction between students and teacher but due to unobserved differences in ability between native and foreign origin students, the estimates would be biased. Therefore, I test for differential sorting by regressing student characteristics that are likely to be correlated with unobserved ability on a foreign origin student-teacher interaction.

Table 1 shows the interaction coefficients of the estimations, which measure how much the native foreign origin gap in outcomes varies across courses taught by native and foreign origin teachers. All specifications are insignificant and most coefficients are close to zero. As math and German test scores are highly correlated, I view column (4) as a particularly good measure of a potential unobserved student characteristic that might be related to a differential selection. Overall, this balancing test gives confidence that there is no systematic sorting with respect to the foreign origin student-teacher interaction.

Table 1: Student-Teacher Sorting by Foreign Origin

	(1) Female student	(2) Age	(3) Class repeated	(4) Math testscore
Foreign origin student-teacher interaction	−0.033	2.691	−0.010	−0.007
	(0.052)	(6.393)	(0.012)	(0.136)
Class FE	*Yes*	*Yes*	*Yes*	
Observations	7,313	6,969	7,351	7,346

*Notes: – Each estimate is from a regression of the corresponding student characteristic on a dummy indicating the teacher's origin, a dummy indicating the student's origin and the interaction between these two variables in a classroom. (Regression results without class FE are comparable and displayed in Table A1.) Robust standard errors are in parentheses. – *** p<0.01, ** p<0.05, * p<0.10.*

Further sources of endogeneity could arise from changes in class composition over time and unobserved student characteristics.[8] Therefore, I adapt Eq. (1) by including student fixed effects and dropping student-level variables from Eq. (1) that are multicollinear with the student fixed effects. This within-student identification strategy uses variation in assignment to teacher due to student mobility and teacher turnover and accounts for

Table A2 presents the results of this balancing test. For gender, age and class repeated, I cannot reject the hypothesis that the correlation between student characteristics and foreign origin teacher is equal to zero. The positive coefficient on math test score can be explained by the higher probability of having a foreign origin teachers to work in schools with an academic tracks (*Gymnasium*).

[8] A related source of endogeneity results from dynamic assignment of teachers into classes (e.g. good teachers follow after bad teachers). While I can not directly test for dynamic selection, it is unlikely to bias the estimates from Eq. (1) as long as the dynamic selection is orthogonal to the foreign origin of teachers.

time-invariant student heterogeneity (e.g., with respect to student's unobserved ability or motivation). This strategy yields unbiased estimators if there are no unobserved, time-varying student-specific factors that are correlated with both students' outcomes and class assignment.[9]

For the student fixed effects specification, I estimate the model

$$y_{iclt} = \beta FT_{ct} + \phi' X_{it} + \gamma' C_l + \rho_c + \delta_t + \omega_i + \varepsilon_{iclt} \tag{2}$$

where ω_i are student fixed effects.

4 Data and Descriptive Statistics

This study uses data from the German Educational National Panel Study (NEPS) (Blossfeld, 2011). The NEPS has a multi-cohort design and draws from a representative sampling frame of students from six starting cohorts. The survey follows students as they move through the education system and contains extensive questionnaires answered by persons in the students' personal environment, such as parents, teachers, and headmasters.

For the empirical analysis, I employ data from starting cohort 3 (SC3) as SC3 provides unique information on teachers' origin. SC3 follows students from grade 5 to 9, an age cohort that is particular suitable for the research question as the first nine years of education are compulsory and crucial for lifelong education outcomes (Angrist and Krueger, 1991). The sampling population of SC3 contains all German fifth graders in schools offering lower secondary education in school year 2010/11. First, schools are randomly drawn from the population of public schools to be representative by school type.[10] Second, a class is randomly selected within each school (see Steinhauer and Zinn, 2016, for sampling design). Participation is voluntary and implies that students complete competency tests and answer a questionnaire on their socioeconomic background. The teacher questionnaire contains

[9] This specification controls for absolute sorting that takes place if students who take classes with foreign origin teachers are systematically different from those who do not—irrespective of their foreign origin.

[10] Students from schools with a predominant foreign teaching language and students who are not able to participate in the normal testing procedure are excluded.

information on the teachers' demographics and aspects of their career choice and studies. I disregard interview data on parents and headmasters to minimize sample attrition.

In order to determine the students' foreign origin, I employ three variables provided by the NEPS data set. (a.) Students report which citizenship they hold. If they mention any (additional) nationality other than German, I code them as foreign origin. (b.) Interviewers record students' country of origin. I treat non-German groups of origin as foreign origin. (c.) Students state if they have a Russian or Turkish migration background. If they mention one of the two migration backgrounds, I code them as foreign origin.[11]

To determine German language teachers' foreign origin, I use two variables. (a.) Teachers are asked about their migration background, namely if they are foreign born or if they have at least one foreign born parent. (b.) Teachers report their mother tongue, meaning the language they learned as a child in the family. If they mention a mother tongue additional to German, or other than German, I code them as foreign origin. If teachers do not report a migration background or a mother tongue, I code them as native Germans.

Besides containing unique information on teacher origin, the NEPS has the advantage of providing objective and unidimensional competence scores. For the empirical analysis, I focus on reading comprehension scores as the main outcome variable. The score is designed to measure the ability to understand and use written texts, which are important preconditions to develop personal skills and participate in social life and the labor force (Gehrer *et al.*, 2012). As promoting reading comprehension is one of the key objectives of German language classes, I can attribute this skill to the domain of the German language teacher.

A relevant feature of the competence tests is that NEPS interviewers conduct the test and German language teachers cannot manipulate the score. This procedure is crucial in a setting where teacher bias effects might be at work. Reading comprehension is assessed by multiple choice questionnaires, which test the understanding of five text functions and

[11] This question does not bias the sample towards students of Russian and Turkish background. It only identifies an additional 6 percent of foreign origin students.

associated text types, namely informational, commenting, instructional, advertising and literary texts. The reading competence test lasts 28 minutes per text function and fits the thematic orientation, lexical, semantic, and grammatical properties of the specific age cohort (Gehrer *et al.*, 2012). The answers to the multiple choice questions are aggregated by a weighted maximum likelihood estimation and constrained to having a mean of zero in the first wave. This standardization ensures that scores are comparable across different survey waves.

I impose several restrictions on the data. From the initially 6,527 students, I observe 6,485 in the years when the tests take place. Of those, I drop 358 students because they do not participate in the competence test. I can link 5,758 students to their German language teacher and I have context data for 719 German language teachers of 4,724 students.[12]

To illustrate the data, Table 2 presents descriptive statistics for the students observed. The first variable describes the main outcome variable, i.e., the objective reading comprehension scores. The average of 0.29 indicates that the reading comprehension in the sample has increased over time.[13] Out of the 4,724 students in the sample, 35 percent are of foreign origin. This share is in line with statistics of the German Microzensus, which estimate a share of (narrowly defined) foreign origin students of 33 percent in 2012 (Statistisches Bundesamt, 2012). The most common countries of origin in the data are Russia, Turkey, and Poland, which together account for 45 percent of foreign origin students. The sample is balanced with respect to gender, and almost 95 percent of the students are born in 1999 or 2000. The sample contains observations from grade 5, 7 and 9, because reading comprehension is tested in those grades.[14] The grade average of 6.65 indicates that the sample contains more observations in lower grades. This pattern can be explained by sample attrition and 3 percent of repeated grades. The average household size is 4 and around 80 percent of students live in households of 3 to 5 people.

[12]To avoid further sample attrition, I keep teacher observations with missing information if the teacher answers at least two questions used for the control variables.

[13]Further, the sample is slightly skewed towards higher achieving students as the average reading comprehension in grade 5 is 0.07 rather than 0.

[14]The missing years are not necessarily a concern, as teachers typically change classes every 2 years implying that a teacher teaching a certain subject in grade 5 (7) is likely to teach the same class in grade 6 (8).

