

Data

Student Data (Pooled)

PISA: The OECD's Programme for International Student Assessment (PISA) in six waves (2006, 2009, 2012, 2015, 2018, 2022). Includes standardized test scores, as well as both student and school characteristics.

Country-level Data

World Bank Indicators: GDP per capita (2015 USD) and population.

Eurostat: Population count of 15-year-old immigrant and native youth.

OECD International Migration Database: Lagged immigrant inflow and immigrant stock data.

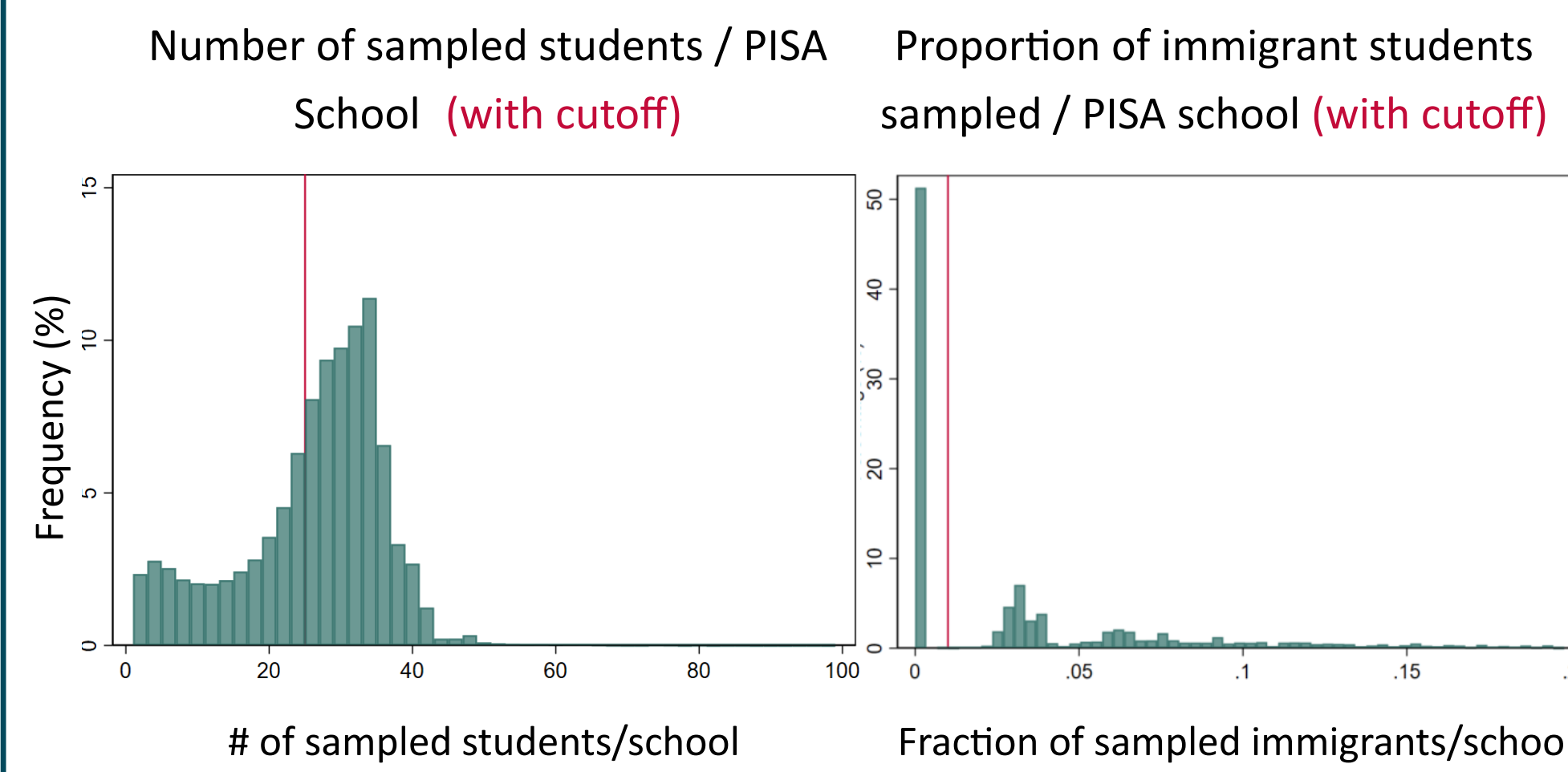
CEPII BACI: Geographical and historical predictors of immigration.

