Intergenerational Mobility in Education in Greece:
An Exploration into Socioeconomic Determinants of Students' Performance and Future Career Plans Before, During and After the Crisis

London School of Economics Research Seminar

February 28th, 2023

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HELLENIC OBSERVATORY

Contents

- **Motivation & objectives**
- The Greek education system and social mobility
- Data, methods and variables
- Results
- Conclusions

Motivation and objectives

Context and motivation

- Education plays a central role in social mobility
- Educational attainment is closely associated with employment status, profession selection, income, living standards and general well-being

If cognitive performance is systematically distributed across the student population according to household/ parental socioeconomic characteristics (e.g., wealth, education or occupation)

then adolescents from disadvantaged households would face unequal chances in their future prospects compared to their more advantaged counterparts

Motivation & Objectives

Objectives

- Evaluate the role of socioeconomic status on the cognitive performance and future plans of Greek high-school students
- Examine intertemporal trends in light of the recent economic crisis
- Examine differences with other countries on the effect of socioeconomic and other drivers on intergenerational educational mobility.

Contribution

- Explore socioeconomic variation in Greek high-school students' outcomes in a coherent and systematic way: wide range of student outcomes, intertemporal analysis (covering almost two decades) and comparative context (comparison with other EU/OECD countries)

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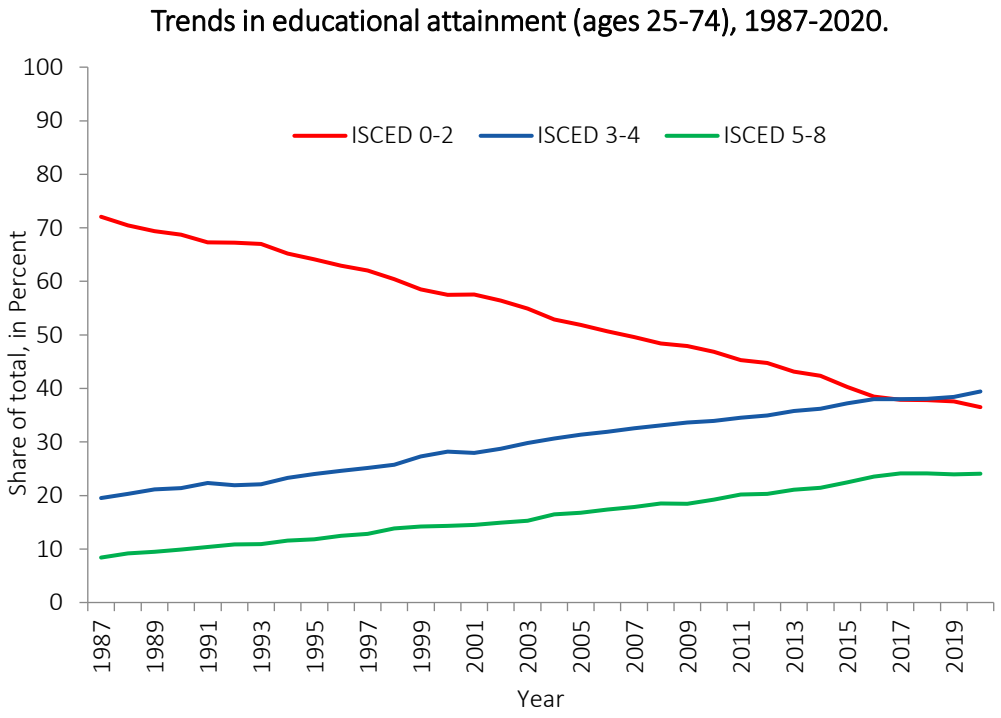
Since the 1980s, secondary and tertiary education in Greece have expanded considerably