Table 2: Descriptive Statistics – Students

	Mean	Min	Max	Student Obs.	Panel Obs.
Main outcome variable					
Reading comprehension score	0.285	−4	6	4,724	7,351
Student characteristics					
Female	0.494	0	1	4,724	7,351
Foreign origin	0.352	0	1	4,724	7,351
Birth month					
January	0.082	0	1	4,724	7,351
February	0.078	0	1	4,724	7,351
March	0.084	0	1	4,724	7,351
April	0.079	0	1	4,724	7,351
May	0.078	0	1	4,724	7,351
June	0.085	0	1	4,724	7,351
July	0.090	0	1	4,724	7,351
August	0.092	0	1	4,724	7,351
September	0.092	0	1	4,724	7,351
October	0.081	0	1	4,724	7,351
November	0.080	0	1	4,724	7,351
December	0.079	0	1	4,724	7,351
Birth year					
1995	0.001	0	1	4,724	7,351
1997	0.002	0	1	4,724	7,351
1998	0.045	0	1	4,724	7,351
1999	0.413	0	1	4,724	7,351
2000	0.530	0	1	4,724	7,351
2001	0.010	0	1	4,724	7,351
2002	0.001	0	1	4,724	7,351
Grade	6.647	5	9	4,724	7,351
Grade repeated	0.025	0	1	4,724	7,351
Household size	4.439	1	10	4,724	7,351
Other outcome variables					
Mathematics score	0.304	−5	5	4,720	7,346
German grade	4.370	1	6	4,700	8,572
German teacher tries to understand my point	3.283	1	5	4,584	7,024
German teacher has class under control	3.702	1	5	4,666	7,213

Notes: – The descriptive statistics are weighted to account for differences in the number of observations per student.

Besides reading comprehension scores and student characteristics, Table 2 provides information on further outcome variables. It shows an average mathematics score of 0.30, indicating that the mathematical test score also increases over time. The German grade corresponds to the subjective grade given by the German language teacher at the end of the school year and it ranges from one to six. Here, six corresponds to an outstanding achievement while one (and two) refers to an insufficient achievement. The most prevalent grade is satisfactory (4), which 44 percent of students receive. The NEPS data also contain survey questions on how students perceive their teachers. Students are asked to agree with statements about their German language teacher on a scale ranging from 1 to 5.[15] In the sample, 28 percent of students rather agree with the statement that their teacher tries

[15]The categories are: Does not apply at all (1), does rather not apply (2), partly (3), does rather apply (4), applies completely (5).

to understand their point of view and then tells them what he/she would do. 31 percent of students state that their teacher has the class completely under control.

Overall, the characteristics of native and foreign origin students differ significantly with respect to all variables except for gender and birth month (see Table A3). In line with the existing literature, the data reveal a large native-foreign gap in achievement with a mean reading comprehension score for native students of 0.42 (0.47 for math) and 0.06 (0.04 for math) for foreign origin students. In addition, foreign origin students are older and more likely to live in larger households.

Table 3: Descriptive Statistics – German Language Teachers

	Mean	Min	Max
Foreign origin	0.063	0	1
First generation immigrant	0.022	0	1
Second and higher generation immigrant	0.040	0	1
Bilingual	0.040	0	1
Slavic	0.014	0	1
Romance	0.014	0	1
Others	0.013	0	1
Female	0.752	0	1
Age	44.170	24	66
Birth decade			
1940s	0.031	0	1
1950s	0.292	0	1
1960s	0.208	0	1
1970s	0.228	0	1
1980s	0.241	0	1
Age when profession was chosen			
Between 0-14	0.145	0	1
Between 15-19	0.446	0	1
Between 20-24	0.210	0	1
After 25	0.104	0	1
Grade at first state exam	−0.010	−2	3
German language studies	0.900	0	1
Language studies	0.236	0	1
Teacher-year observations	7,351		
Teacher observations	718		

Notes: – The descriptive statistics are weighted to account for differences in the number of observations per teacher.

Table 3 summarizes the main explanatory variable and the teacher characteristics controlled for in the empirical analysis. Of the German language teachers observed in the sample, 6 percent are of foreign origin. This share is comparable with national estimates for 2012 (7.8 percent) (Statistisches Bundesamt, 2018). More than 60 percent of foreign origin teachers are born in Germany, implying that the majority of foreign origin teachers are second and higher generation immigrants. Further, 63 percent of foreign origin teachers report a mother tongue other than (or additional to) German. In contrast to the student

population, teachers are evenly distributed across countries of origin and mother tongues. In the sample, 34 percent of foreign origin teachers have a Slavic mother tongue (mainly Polish and Russian), 34 percent a Romance mother tongue (mainly Italian), and 32 percent another (*Other*) mother tongue (mainly English). Less than one in four German language teachers is male, and the German teacher's average age is 44. Besides age and birth decade, I further control for the age when the person decided to become a teacher. Almost 45 percent of teachers report that they chose their profession in their teens.

While the question on age when profession was chosen might be prone to response bias, I include it to control for unobserved intrinsic motivation. To proxy German language teachers' overall ability, I include their average grade at the first state examination which is standardized to have a mean of zero and a standard deviation of one in the full sample. Of the German language teachers in the sample, 90 percent studied German language studies and 24 percent studied other languages such as English or Slavic languages. I include controls for the federal state where the German language teacher acquired his/her higher education entrance qualification, but I do not report them due to data confidentiality.

Native and foreign origin teachers differ significantly with respect to all variables, except the federal state where they acquired their higher education entrance qualification (see Table A4). Foreign origin teachers are younger and decided to become teachers earlier than native teachers. Further, their average grade at the first state examination is 0.17 standard deviations below the grade of native teachers and they are more likely to teach in the academic track (*Gymnasium*). While 25 percent of native teachers work in *Realschule*, only 10 percent of foreign origin teachers do so. In sum, native and foreign origin teachers differ with respect to important observable characteristics. Therefore, it is crucial to control for these characteristics.

Overall, the sample consists of 255 classes (2,911 students) with a teacher transition. Of those, 31 classes (419 students) experience a change in the foreign origin of the teacher. While the sample size is limited, the identifying variation is larger than in previous studies (c.f., Borjas, 2000; Fleisher *et al.*, 2002; Asano, 2008) and comparable to the US study by Seah (2018a).

5 Results

5.1 Foreign Teacher Effect

I start the empirical analysis by testing if foreign origin teachers affect students' reading comprehension. Panel A of Table 4 displays the aggregated foreign origin teacher effect for the full sample. Panels B and C provide separate estimates for native and foreign origin students to investigate if there are differential effects by students' origin. As we move along the columns, I increasingly restrict the variation used to identify the parameter of interest. The specification in column (1) controls for student characteristics and class fixed effects. Following Eq. (1), it accounts for peer effects and teacher allocation across schools and classes. Column (2) includes teacher characteristics, and column (3) displays results from the preferred specification described in Eq. (2), which contains both student and classroom fixed effects.[16]

For the overall sample, there is a positive and significant correlation between reading comprehension scores and having a foreign origin teacher in column (1). The foreign origin teacher estimate becomes larger once its effect is disentangled from teacher characteristics in column (2). In column (3), the effect is identified by within-student variation in teacher allocation. Consequently, less variation is employed and β is less precisely estimated. Nevertheless, the effect stays significant and the magnitude rises to 0.26. The coefficient of 0.26 amounts to 0.20 standard deviations in the reading comprehension test score. This effect is sizable in comparison to teacher value-added effects found in the literature. Rockoff (2004), for example, finds an increase in teacher quality by one standard deviation to improve student test scores by 0.1 standard deviations. Other seminal papers of the teacher value-added literature document similar effect sizes (c.f., Rivkin *et al.*, 2005; Aaronson *et al.*, 2007; Chetty *et al.*, 2014a,b).