MIPEX: Migrant Integration Policy Index, an international index (0-100) comparing countries on eight immigration policy areas.

PISA Sampling

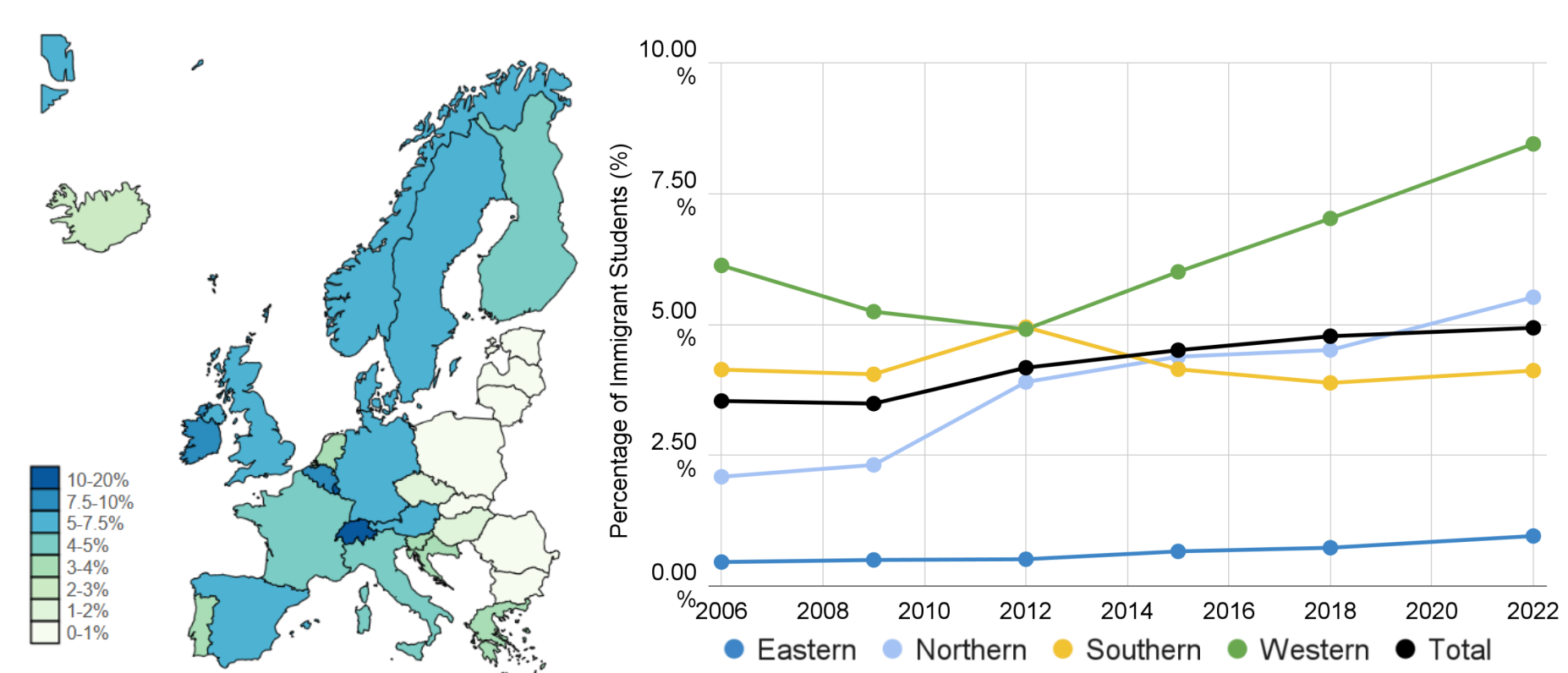
Key variable: Immigrant presence defined at the school level, as an indicator for >1% of sampled students being immigrants.