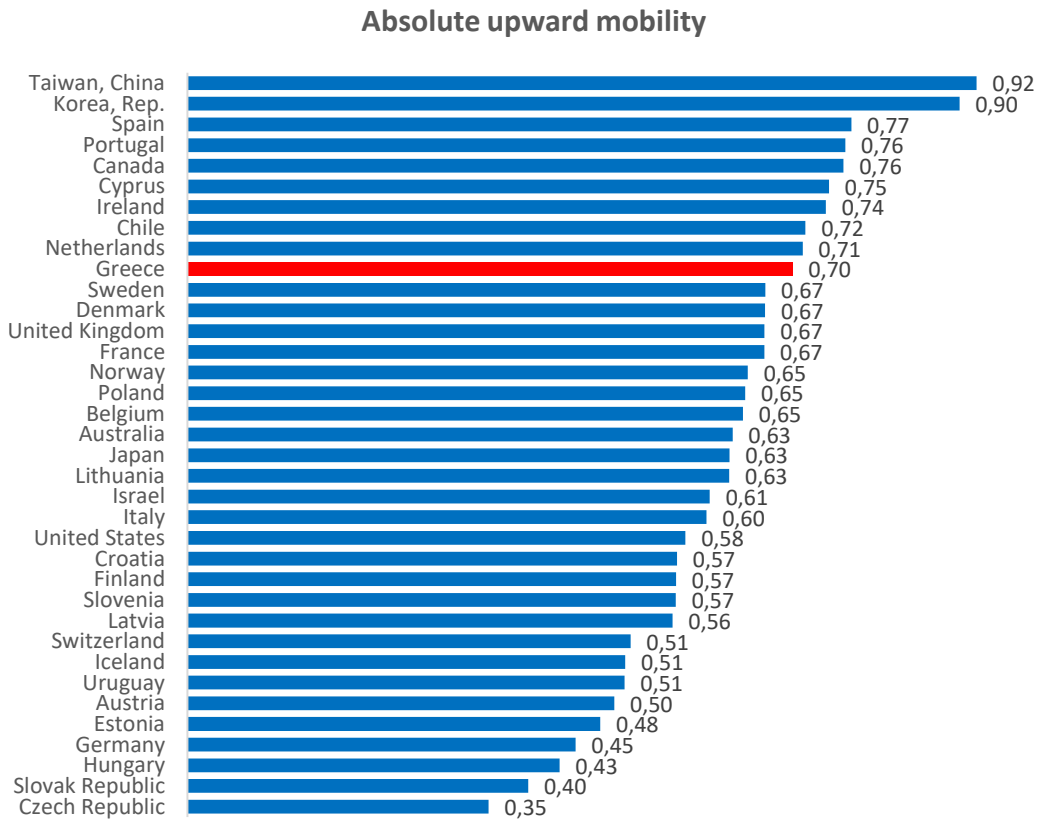


Source: ELSTAT Labour Force Survey (authors' calculations).

- Population share aged 25-74 with up to lower secondary education (ISCED 0-2) fell from 72% in 1987 to 37% in 2020
- Population share with tertiary education (ISCED 5-8) increased from 9% to 24%
- Currently Greece has the highest enrolment rates in bachelor's programs among individuals aged 19-24 years in the OECD (OECD, 2019)

This expansion is believed to have played a key role in boosting upward intergenerational mobility in education