For native students, in Panel B, the effect size of having a foreign origin teacher is similar in the specifications including class and student fixed effects (column (2) and

[16]For ease of exposition, coefficients of the control variables are presented in Table A7 and Table A8. They are in the expected direction.

Table 4: Effect of Foreign Origin Teacher on Reading Comprehension

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.175**	0.232***	0.259*
	(0.069)	(0.069)	(0.137)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.660
Observations	7,351	7,351	7,351
Panel B: Native Students			
Foreign origin teacher	0.260**	0.315***	0.279
	(0.108)	(0.107)	(0.223)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.362	0.363	0.648
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Foreign origin teacher	0.115	0.129	0.375*
	(0.087)	(0.095)	(0.198)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.394	0.655
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

(3)). For foreign origin students, in Panel C, the correlation between student unobserved heterogeneity and the teacher's origin matters. With student fixed effects, the effect of having a foreign origin teacher doubles in size and becomes statistically significant. Overall, in the preferred third specification, the foreign origin teacher effect is larger and more precisely estimated for foreign origin than native students. Especially for foreign origin students, this improvement in reading comprehension can have important implications for lifelong outcomes such as productivity and wages because language fluency facilitates the transfer and adaptation of skills in the job market (Chiswick and Miller, 1995; Dustmann and van Soest, 2001; Hayfron, 2001; Dustmann and Fabbri, 2003).

Nevertheless, the effects are positive and comparable in size for both sub-samples.[17] This finding is in line with Seah (2018a), who shows no adverse effects of immigrant

[17]Results obtained from a fully interacted model do not reveal significantly different effects of foreign origin teachers on students with and without foreign origin.

teachers on native students in the US. In contrast to the literature on race-matching, the positive effect of foreign origin teachers is not caused by matching effects in the sense that there are positive effects on the matched group (here: foreign origin students) and adverse effects on the mismatched group (here: native students). Instead, Table 4 indicates positive effects for foreign origin students and clearly no negative effect for native students. However, I do not find a universal positive effect of foreign origin teachers on students' academic achievement as the effect of foreign origin teachers on math test scores is indistinguishable from zero (see Table A9). Therefore, the following section focuses on German language teachers and analyzes teacher bias and role model effects as well as language specific skills as potential mechanisms for the positive effect on students' reading comprehension.

5.2 What Explains the Foreign Teacher Effect?

5.2.1 Teacher Bias Effect

The positive effect of foreign origin teachers in Table 4 is stronger for foreign origin students. Therefore, I test if a teacher bias effect, meaning an explicit behavior of teachers targeted towards matched students (e.g., grading them more favorably), can explain the differential effect sizes between native and foreign origin students.

So far, the specification implicitly assumes that foreign origin students can be influenced by any foreign origin teacher equally and by a similar amount. An alternative approach is to allow foreign origin interaction to operate only if a student is matched with a teacher of a similar language group. Therefore, I analyze if teachers are more likely to increase the reading comprehension of students who share a similar origin. Such an effect could indicate that teachers allocate more class time to students whose origin they match with.

In Table 5, I employ a language match variable as the main variable of interest.[18] The language match variable is equal to one if student and teacher report a mother tongue of

[18]Using a linguistic distance measure to proxy the match with respect to the disadvantage in reading comprehension arising from the linguistic distance between student and teacher (e.g., Isphording, 2014) yields in similar results (see Table A10).

Table 5: Effect of Language Match between Teacher and Student on Reading Comprehension

Panel A: Native Students	(1)	(2)	(3)
Language match	−0.352***	−0.467***	−0.533**
	(0.108)	(0.127)	(0.263)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.362	0.363	0.649
Observations	4,812	4,812	4,812
Panel B: Foreign Origin Students			
Language match	0.003	−0.022	0.324
	(0.283)	(0.356)	(0.475)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.393	0.653
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

the same language group, e.g. a student with German as a mother tongue and a teacher with German as a mother tongue. Notably, there is a negative matching effect for native students. Yet, this negative language match for native students is not surprising given the positive effect of foreign origin teachers who mostly do not match the students' German mother tongue. For foreign origin students, there is no significant positive matching effect. The point estimate of having a student-teacher language match is smaller than the effect of having a foreign origin teacher. Furthermore, the standard errors are larger.[19]

As a second test for teacher bias, I analyze the students' German grades. In Germany, few centralized exams are conducted until grade 9, and the grading of students is mostly left to the discretion of the teacher. A positive effect of language matches on subjective teacher grading could suggest a teacher bias. Table 6 uses students' German grades as an outcome variable and shows, in Panel A, a positive correlation between having a language match and the German grade for native students. For foreign origin students, Table 6 does not reveal a positive matching effect.[20] Therefore, the results fail to confirm the existence

[19]These results are in line with Fairlie *et al.* (2014), who find the effect of same-race and minority interaction to be similar.

[20]I obtain similar results running regressions on a harmonized sample of students taking the reading comprehension test in Table A11.

of a teacher bias effect for foreign origin teachers.[21] Instead, the results illustrate that the foreign teacher effect is not driven by specific language matches between foreign origin students and teachers.

Table 6: Effect of Language Match between Teacher and Student on German Grade

Panel A: Native Students	(1)	(2)	(3)
Language match	0.111	0.131**	0.116
	(0.079)	(0.060)	(0.083)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.224	0.223	0.640
Observations	5,757	5,757	5,757
Panel B: Foreign Origin Students			
Language match	−0.370	−0.376	−0.091
	(0.361)	(0.362)	(0.197)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.174	0.175	0.625
Observations	2,815	2,815	2,815

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

5.2.2 Role Model Effect

Teacher bias and role model effects are difficult to disentangle. Studies in a university setting interpret exposure to female faculty members or female instructors in initial courses as female role model effects (e.g., Canes and Rosen, 1995; Bettinger and Long, 2005). Yet, these studies cannot rule out direct teacher influence via teacher bias effects. To overcome this problem, Dee (2007) compares students' perception on the subject taught by matched and unmatched teachers to elicit the role model effect more directly. Likewise, I approximate role mode effects by employing survey questions on how students perceive their teachers. If teacher's foreign origin can explain part of the variation in students' perception of their teacher, this effect can be attributed to a role model effect.[22]

[21] Using foreign origin teacher instead of the language match variable as the main explanatory variable, Table A12 does not show a teacher bias effect.

[22] In this context, I define a role model effect as a positive teacher perception of the student irrespective of this perception being caused by an underlying teacher bias effect or not.

Table 7: Effect of Foreign Origin Teacher on Students' Perception that the Teacher Understands Their Point

Panel A: Native Students	(1)	(2)	(3)
Foreign origin teacher	−0.243**	−0.153	−0.064
	(0.104)	(0.118)	(0.237)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.075	0.088	0.163
Observations	4,598	4,598	4,598
Panel B: Foreign Origin Students			
Foreign origin teacher	0.167	0.272**	0.181
	(0.138)	(0.137)	(0.271)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.091	0.098	0.240
Observations	2,426	2,426	2,426

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table 8: Effect of Foreign Origin Teacher on Students' Perception that the Teacher Has Class Under Control

Panel A: Native Students	(1)	(2)	(3)
Foreign origin teacher	−0.043	−0.188	−0.119
	(0.125)	(0.148)	(0.292)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.237	0.250	0.285
Observations	4,735	4,735	4,735
Panel B: Foreign Origin Students			
Foreign origin teacher	0.245*	0.241*	0.259
	(0.135)	(0.141)	(0.314)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.212	0.213	0.311
Observations	2,478	2,478	2,478

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table 7 and 8 display the results on role model effects. Panel B of Table 7 shows that foreign origin students report more often that their teacher tries to understand their point of view, and then tells them what he/she would do if the teacher has a foreign origin. Native students seem to be more likely to feel supported by their native teacher. This differential evaluation persists in a more general question such as "I think my German class teacher has the class under control" where foreign origin students perceive foreign origin teachers more favorably.