School size: Only schools with >25 sampled students are kept.



Spatial and Time Variation

Figure. Percentage of Immigrant Students by Country and Year (PISA)



Summary Statistics

PISA test scores in all subjects are standardized to a mean of 500 points, with a standard deviation of 100 points, in all waves. The percentage of students who are immigrants in the sample is 4.70%. Across all schools with sampled immigrants (treatment), the percentage is 9.03%.

Table. Student-level Summary Statistics for Outcome Variables (Mean and SD)

	All Students	Schools with ≤1% Sampled Immigrants	Schools with >1% Immigrants	Immigrant Students Only
Math Score	502.40 [86.65]	506.92 [86.43]	497.85 [86.62]	467.23 [90.44]
Science Score	506.85 [88.87]	510.39 [87.99]	503.30 [89.62]	470.18 [93.27]
Reading Score	503.29 [91.69]	507.38 [90.86]	499.17 [92.34]	463.37 [98.05]
Agree/Strongly Agree: I feel like I make friends easily	0.81 [0.39]	0.81 [0.39]	0.81 [0.39]	0.77 [0.42]
Agree/Strongly Agree: I feel like I belong at school	0.53 [0.50]	0.54 [0.50]	0.52 [0.50]	0.50 [0.50]
Agree/Strongly Agree: I feel like an outsider	0.09 [0.29]	0.10 [0.30]	0.09 [0.28]	0.13 [0.33]
% Immigrant Students (School)	4.70	0.00	9.03	17.65
Observations	292,381	140,143	152,238	12,889

Note: Includes all observations with data recorded for gender, private school attendance, GDP per capita (2015 USD), parental education, and outcome variables in the table. Only including schools with more than 25 students sampled.

Migration and the Classroom:

The Effects of Immigration on the Test Scores and School Experience of Native Students in Europe

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Research Questions & Hypotheses

- How does the presence of immigrant peers in the classroom affect native student test scores in math, science, and reading?
 - Test scores of natives will be lower in schools with more immigrants, in line with the existing literature. Mechanism: Classroom heterogeneity drives this effect.
- How do native students react to the presence of immigrant peers?
 - If education effect is strong, students may report feeling more pessimistic about the schooling experience and about immigration.
- Do effects vary when considering country and student characteristics?
 - Countries less open to immigration will drive the negative test score.

Contributions

- Broadens analysis across several European countries, whereas analysis is typically done within-country.
- Introduces self-reported school experience outcomes as a measure of how students feel about their social schooling experience.

Empirical Strategy: IV-FE (3)

Population proportion of immigrants at a larger geographical unit can be used as an instrument for school-level immigrant presence, which is endogenous if immigrants study disproportionately at schools with fewer resources, or if natives more in response to immigration. **Key assumption:** With controls and TWFE, proportion of immigrant students at broader geographical level only influences native students through in-school effect.

- Proportion of 15-Year-Old Immigrants in Country (Eurostat)

$$\{> 1\% \text{ Immigrant}\}_{ISZC} = \beta_0 + \beta_1 \text{Proportion}_{ct} + \gamma X_{ISZC} + \alpha_c + \alpha_w + \epsilon_{ISZC}$$
- Proportion by Country, Year, and Community size (PISA)

$$\{> 1\% \text{ Immigrant}\}_{ISZC} = \beta_0 + \beta_1 \text{Proportion}_{zct} + \gamma X_{ISZC} + \alpha_c + \alpha_t + \epsilon_{ISZC}$$
- Constructed Immigrant Flows (based on Ortega and Peri, 2014)