Greece ranks high in the absolute education mobility indicator

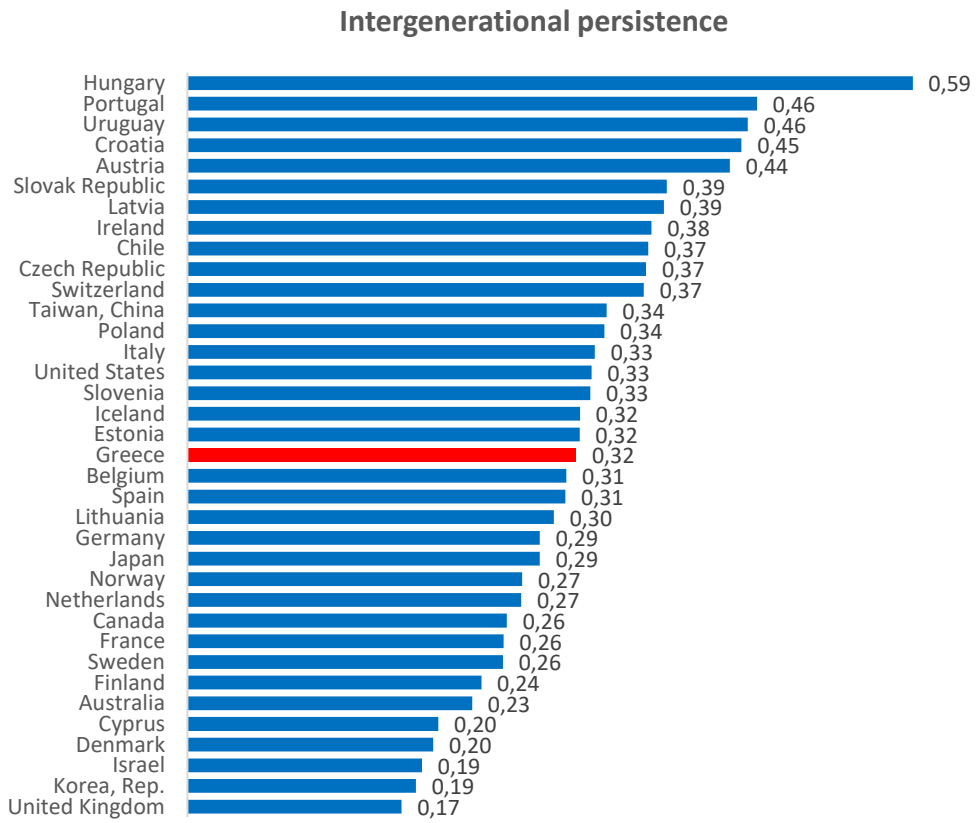


Source: Global Database on Intergenerational Mobility (2020), World Bank

- The probability that children born in the 1980s in Greece have a higher education attainment level than the highest level of their parents is 70%

Based on this indicator, Greece ranks 10th among 36 high-income economies featured in the Global Database for Intergenerational Mobility (GDIM) of the World Bank

But more modestly in the intergenerational persistence indicator



Source: Global Database on Intergenerational Mobility (2020), World Bank

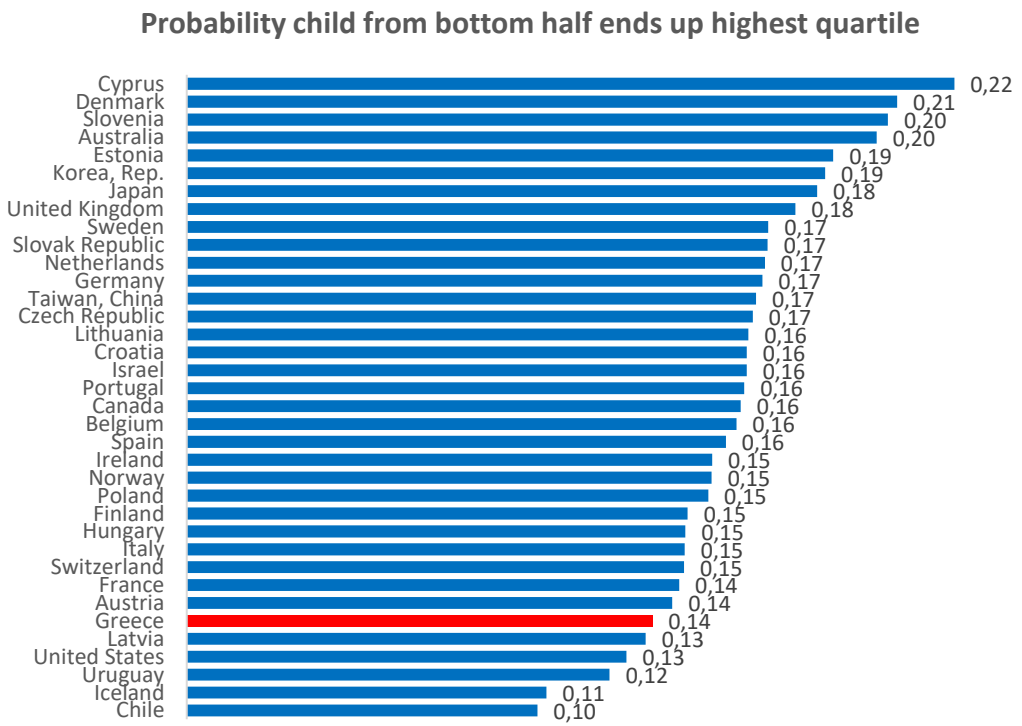
- The indicator measures the estimated impact of one additional year of schooling of parents on the years of schooling of their children
- For the 1980s cohort in Greece, an additional year of schooling of the parent adds on average 0.32 years of additional schooling to the child