Overall, the results in our preferred specification (3) are insignificant, which is partly due to the limited variation in outcome variables.[23] Nevertheless, the pattern displayed supports a role model effect. Foreign origin students are more likely to feel understood by foreign origin than native teachers.[24] Therefore, I conclude that the strong positive effect of having a foreign origin teacher on foreign origin students can partly be attributed to a role model effect that motivates foreign origin students differently than their native counterparts.

5.2.3 Language-Specific Skills

To understand why there is an effect of teachers' origin, not only on foreign origin students but also on native student, this section focuses on an obvious characteristic in which native and foreign origin teachers differ: Language skills. Native teachers—by definition—only have German as a mother tongue, while foreign origin teachers often grew up learning more than one language. This difference in exposure to languages could have important implications for their language teaching skills. Around 63 percent of foreign origin teachers in the sample are born in Germany. Going through the German education system requires them to be fluent in German, but the experience of learning German as a second language, or the early exposure to more than one language, might affect the way they understand and

[23]The results of Table 7–8 are comparable when controlling for students test scores.

[24]Other perception variables such as "I think my German teacher encourages me to ask questions" (Table A13), "I think my German teacher expects me to try my very best" (Table A14) or "I think my German teacher is aware of everything that happens in class." display similar results (Table A15).

teach languages.[25] The "conscious competence" learning model, for example, describes the psychological progress from incompetence to competence in a skill. The model implies that "conscious competence" teachers (e.g., bilingual teachers who have consciously learned German language skills), are better teachers than "unconscious competence" teachers (e.g., native teachers), because "unconscious competence" teachers can have difficulties in explaining the skill that has become largely instinctual to them (Robinson, 1974). To elicit the effect of such a potential language specific skill, I test if foreign origin teachers who report a mother tongue other than German affect students' reading comprehension differently.

Table 9: Effect of Bilingual Teachers on Reading Comprehension

Panel A: All Students	(1)	(2)	(3)
Bilingual teacher	0.291***	0.333***	0.431**
	(0.073)	(0.098)	(0.169)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.661
Observations	7,351	7,351	7,351
Panel B: Native Students			
Bilingual teacher	0.352***	0.467***	0.533**
	(0.108)	(0.127)	(0.263)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.362	0.363	0.649
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Bilingual teacher	0.239**	0.196	0.516**
	(0.117)	(0.133)	(0.211)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.394	0.656
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table 9 displays the effect of having a bilingual teacher, i.e., a teacher with a mother

[25]While the economic literature on bilingualism is scarce, a study by Clifton-Sprigg (2015) finds no differences in children's cognitive and non-cognitive skills based on the number of languages spoken at home.

tongue other than German, on reading comprehension scores. In comparison to the baseline regression in Table 4, Panel A, the effect of having a bilingual teacher is larger and more significant than the effect of having a foreign origin teacher. Further, the table reveals that the effect is particularly large for native students. Their reading comprehension increases by 0.53, i.e., 0.42 standard deviations, when they have a bilingual teacher. Nevertheless, the positive effect holds for both native and foreign origin students.

As a falsification test, I test if having a bilingual Math teacher influences math test scores in a similar way (Table A16). If bilingual teachers have language-specific skills, rather than being a particularly positive selection of teachers, the effect on language comprehension should be larger than on analytical math skills. The regressions on math test scores reveal no effect of having a bilingual teacher once teacher characteristics are included.[26] The effect of bilingual teachers is smaller and indistinguishable from zero for both sub-samples. This finding supports the notion that the effect of bilingual teachers is language-specific rather than driven by a particular positive selection of bilingual teachers.

In summary, the positive effect is specific to reading comprehension and particularly strong for bilingual teachers. While most studies discuss matching effects between students and teachers, these results suggest that foreign origin teachers who grew up bilingually are especially equipped to teach languages. Notably, this language-specific skill is beneficial for both native and foreign origin students.

5.3 Alternative Explanations

In this section, I report results from alternative specifications to provide additional robustness checks and explore the heterogeneity of the findings.

First, I investigate if a particular group of foreign origin teachers is driving the effect. I test if first generation immigrant teachers and second and higher generation immigrant teachers affect reading performance differently. A strong effect of foreign born teachers could hint at a positive selection, e.g., because of better teacher training abroad. Table 10

[26]The samples on reading comprehension and mathematics scores do not match perfectly as the NEPS data contain more observations with information on Math teacher than German teacher. More information on Math teachers' characteristics are displayed in Tables A5 and A6.

shows that better educated foreign born teachers cannot explain the findings. The effect of first generation immigrant teachers is larger for native students but overall the effects for both teacher groups are comparable in size and insignificant. Alternatively, the effect could be driven by a particular well equipped immigrant group. Testing for differential effects across language groups, I find positive and large point estimates for all language groups (Table A17). Accordingly, the results cannot be explained by one particularly motivated or able immigrant group.

Table 10: Effect of Immigrant Generation on Reading Comprehension

Panel A: All Students	(1)	(2)	(3)
Immigrant background (Ref.: None)			
First generation	0.169*	0.393***	0.257
	(0.100)	(0.129)	(0.215)
Second and higher generation	0.178*	0.147*	0.260
	(0.092)	(0.083)	(0.162)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.660
Observations	7,351	7,351	7,351
Panel B: Native Students			
Immigrant background (Ref.: None)			
First generation	0.317***	0.544***	0.313
	(0.114)	(0.154)	(0.236)
Second and higher generation	0.229	0.171	0.264
	(0.147)	(0.136)	(0.278)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.362	0.363	0.647
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Immigrant background (Ref.: None)			
First generation	0.056	0.227	0.497
	(0.159)	(0.182)	(0.355)
Second and higher generation	0.144	0.093	0.327
	(0.112)	(0.104)	(0.224)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.393	0.655
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Another potential concern is that the results are caused by a different selection of foreign origin teachers in comparison to native teachers. While it is beyond the scope of this

paper to discuss potential differences in unobservables, I can proxy the intrinsic motivation by controlling for variables that capture aspects of the teacher's career choice and cultural orientation (Table A18–A19).[27] Different motivations for becoming a teacher do not influence the students' performance significantly while teachers who belief in the relevance of multicultural ideals have a positive effect on native students reading comprehension. The general pattern of the foreign origin teacher effect remains in both specifications.

Table 11: Effect of Ever Being Taught By A Foreign Origin Teacher on Reading Comprehension

Panel A: All Students	(1)	(2)	(3)
Ever had a foreign origin teacher	0.097	0.123*	0.243*
	(0.060)	(0.063)	(0.138)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.377	0.660
Observations	7,351	7,351	7,351
Panel B: Native Students			
Ever had a foreign origin teacher	0.103	0.121	0.208
	(0.081)	(0.091)	(0.220)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.361	0.362	0.647
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Ever had a foreign origin teacher	0.126	0.140	0.422**
	(0.102)	(0.105)	(0.210)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.394	0.655
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

The results are also robust to the inclusion of the students' math test scores (see Table A21). Math test scores proxy student-year-specific performance and accordingly provide a lower bound estimate of the foreign origin teacher effect if there are positive spillover effects, i.e., if better reading comprehension increases math test scores. Further, reading

[27] As native and foreign origin differ significantly with respect to grades at the first state examination, I test if foreign origin teachers who receive better grades are driving the effect. Table A20 displays the results and hints at an effect that is rather driven by poorly performing foreign origin teachers than foreign origin teacher who perform particularly well.

comprehension is a cumulative skill and a teacher's positive effect should also pay off in the following school years. Therefore, Table 11 illustrates the effect of ever having had a foreign origin teacher. It illustrates that the positive foreign origin teacher effect persists if one considers the subsequent reading comprehension scores. The long term effect of foreign origin teachers is particularly strong for foreign origin students suggesting a long lasting role model effect.