$$\ln\left(\frac{\text{Inflows}_{ct}}{\text{Population}_{ct}}\right) = \beta_0 + \beta_1 \ln(\text{Dist}_{ct}) + \beta_2 \ln(\text{Pop}_{ct}) + \beta_3 \ln(\text{Pop}_{jt}) + \beta_4 \text{CommonLang}_{ct} + \beta_5 \text{Colony}_{ct} + \beta_6 \text{Border}_{ct} + u_{ct}$$

$$\{> 1\% \text{ Immigrant}\}_{ISZC} = \beta_0 + \beta_1 \left[\sum_{j \neq c} \frac{\text{Inflows}_{jct}}{\text{Population}_{ct}} \right] \times CS_{zct} + \beta_2 \left[\sum_{j \neq c} \frac{\text{Inflows}_{jct}}{\text{Population}_{ct}} \right] \times CS_{zct} + \gamma X_{ISZC} + \alpha_c + \alpha_t + \epsilon_{ISZC}$$

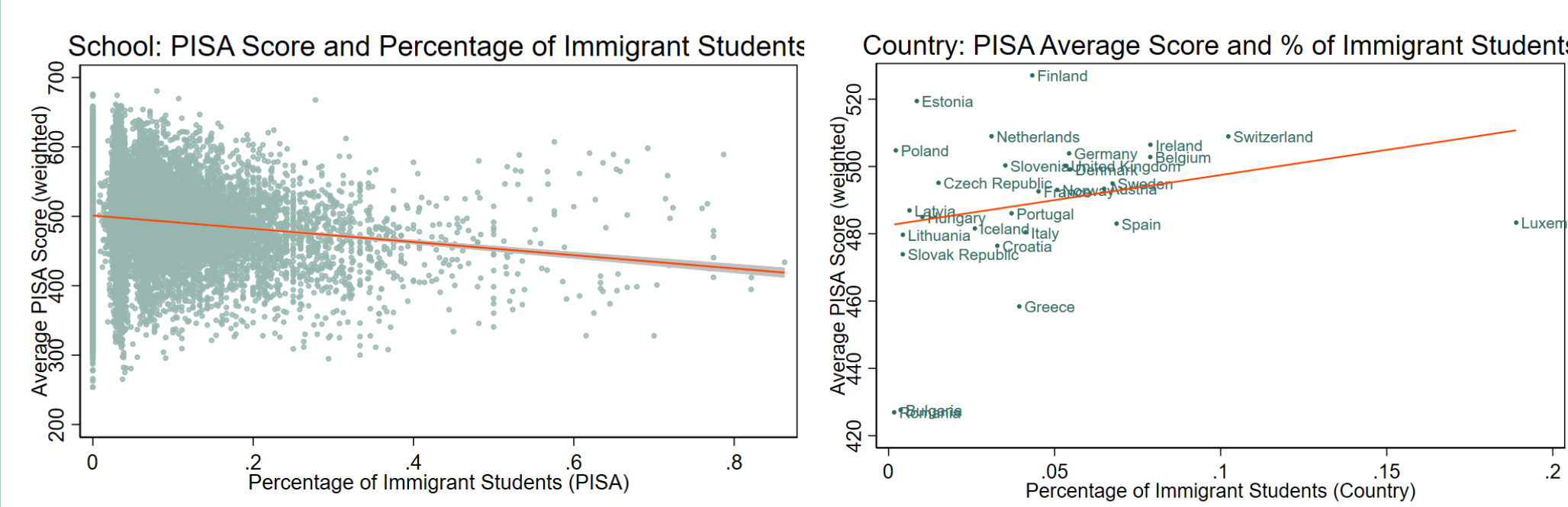
Main Specification:

$$Y_{ISZC} = \beta_0 + \beta_1 \{> 1\% \text{ Immigrant}\}_{ISZC} + \gamma X_{ISZC} + \alpha_c + \alpha_t + \epsilon_{ISZC}$$

i: Individual student
s: School
z: Community Size (Village, Small Town, Town, City, Large City)
c: Country
j: Immigrant Origin Country
t: Year
CS: Community Size Indicator
X: Controls at individual, school, and country level
α: Fixed effects (year, country)
ε_u: Error
Y: Outcomes

Test Scores, Schools, and Countries

Average PISA score and % of immigrant students: Negative association at the school level, positive association at the country level. Therefore, it is important to condition on country characteristics to account for endogeneity in country choice (similar to Brunello and Rocco, 2013), or use FE.