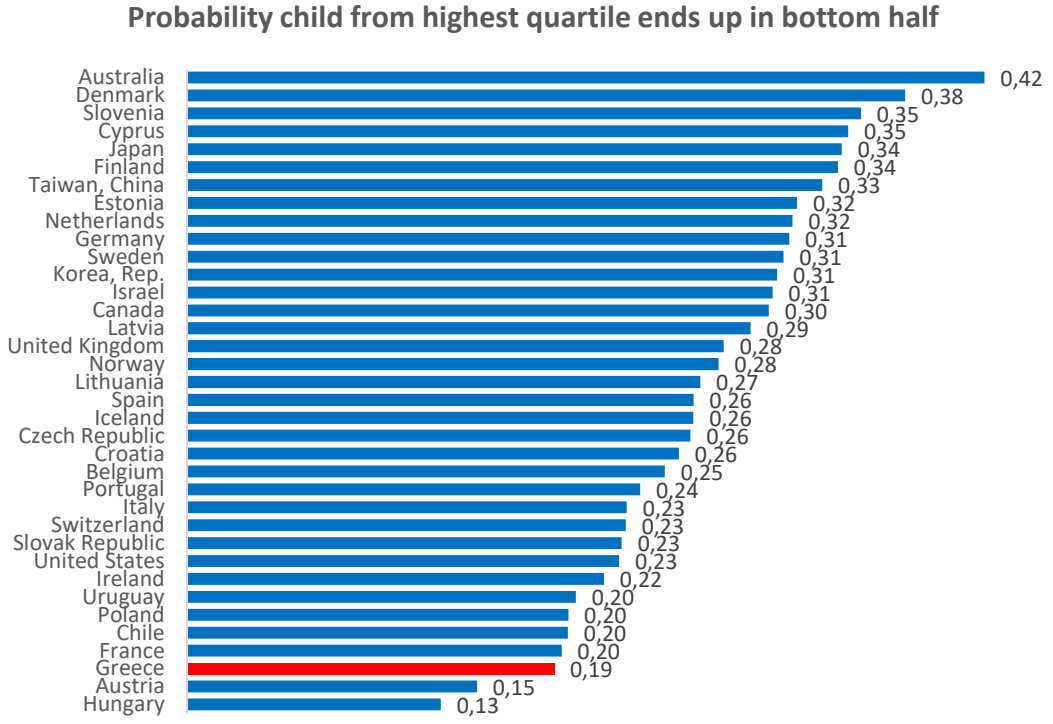
Based on this indicator, Greece is placed right in the middle of the ranking of high-income economies (18th place)

And low in terms of overall social mobility and inequality…

The probability that a child with parents from the bottom half of the educational attainment distribution moves to the top quantile for the 1980s cohort is limited to 14%

And the probability of a child with parents from the top quantile moving to the bottom half is estimated at 19%





Source: Global Database on Intergenerational Mobility (2020), World Bank

Greece ranks 31st and 34th respectively, among the 36 high-income economies featured in GDIM

What are the barriers? (1/2)

- Access to tertiary education is performance-based but typically open with no requirement for tuition fees. However, various barriers to equitable access exist
- Students from families of professionals have significantly higher rates of access to higher education (e.g., Thanos, 2011; Kontogiannopoulou-Polydorides, 1999)
- Highly-demanded faculties (Medicine, Law and Engineering) mostly covered by upper and upper-middle strata while faculties with less promising prospects mainly attended by students from lower/ lower-middle strata (e.g, Maloutas, 2015; Panayotopoulos, 2000; IOBE, 2019)

Therefore, it is harder for more disadvantaged students to improve their relative social position within their generation, despite the absolute improvement compared to their parents' educational achievements

What are the barriers? (2/2)