Table 12: Effect of Foreign Origin Teacher on Reading Comprehension of Best Students

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.106	0.125	0.191
	(0.109)	(0.088)	(0.192)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.151	0.151	0.436
Observations	3,674	3,674	3,674
Panel B: Native Students			
Foreign origin teacher	0.146	0.037	−0.103
	(0.092)	(0.161)	(0.448)
Class FE	No	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.058	0.133	0.409
Observations	2,406	2,406	2,406
Panel C: Foreign Origin Students			
Foreign origin teacher	−0.011	0.115	0.661***
	(0.089)	(0.094)	(0.212)
Class FE	No	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.065	0.124	0.442
Observations	1,268	1,268	1,268

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

I further test if there are heterogeneous effects of having a foreign origin teacher with respect to students' proficiency. More specifically, I divide the samples by the median reading comprehension score. Table 12 reports the results for the 50 percent best students of each sample and Table 13 summarizes the results for the worst students. In Table 12, the overall positive effect of foreign origin teachers is small. For above median native students the effect is even negative but insignificant. For above median foreign origin

Table 13: Effect of Foreign Origin Teacher on Reading Comprehension of Worst Students

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.118*	0.163**	0.310
	(0.069)	(0.079)	(0.194)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.228	0.228	0.340
Observations	3,677	3,677	3,677
Panel B: Native Students			
Foreign origin teacher	0.107	0.323***	0.503**
	(0.077)	(0.118)	(0.251)
Class FE	No	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.041	0.192	0.298
Observations	2,406	2,406	2,406
Panel C: Foreign Origin Students			
Foreign origin teacher	−0.191*	−0.113	0.045
	(0.102)	(0.124)	(0.299)
Class FE	No	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.056	0.145	0.271
Observations	1,271	1,271	1,271

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

students, however, the effect displayed is large and significant. Table 13 illustrates the results for the 50 percent of students with the worst reading performance and shows that the effects are reversed for this sample. Here, the worst native students have higher reading comprehension scores if their teacher has a foreign origin, while the effect on the below median foreign origin students is not different from zero.[28] This finding adds new evidence to the matching literature which has previously shown that low-performing students benefit particularly from being assigned to race-congruent teachers (Egalite *et al.*, 2015).

[28]This finding is confirmed when distinguishing between the academic track (*Gymnasium*) and the other non-academic tracks (*Realschule* and *Hauptschule)* (Table A22 and A23).

6 Conclusion

This paper is the first to provide evidence on a positive effect of having a foreign origin teacher on students' academic achievement. Given the under-performance of an increasing share of foreign origin students, investigating the effect of foreign origin teachers fills an important gap in the economics literature. Using data from the German National Educational Panel Study and exploiting variation in teacher assignment within student, I analyze the effect of having a foreign origin German language teacher on reading comprehension in lower secondary school. In doing so, I show that objectively measured reading test scores are positively affected by having a foreign origin teacher.

For foreign origin students, I find evidence for a role model effect, in line with studies on race and gender matching (e.g., Dee, 2004; Bettinger and Long, 2005; Paredes, 2014). Foreign origin students improve their reading comprehension significantly and perceive their teacher more favorably if the teacher is of foreign origin. Adding to the literature on matching effects, this study shows that role model effects can exist for "imperfect" matches, meaning that students' and teachers' countries of origin do not have to be identical for role model effects to emerge. Overall, the improvement in foreign origin students' language fluency can have important implications for lifelong outcomes such as productivity and wages as language proficiency facilitates the adaptation of skills in the job market.

Most notably, the study finds that bilingual foreign origin teachers increase students' reading comprehension scores universally. Ruling out alternative explanations, I argue that bilingual teachers have language-specific skills that make them particularly well-equipped to teach languages both to native and foreign origin students. Therefore, the study contributes to the literature by establishing a role for bilingual teachers in the context of language acquisition. It should encourage researchers to study the advantages of bilingualism in the education system more rigorously as the knowledge and experience of bilingual teachers can be used to develop language teaching styles that improve the reading comprehension of both native and foreign origin students.

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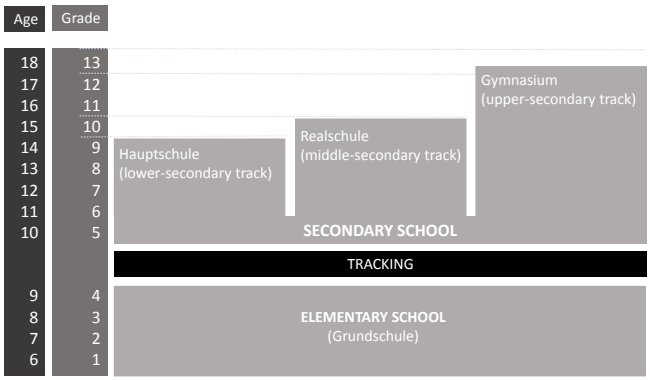
Appendix

Figure A1: German School System



Notes: – Own illustration.

Table A1: Student-Teacher Sorting by Foreign Origin

	(1) Female student	(2) Age	(3) Class repeated	(4) Math testscore
Foreign origin student-teacher interaction	−0.007	−2.995	−0.008	−0.007
	(0.055)	(4.602)	(0.015)	(0.107)
Observations	7,313	6,969	7,351	7,346

*Notes: – Each estimate is from a regression of the corresponding student characteristic on a dummy indicating the teacher's origin, a dummy indicating the student's origin and the interaction between these two variables. Robust standard errors are in parentheses. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A2: Sorting by Foreign Origin of Teacher

	(1) Female student	(2) Age	(3) Class repeated	(4) Math testscore
Foreign origin teacher	0.014	−1.193	−0.010	0.166*
	(0.047)	(1.062)	(0.012)	(0.088)
Observations	7,313	6,969	7,351	7,346

*Notes: – Each estimate is from a regression of the corresponding student characteristic on a dummy indicating the teacher's origin in a classroom. Robust standard errors are in parentheses. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A3: Student Characteristics, t-test

	Native	Foreign Origin	Difference	Std. Error
Main outcome variable				
Reading comprehension score	0.421	0.064	0.357	(0.031)***
Student characteristics				
Female	0.492	0.507	−0.015	(0.012)
Grade	6.786	6.696	0.090	(0.039)**
Birth month	6.520	6.584	−0.065	(0.084)
Birth year	1999.538	1999.437	0.101	(0.015)***
Grade repeated	0.020	0.028	−0.008	(0.004)**
Household size	4.392	4.505	−0.112	(0.033)***
Other outcome variables				
Mathematical test score	0.470	0.041	0.429	(0.029)***
German grade	4.456	4.260	0.195	(0.025)***
German teacher tries to understand my point	3.271	3.281	−0.010	(0.027)
German teacher has class under control	3.674	3.712	−0.038	(0.029)
Native student obs.	4,812			
Foreign origin student obs.	2,539			

*Notes: – The table shows descriptive statistics for the two sub-samples of native and foreign origin students, as well as the difference in mean values between the two samples. Significance stars indicate the result of the respective t-test. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A4: German Language Teacher Characteristics, t-test

	Native	Foreign Origin	Difference	Std. Error
Female	0.781	0.847	−0.066	(0.021)***
Birth year	1967.650	1975.141	−7.491	(0.596)***
Age when profession was chosen	1.574	1.119	0.455	(0.058)***
Grade at first state exam	−0.006	−0.172	0.166	(0.046)***
German language studies	1.052	0.993	0.059	(0.023)***
Language studies	0.485	0.262	0.223	(0.036)***
State of higher education entrance qualification	5.964	5.772	0.192	(0.168)
School type	4.579	5.171	−0.592	(0.077)***
Native teacher obs.	6,947			
Foreign origin teacher obs.	404			

*Notes: – The table shows descriptive statistics for the two sub-samples of native and foreign origin German language teachers, as well as the difference in mean values between the two samples. Significance stars indicate the result of the respective t-test. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A5: Descriptive Statistics – Math Teachers

	Mean	Std. Dev.	Min	Max
Foreign origin	0.057	0.23	0	1
Second and higher generation immigrant	0.033	0.18	0	1
First generation immigrant	0.024	0.15	0	1
Bilingual	0.020	0.14	0	1
Slavic	0.006	0.08	0	1
Romance	0.005	0.07	0	1
Others	0.009	0.09	0	1
Female	0.577	0.49	0	1
Age	44.712	12.04	22	70
Birth decade				
1940s	0.031	0.17	0	1
1950s	0.320	0.47	0	1
1960s	0.202	0.40	0	1
1970s	0.198	0.40	0	1
1980s	0.249	0.43	0	1
Age when profession was chosen				
Between 0-14	0.152	0.36	0	1
Between 15-19	0.450	0.50	0	1
Between 20-24	0.180	0.38	0	1
After 25	0.097	0.30	0	1
Grade at first state exam	−0.035	0.85	−2	3
Teacher-year observations	8,937			
Teacher observations	818			

Notes: – The descriptive statistics are weighted to account for differences in the number of observations per teacher.