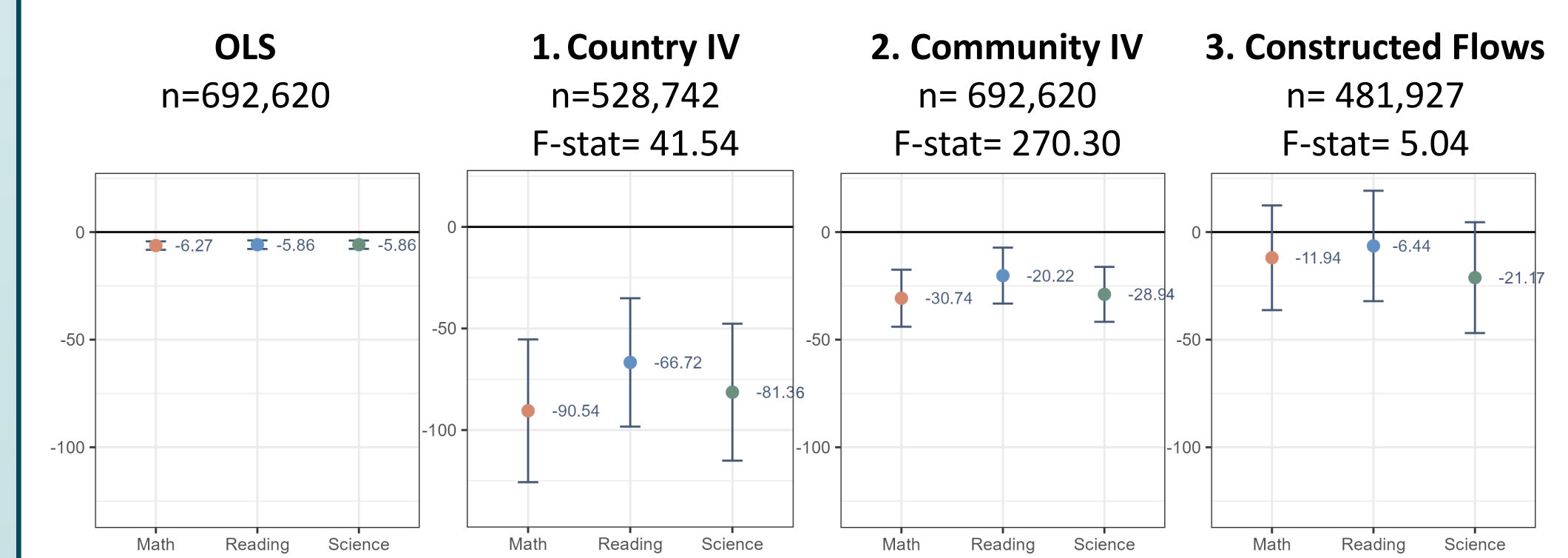
Background

- Native students can be impacted by immigration if an increase in immigrant peers changes the teaching environment. In particular, if teachers spend more time aiding immigrant students, who may have spent early years in a different educational system— if “classroom heterogeneity” increases (Jensen and Rasmussen, 2011; Hunt, 2017).
- Little research on how native students respond socially or behaviourally to immigrant peers. Quasi-experimental evidence that exposure to diverse peer backgrounds may increase prosocial behaviour (Rao, 2019), but not in the context of immigration in Europe.

Results: Test Scores of Natives

Controls include student and school characteristics, and GDP per capita. Estimates suggest a small and negative effect on native test scores.