- Inequality has shifted to higher educational levels such as postgraduate programs (often requiring tuition fees) and doctorates (Hadjiyanni and Valassi, 2009)
- Much of the Greek educational system operates in a state of isolation from the actual needs of the economy and the labour market (Vettas, 2017)
- In private sector jobs, the difference in the probability of finding a job is limited for education attainment levels lower than a master's degree (relationship is stronger in public sector).
  - Also, post-secondary non-tertiary education does not appear to improve the chances of employment, compared to the upper secondary level (IOBE, 2018)
- Very large household expenditure for tutorials preparing students for the final national exams ensuring admission to tertiary education.
  - Private tutorials are also becoming increasingly prevalent amongst younger students

It is estimated that households with children in lower and upper secondary education annually spent over EUR 900 million (0.5% of GDP) for private lessons amidst the crisis (in 2016)- excluding private school tuition fees (IOBE, 2019)

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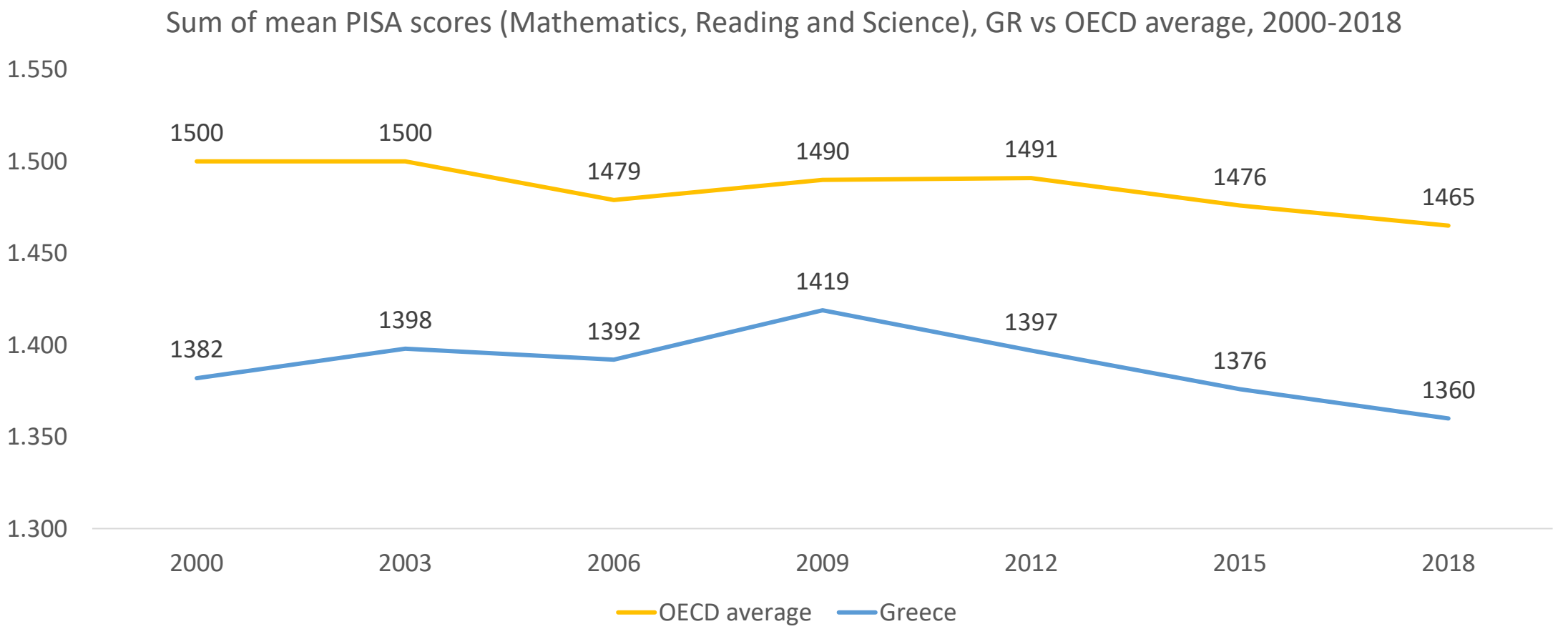
Data

- Microdata of the OECD's Program for International Student Assessment (PISA) from 2000 to 2018 (full available range)
- PISA is a worldwide survey developed by the OECD in both member and non-member countries in 2000 (takes place every 3 years)
- Its main objective: to measure and compare on a cross-country basis 15-year-old student cognitive performance in three fields of literacy: Mathematics, Reading and Science
- Database also contains rich information at the student, household and school level collected through various questionnaires
- 2018 sample: ≈ 600,000 obs. from 80 countries, Greek sample: 6,403 obs.