Table A6: Math Teacher Characteristics, t-test

	Native	Foreign Origin	Difference	Std. Error
Female	0.556	0.399	0.158	(0.025)***
Birth year	1965.982	1974.273	−8.291	(0.588)***
Age when profession was chosen	1.514	1.232	0.282	(0.058)***
Grade at first state exam	−0.054	0.030	−0.084	(0.042)**
State of higher education entrance qualification	6.088	5.754	0.335	(0.166)**
School type	4.686	4.507	0.179	(0.075)**
Native teacher obs.	8,523			
Foreign origin teacher obs.	414			

*Notes: – The table shows descriptive statistics for the two sub-samples of native and foreign origin Math teachers, as well as the difference in mean values between the two samples. Significance stars indicate the result of the respective t-test. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A7: Effect of Foreign Origin Teacher on Reading Comprehension – All Students

	(1)	(2)	(3)
Foreign origin teacher	0.175**	0.232***	0.259*
	(0.069)	(0.069)	(0.137)
Student characteristics			
Female	0.114***	0.116***	–
	(0.029)	(0.029)	
Foreign origin	−0.182***	−0.181***	–
	(0.032)	(0.032)	
Birth month (Ref.: January)			
February	−0.057	−0.056	–
	(0.066)	(0.066)	
March	0.013	0.014	–
	(0.064)	(0.064)	
April	−0.044	−0.044	–
	(0.067)	(0.067)	
May	−0.025	−0.025	–
	(0.070)	(0.071)	
June	−0.024	−0.026	–
	(0.066)	(0.066)	
July	0.112*	0.112*	–
	(0.065)	(0.065)	
August	0.109	0.112*	–
	(0.067)	(0.067)	
September	0.092	0.097	–
	(0.072)	(0.072)	
October	0.278***	0.275***	–
	(0.075)	(0.075)	
November	0.144*	0.141*	–
	(0.075)	(0.075)	
December	0.155**	0.157**	–
	(0.074)	(0.074)	
Birth year (Ref.: 1999)			
1995	0.054	0.082	–
	(0.401)	(0.426)	
1997	−0.124	−0.101	–
	(0.345)	(0.348)	
1998	−0.197***	−0.193***	–
	(0.054)	(0.054)	
2000	0.142***	0.140***	–
	(0.037)	(0.037)	
2001	0.325*	0.324*	–
	(0.168)	(0.169)	
2002	1.664***	1.667***	–
	(0.059)	(0.059)	
Grade (Ref.: 5)			
7	0.611***	0.574***	0.591***
	(0.039)	(0.040)	(0.068)
9	−0.076*	−0.090**	−0.152**
	(0.040)	(0.042)	(0.069)
Grade repeated	−0.081	−0.083	−0.209
	(0.092)	(0.092)	(0.171)
Household size	−0.029***	−0.029***	−0.067**
	(0.010)	(0.011)	(0.032)
Teacher characteristics			
Grade at first state exam	–	0.062***	0.065*
		(0.023)	(0.037)
Female	–	−0.017	−0.079
		(0.044)	(0.061)
Age	–	0.005	−0.003
		(0.008)	(0.013)
Birth decade (Ref.: 1940s)			
1950s	–	0.103	0.130
		(0.100)	(0.176)
1960s	–	−0.139	−0.014
		(0.146)	(0.250)
1970s	–	−0.167	0.029
		(0.209)	(0.336)
1980s	–	−0.036	0.175
		(0.270)	(0.443)
Age job was chosen (Ref.: Before 10)			
Between 15-19	–	0.022	0.039
		(0.061)	(0.106)
Between 20-24	–	0.074	0.131
		(0.068)	(0.122)
After 25	–	−0.090	0.057
		(0.081)	(0.126)
German studies	–	−0.030	−0.009
		(0.097)	(0.108)
Other language studies	–	0.103**	0.069
		(0.051)	(0.083)
Class FE	Yes	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.660
Observations	7,351	7,351	7,351

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A8: Effect of Foreign Origin Teacher on Reading Comprehension – By Student Origin

	Native Students			Foreign Origin Students		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign origin teacher	0.260**	0.315***	0.279	0.115	0.129	0.375*
	(0.108)	(0.107)	(0.223)	(0.087)	(0.095)	(0.198)
Student characteristics						
Female	0.128***	0.129***	–	0.087	0.090*	–
	(0.037)	(0.037)		(0.054)	(0.054)	
Birth month (Ref.: January)						
February	−0.128	−0.126	–	0.151	0.145	–
	(0.084)	(0.085)		(0.126)	(0.127)	
March	−0.065	−0.066	–	0.225*	0.235*	–
	(0.084)	(0.085)		(0.126)	(0.127)	
April	−0.169**	−0.166*	–	0.206	0.213	–
	(0.085)	(0.086)		(0.160)	(0.161)	
May	−0.067	−0.063	–	0.063	0.049	–
	(0.088)	(0.089)		(0.152)	(0.153)	
June	−0.069	−0.067	–	0.078	0.079	–
	(0.087)	(0.087)		(0.125)	(0.126)	
July	0.111	0.115	–	0.227*	0.224*	–
	(0.090)	(0.091)		(0.121)	(0.122)	
August	0.040	0.045	–	0.384***	0.396***	–
	(0.087)	(0.088)		(0.137)	(0.138)	
September	0.021	0.030	–	0.364**	0.372**	–
	(0.091)	(0.091)		(0.147)	(0.147)	
October	0.257***	0.262***	–	0.372***	0.363**	–
	(0.097)	(0.097)		(0.144)	(0.145)	
November	0.086	0.087	–	0.235	0.238	–
	(0.097)	(0.098)		(0.149)	(0.151)	
December	0.122	0.126	–	0.294*	0.303**	–
	(0.097)	(0.098)		(0.153)	(0.154)	
Birth year (Ref.: 1999)						
1995	0.154	0.286	–	–	–	–
	(0.292)	(0.326)				
1997	0.928***	0.932***	–	−0.345	−0.337	–
	(0.083)	(0.083)		(0.343)	(0.342)	
1998	−0.162**	−0.161**	–	−0.226***	−0.221**	–
	(0.081)	(0.081)		(0.086)	(0.086)	
2000	0.165***	0.164***	–	0.188***	0.189***	–
	(0.052)	(0.052)		(0.070)	(0.071)	
2001	0.343	0.347	–	0.577*	0.620*	–
	(0.217)	(0.219)		(0.340)	(0.342)	
2002	1.503***	1.502***	–	–	–	–
	(0.089)	(0.089)				
Grade (Ref.: 5)						
7	0.571***	0.544***	0.591***	0.642***	0.597***	0.610***
	(0.048)	(0.047)	(0.074)	(0.067)	(0.070)	(0.136)
9	−0.153***	−0.123**	−0.174**	0.042	0.005	−0.093
	(0.049)	(0.052)	(0.083)	(0.067)	(0.076)	(0.130)
Grade repeated	−0.055	−0.069	−0.288	−0.151	−0.131	0.009
	(0.137)	(0.136)	(0.289)	(0.153)	(0.156)	(0.275)
Household size	−0.025*	−0.026*	−0.035	−0.055***	−0.054***	−0.109**
	(0.014)	(0.014)	(0.042)	(0.018)	(0.018)	(0.053)
Teacher characteristics						
Grade at first state exam	–	0.048*	0.079*	–	0.056*	0.067
		(0.026)	(0.045)		(0.034)	(0.053)
Female	–	−0.054	−0.111	–	0.142*	0.011
		(0.049)	(0.074)		(0.086)	(0.119)
Age	–	0.006	0.000	–	0.002	0.001
		(0.010)	(0.017)		(0.012)	(0.022)
Birth decade (Ref.: 1940s)						
1950s	–	0.140	0.102	–	0.040	0.012
		(0.118)	(0.207)		(0.169)	(0.328)
1960s	–	−0.042	−0.059	–	−0.414*	−0.178
		(0.181)	(0.321)		(0.234)	(0.414)
1970s	–	−0.155	−0.105	–	−0.182	−0.093
		(0.251)	(0.424)		(0.328)	(0.588)
1980s	–	0.011	0.023	–	−0.176	0.045
		(0.326)	(0.556)		(0.428)	(0.759)
Age job was chosen (Ref.: Before 10)						
Between 15-19	–	0.031	0.040	–	0.085	0.056
		(0.074)	(0.129)		(0.093)	(0.162)
Between 20-24	–	0.131	0.140	–	0.087	0.160
		(0.084)	(0.147)		(0.103)	(0.179)
After 25	–	−0.160	0.033	–	0.142	0.153
		(0.102)	(0.156)		(0.123)	(0.196)
German studies	–	−0.191	0.003	–	0.104	−0.144
		(0.138)	(0.165)		(0.113)	(0.181)
Other language studies	–	0.116*	0.032	–	0.074	0.210
		(0.070)	(0.113)		(0.076)	(0.134)
Class FE	Yes	Yes	Yes	Yes	Yes	Yes
Student FE	No	No	Yes	No	No	Yes
Adjusted R^2	0.362	0.363	0.648	0.394	0.394	0.655
Observations	4,812	4,812	4,812	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A9: Effect of Foreign Origin Teacher on Mathematics