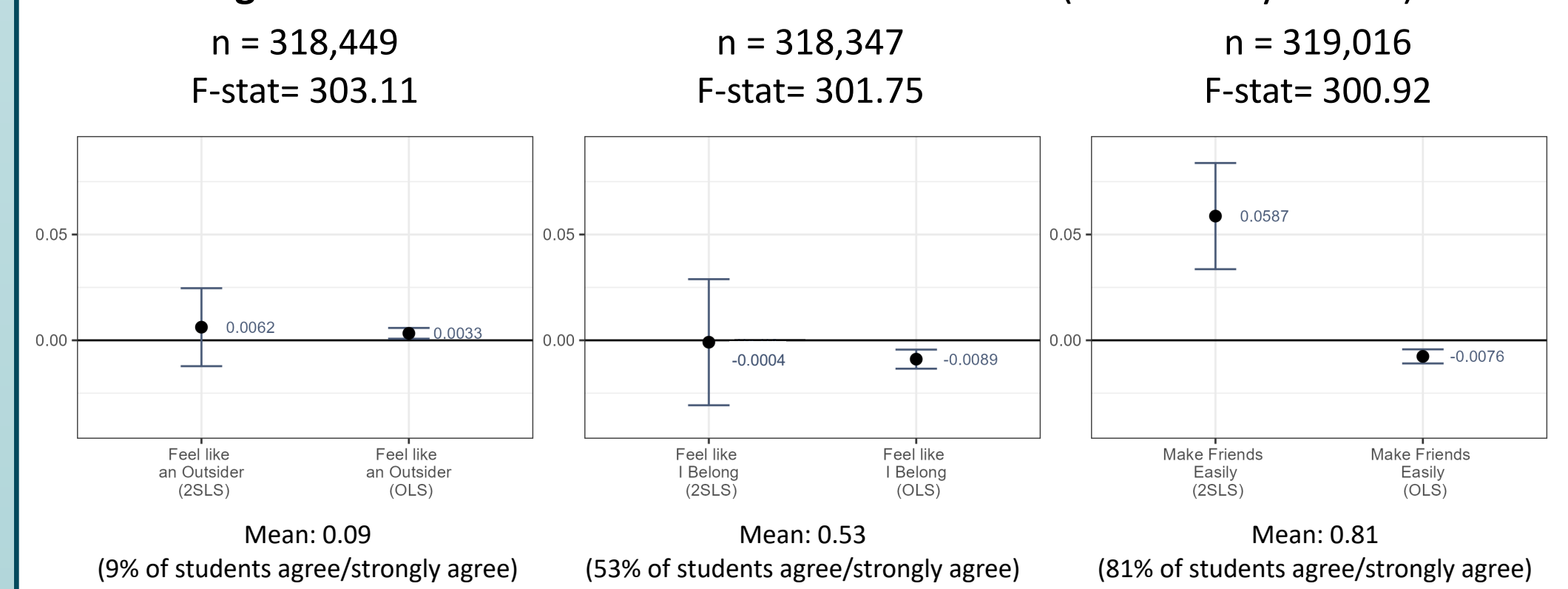
Figure. Score coefficients and 95% confidence interval



Results: School Experience of Natives

Estimates suggest little to no effect on school social experience for native students, with the exception of a 7% increase in native students agreeing with making friends easily in school.