2 main sources of the PISA microdata: tests and questionnaires. Tests (computer-based) assess performance in 3 main domains. Other information on students, their beliefs and experiences, their homes, background, their schools and the broader learning environment is collected through questionnaires.

Greek students' PISA performance has been systematically lagging the OECD average during the entire 2000-2018 period



In 2018, Greece ranked 42nd in Reading, 43rd in Maths and 44th in Science, amongst 80 countries.

Methods

• We employ multivariate regression techniques to explore existence and magnitude of relationships between socioeconomic and other characteristics, on one hand, and educational outcomes and future plans, on the other

PISA scores regressions	Aspirations regressions
• OLS • Regress plausible values of education performance per student on socioeconomic characteristics (such as household wealth, possession of cultural and educational resources, education and occupation of parents and immigrant status) • Control for demographic (age in months, sex), school (such as class size, computer infrastructure, cultural activities) and other characteristics (such as self-reported support from teachers and parents).	• Logistic regressions • Regress binary constructs of students' future aspirations (to enter university education, work as managers or highly paid professionals) on the same set of explanatory variables

Methods (continued)

In greater detail, we estimate the following relation:

$$y_i = \alpha + \beta X_i + \gamma Z_i + \varepsilon_i$$

- where y_i is a vector of student outcomes for individual *i* (plausible values of PISA scores or aspiration variables)
- X_i is a vector of variables for individual i that capture socioeconomic characteristics related to social mobility (such as parent education, occupation and wealth)
- Z_i is a vector of control variables for individual i that capture demographic and other characteristics that might be related to student performance (such as age, sex and class size)
- ε_i is the error term of the regression (i.e. the difference between the actual and the predicted values of the student outcomes), while α, β, γ are the coefficients estimated by the regression.

Variables

Dependent

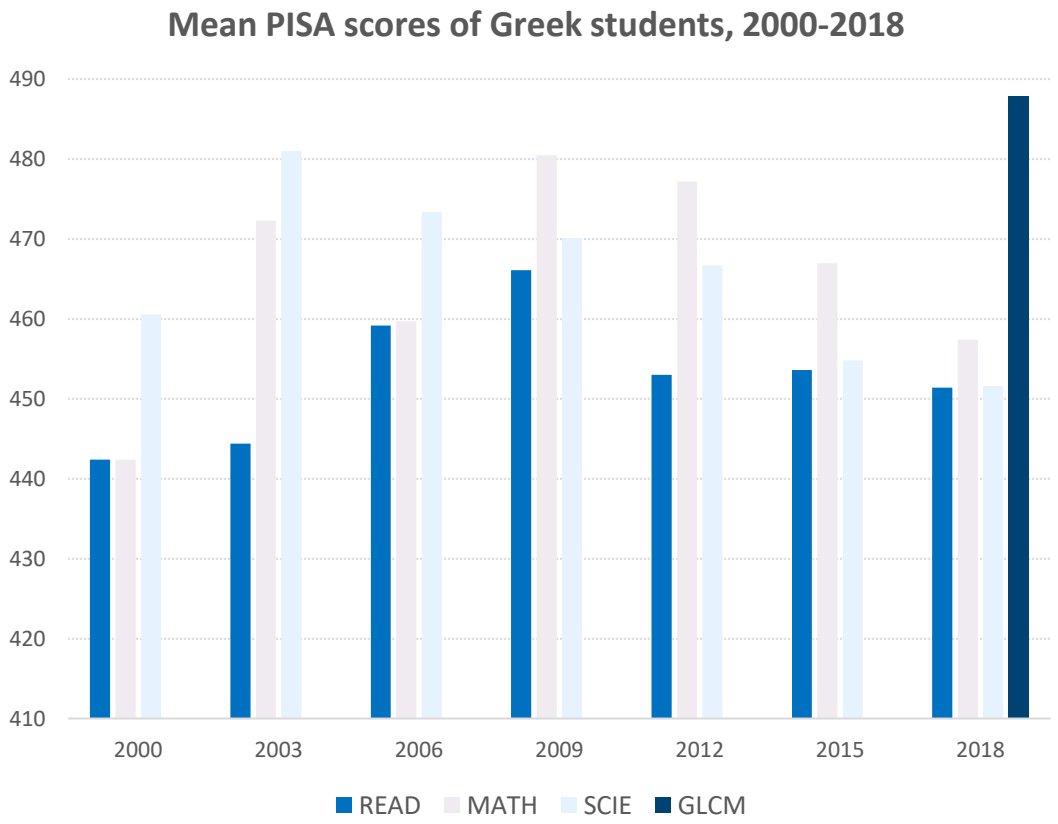
- PISA score in Mathematics (MATH)
- PISA score in Reading (READ)
- PISA score in Science (SCIE)
- PISA score in Global Competence (GLCM)*
- Student aims to pursue Higher Education (HE)
- Student aims to be Studying and not Working in 5 years (SW)
- Student aims to pursue high-level career (HP)