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	−0.031	−0.028	−0.033
	(0.064)	(0.063)	(0.086)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.469	0.469	0.737
Observations	8,937	8,937	8,937
Panel B: Native Students			
Foreign origin teacher	−0.089	−0.123	−0.094
	(0.078)	(0.078)	(0.093)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.438	0.438	0.722
Observations	5,952	5,952	5,952
Panel C: Foreign Origin Students			
Foreign origin teacher	0.065	0.050	−0.018
	(0.114)	(0.117)	(0.207)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.502	0.501	0.746
Observations	2,985	2,985	2,985

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A10: Effect of Linguistic Distance between Teacher and Student on Reading Comprehension

Panel A: All Students	(1)	(2)	(3)
Linguistic Distance	0.002*	0.002*	0.003
	(0.001)	(0.001)	(0.003)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.385	0.386	0.657
Observations	6,498	6,498	6,498
Panel B: Native Students			
Linguistic Distance	0.004***	0.005***	0.005
	(0.001)	(0.002)	(0.003)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.365	0.366	0.649
Observations	4,709	4,709	4,709
Panel C: Foreign Origin Students			
Linguistic Distance	−0.001	−0.001	−0.018
	(0.002)	(0.003)	(0.014)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.414	0.413	0.627
Observations	1,789	1,789	1,789

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A11: Effect of Language Match between Teacher and Student on German Grade (Harmonized Sample)

Panel A: Native Students	(1)	(2)	(3)
Language match	0.226***	0.261***	−0.103
	(0.060)	(0.096)	(0.340)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.229	0.225	0.653
Observations	3,101	3,101	3,101
Panel B: Foreign Origin Students			
Language match	−0.238	−0.245	0.032
	(0.483)	(0.532)	(0.333)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.152	0.148	0.593
Observations	1,606	1,606	1,606

*Notes: – Results are obtained from OLS regressions. The sample of the analysis is restricted to students taking the reading competence test (Table 4). All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A12: Effect of Foreign Origin Teacher on German Grade

Panel A: Native Students	(1)	(2)	(3)
Foreign origin teacher	−0.014	−0.056	−0.080
	(0.077)	(0.051)	(0.081)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.224	0.223	0.640
Observations	5,757	5,757	5,757
Panel B: Foreign Origin Students			
Foreign origin teacher	−0.173*	−0.180*	−0.111
	(0.094)	(0.101)	(0.129)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.174	0.175	0.625
Observations	2,815	2,815	2,815

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A13: Effect of Foreign Origin Teacher on Students' Perception that the Teacher Encourages Them

Panel A: Native Students	(1)	(2)	(3)
Foreign origin teacher	−0.293**	−0.276**	−0.158
	(0.128)	(0.131)	(0.247)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.083	0.093	0.201
Observations	4,622	4,622	4,622
Panel B: Foreign Origin Students			
Foreign origin teacher	0.140	0.240	0.010
	(0.153)	(0.149)	(0.308)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.062	0.067	0.221
Observations	2,435	2,435	2,435

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A14: Effect of Foreign Origin Teacher on Students' Perception that the Teacher Expects Them To Try Their Best

Panel A: Native Students	(1)	(2)	(3)
Foreign origin teacher	0.045	0.020	−0.009
	(0.096)	(0.091)	(0.196)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.072	0.071	0.174
Observations	4,724	4,724	4,724
Panel B: Foreign Origin Students			
Foreign origin teacher	0.043	0.043	0.292
	(0.097)	(0.115)	(0.256)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.075	0.071	0.190
Observations	2,479	2,479	2,479

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A15: Effect of Foreign Origin Teacher on Students' Perception that the Teacher Notices Everything

Panel A: Native Students	(1)	(2)	(3)
Foreign origin teacher	−0.215	−0.274*	−0.356
	(0.135)	(0.142)	(0.269)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.170	0.180	0.265
Observations	4,754	4,754	4,754
Panel B: Foreign Origin Students			
Foreign origin teacher	−0.042	0.028	0.126
	(0.119)	(0.133)	(0.289)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.138	0.144	0.272
Observations	2,493	2,493	2,493

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A16: Effect of Bilingual Teacher on Mathematics

Panel A: All Students	(1)	(2)	(3)
Bilingual teacher	−0.170	−0.158	0.032
	(0.104)	(0.137)	(0.152)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.469	0.469	0.737
Observations	8,937	8,937	8,937
Panel B: Native Students			
Bilingual teacher	−0.301	−0.269	0.106
	(0.217)	(0.252)	(0.247)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.438	0.438	0.722
Observations	5,952	5,952	5,952
Panel C: Foreign Origin Students			
Bilingual teacher	−0.205**	−0.207	0.065
	(0.096)	(0.128)	(0.224)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.502	0.501	0.746
Observations	2,985	2,985	2,985

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A17: Effect of Teacher's Native Language on Reading Comprehension

Panel A: All Students	(1)	(2)	(3)
Language family (Ref.: German)			
Slavic	0.222**	0.471***	0.426**
	(0.090)	(0.143)	(0.205)
Romanic	0.426***	0.282**	0.329
	(0.100)	(0.140)	(0.343)
Others	0.248	0.151	0.587**
	(0.190)	(0.221)	(0.293)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.661
Observations	7,351	7,351	7,351
Panel B: Native Students			
Language family (Ref.: German)			
Slavic	0.273***	0.529***	0.462*
	(0.096)	(0.169)	(0.254)
Romanic	0.410**	0.330	0.306
	(0.207)	(0.225)	(0.570)
Others	0.393*	0.503*	0.917***
	(0.219)	(0.278)	(0.340)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.362	0.363	0.649
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Language family (Ref.: German)			
Slavic	0.183	0.440**	0.687**
	(0.149)	(0.187)	(0.318)
Romanic	0.420**	0.086	0.336
	(0.178)	(0.214)	(0.395)
Others	−0.005	−0.087	0.476
	(0.269)	(0.328)	(0.353)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.393	0.655
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A18: Effect of Foreign Origin Teacher on Reading Comprehension Controlling For Aspects of Teacher's Career Choice