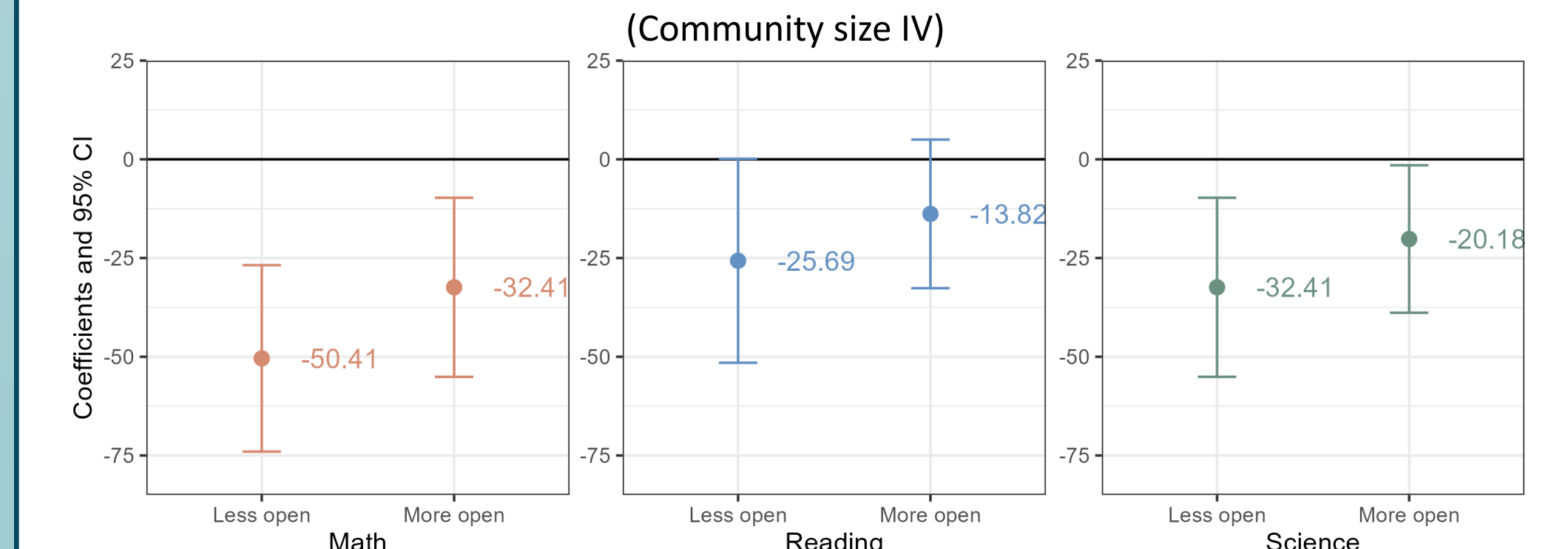
Figure. Coefficients and 95% confidence interval (Community-size IV)



Results: Heterogeneity & Mechanisms

Countries below median in terms of overall openness to migration could have a test score effect that is larger in magnitude, but estimates not precise. Proxied by MIPEX 2007. Median = 52, Max = 88, Min = 32

Figure. Splitting Countries by Median MIPEX (2007) Score (Community size IV)



Classroom heterogeneity mechanism: Redefining treatment as schools with >1% recent immigrants (<5 years since immigration), or >1% immigrants who speak a different language at home, increases magnitude of test score effect.

Attitudes Toward Immigrants (2018)

PISA 2018 included questions on attitudes towards immigrants voting, questions regarding student contact with immigrants at school and at home, and questions on self-perceived openness to different cultures.

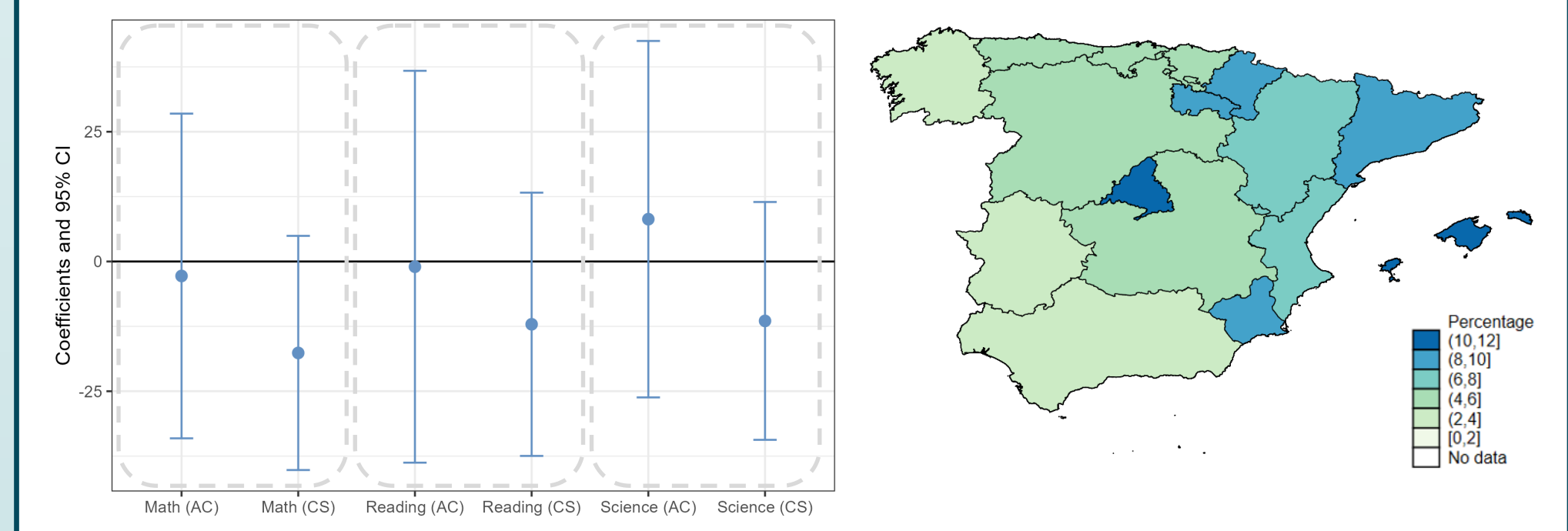
IV-2SLS (Community size IV)	Agree: "Immigrants who live in a country for several years should have the opportunity to vote in elections."	Like me: "I am interested in how people from various cultures see the world."	Like me: "I am interested in finding out the traditions of different cultures"
>1% Immigrants	0.0315 (0.0469)	0.0839 (0.0407)	0.0708 (0.0413)
% Contact with Immigrants (school)	0.0958 (0.1401)	0.2567 (0.1221)	0.2158 (0.1232)
Mean	0.7070	0.8143	0.8021
F-stat*	31.39	30.77	30.64
Observations*	85,954	92,574	92,350

* Only specified for regression using >1% Immigrants as treatment

Robustness: Spain

PISA identifies Autonomous Communities (NUTS 2 Regions) in Spain. Analysis is redone at the regional level for Spain, comparing community-size IV to the more traditional geographic instrument used in the literature. Results differ slightly, but not significantly.

Figure. Comparison of Coefficients (all controls), % Immigrant Students in Autonomous Community (AC) as IV vs. % Immigrant Students in Community-size (CS); Map of % Immigrant Students by AC in Spain



Alternative Treatment Definition

Alternative treatment definition	Results (Test Scores)
>5% Immigrant Students	Negative results (similar).
School-Aggregate % "Contact with Immigrant Students" (2018)	Negative, but imprecise and insignificant test score results.
% immigrant students (school)	Negative results.

Implications and Conclusions

- Attending school with immigrant students (9% on average) leads to approximately a 4-6% reduction in test scores amongst native students, but no large effect on native student self-reported school experience. Self-reported attitudes towards immigrants increase in positivity by around 5-10%; not always significantly.
- Conclusion:** Schooling effect likely not strong enough to negatively impact self-perceived native student experience. Students self-perceive as more open to different cultures, but there isn't enough evidence to determine if this translates to more tangible beliefs/actions.
- Students from countries with more restrictive immigration policy (proxied by MIPEX 2007) appear to have stronger in-school effect, possibly due to institutional preparedness, but effects are not precise.

Future research: Include # of adult immigrants in region as control, to differentiate in-school and labour market mechanisms (Hunt, 2017). Also investigate vocational schooling, a possible mechanism.

References

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