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.175**	0.229***	0.273*
	(0.069)	(0.070)	(0.140)
Aspects of teacher's career choice			
Enjoy teaching		−0.053	−0.056
		(0.050)	(0.067)
Prestige of teachers		0.015	0.019
		(0.027)	(0.038)
Enjoy subject		−0.050	0.008
		(0.041)	(0.064)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.660
Observations	7,351	7,351	7,351
Panel B: Native Students			
Foreign origin teacher	0.259**	0.290***	0.291
	(0.105)	(0.105)	(0.211)
Aspects of teacher's career choice			
Enjoy teaching	−0.151**	−0.112*	−0.101
	(0.063)	(0.062)	(0.077)
Prestige of teachers	0.037	0.031	0.028
	(0.027)	(0.032)	(0.048)
Enjoy subject	−0.053	−0.082*	−0.036
	(0.045)	(0.049)	(0.081)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.363	0.363	0.648
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Foreign origin teacher	0.129	0.111	0.388*
	(0.091)	(0.098)	(0.207)
Aspects of teacher's career choice			
Enjoy teaching	0.049	0.137*	0.043
	(0.068)	(0.077)	(0.141)
Prestige of teachers	0.027	−0.003	0.020
	(0.031)	(0.043)	(0.061)
Enjoy subject	−0.025	−0.060	0.036
	(0.056)	(0.064)	(0.110)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.393	0.654
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A19: Effect of Foreign Origin Teacher on Reading Comprehension Controlling For Teacher's Cultural Orientation

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.175**	0.185***	0.227*
	(0.069)	(0.071)	(0.137)
Teacher's cultural orientation			
Relevance of multicultural ideals		−0.023	0.111
		(0.054)	(0.099)
Consideration of differences in class		0.012	−0.039
		(0.036)	(0.067)
Resolving disputes through similarities		0.122***	0.051
		(0.046)	(0.075)
Problem if students do not adapt to German culture		−0.041*	−0.021
		(0.023)	(0.036)
Objective to promote things in common		0.006	0.010
		(0.043)	(0.066)
Cultural diversity in teacher training		−0.043	−0.020
		(0.040)	(0.062)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.660
Observations	7,351	7,351	7,351
Panel B: Native Students			
Foreign origin teacher	0.236**	0.255**	0.255
	(0.116)	(0.113)	(0.220)
Teacher's cultural orientation			
Relevance of multicultural ideals	0.024	0.062	0.219*
	(0.069)	(0.066)	(0.125)
Consideration of differences in class	0.001	−0.047	−0.104
	(0.047)	(0.048)	(0.083)
Resolving disputes through similarities	0.156**	0.154***	0.052
	(0.060)	(0.057)	(0.093)
Problem if students do not adapt to German culture	−0.060**	−0.064**	−0.008
	(0.029)	(0.028)	(0.043)
Objective to promote things in common	0.053	0.048	0.005
	(0.042)	(0.051)	(0.076)
Cultural diversity in teacher training	−0.073	−0.100**	−0.037
	(0.054)	(0.047)	(0.074)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.363	0.364	0.648
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Foreign origin teacher	0.150*	0.159	0.331
	(0.090)	(0.106)	(0.215)
Teacher's cultural orientation			
Relevance of multicultural ideals	0.041	−0.050	−0.050
	(0.086)	(0.092)	(0.158)
Consideration of differences in class	0.041	0.041	0.051
	(0.064)	(0.068)	(0.114)
Resolving disputes through similarities	0.014	0.021	0.010
	(0.066)	(0.072)	(0.114)
Problem if students do not adapt to German culture	−0.017	−0.028	−0.052
	(0.043)	(0.045)	(0.074)
Objective to promote things in common	−0.107	−0.112	−0.006
	(0.072)	(0.075)	(0.115)
Cultural diversity in teacher training	0.094*	0.094	0.031
	(0.051)	(0.060)	(0.100)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.393	0.653
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A20: Effect of Foreign Origin Teacher on Reading Comprehension Controlling For Grade Interaction

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.183***	0.230***	0.246*
	(0.069)	(0.066)	(0.128)
Foreign origin teacher * teacher grade	−0.068	−0.157*	−0.207*
	(0.074)	(0.094)	(0.112)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.377	0.378	0.661
Observations	7,351	7,351	7,351
Panel B: Native Students			
Foreign origin teacher	0.249**	0.299***	0.244
	(0.111)	(0.105)	(0.204)
Foreign origin teacher * teacher grade	−0.098	−0.165	−0.269*
	(0.087)	(0.119)	(0.158)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.362	0.363	0.648
Observations	4,812	4,812	4,812
Panel C: Foreign Origin Students			
Foreign origin teacher	0.144	0.130	0.375*
	(0.088)	(0.096)	(0.203)
Foreign origin teacher * teacher grade	0.068	−0.021	−0.086
	(0.125)	(0.134)	(0.226)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.394	0.393	0.655
Observations	2,539	2,539	2,539

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A21: Effect of Foreign Origin Teacher on Reading Comprehension Controlling For Math Test Score

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.122*	0.144**	0.238*
	(0.073)	(0.073)	(0.136)
Math test score	0.476***	0.475***	0.164***
	(0.013)	(0.013)	(0.033)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.486	0.485	0.666
Observations	7,346	7,346	7,346
Panel B: Native Students			
Foreign origin teacher	0.197	0.217*	0.262
	(0.120)	(0.119)	(0.221)
Math test score	0.470***	0.468***	0.175***
	(0.017)	(0.017)	(0.040)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.471	0.471	0.655
Observations	4,811	4,811	4,811
Panel C: Foreign Origin Students			
Foreign origin teacher	0.079	0.103	0.347*
	(0.075)	(0.088)	(0.195)
Math test score	0.457***	0.454***	0.133*
	(0.027)	(0.028)	(0.074)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.490	0.488	0.659
Observations	2,535	2,535	2,535

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A22: Effect of Foreign Origin Teacher on Reading Comprehension – Academic Track

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.241***	0.155**	0.221**
	(0.073)	(0.062)	(0.093)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.202	0.203	0.609
Observations	3,457	3,457	3,457
Panel B: Native Students			
Foreign origin teacher	0.223	0.072	0.012
	(0.139)	(0.114)	(0.184)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.200	0.203	0.605
Observations	2,329	2,329	2,329
Panel C: Foreign Origin Students			
Foreign origin teacher	0.305***	0.015	0.394*
	(0.105)	(0.147)	(0.231)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.205	0.204	0.598
Observations	1,128	1,128	1,128

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*

Table A23: Effect of Foreign Origin Teacher on Reading Comprehension – Non-Academic Track

Panel A: All Students	(1)	(2)	(3)
Foreign origin teacher	0.151	0.301**	0.297
	(0.099)	(0.128)	(0.212)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.272	0.273	0.568
Observations	3,894	3,894	3,894
Panel B: Native Students			
Foreign origin teacher	0.355**	0.651***	0.503**
	(0.151)	(0.192)	(0.244)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.255	0.256	0.558
Observations	2,483	2,483	2,483
Panel C: Foreign Origin Students			
Foreign origin teacher	−0.028	0.034	0.301
	(0.102)	(0.144)	(0.344)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R^2	0.290	0.285	0.550
Observations	1,411	1,411	1,411

*Notes: – Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level. – *** p<0.01, ** p<0.05, * p<0.10.*