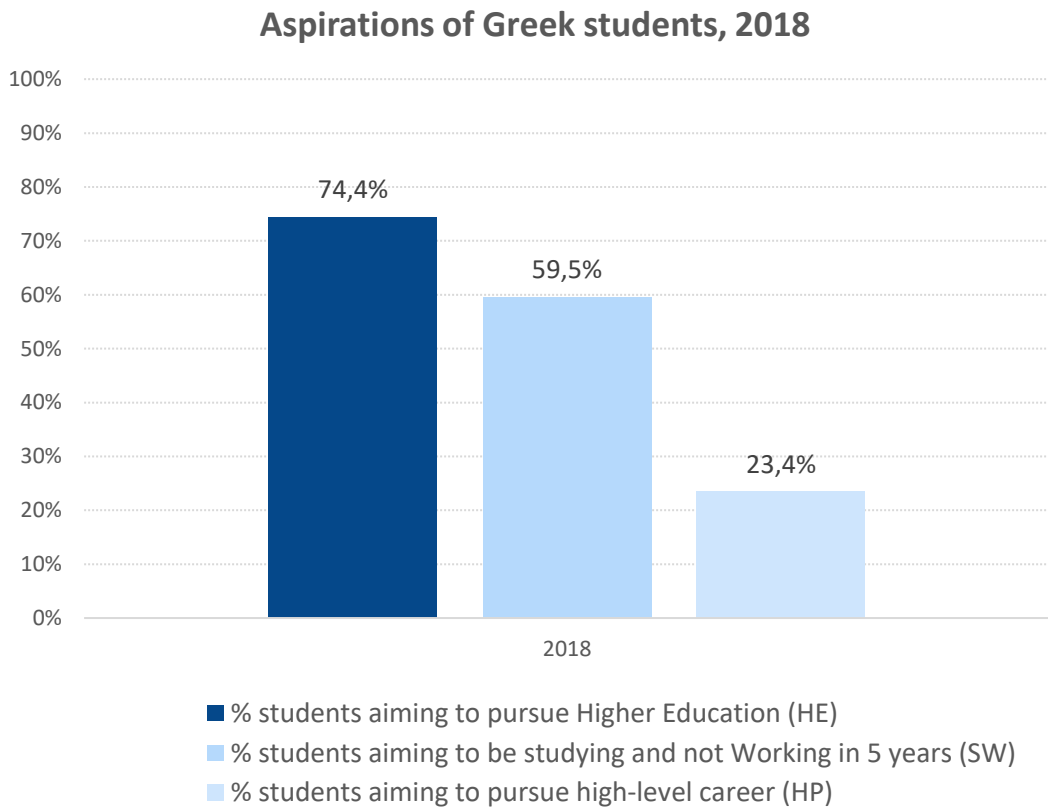
Independent

- Demographics (sex, age in months)
- Duration of Early Childhood Education and Care (ECEC)
- ESCS** and its components (home educational resources, cultural possessions, family wealth, parental education, parental occupation)
- Immigrant status
- Degree of urbanization of residence
- School characteristics (public/private, class size, computers, creative activities)
- Support variables (teacher's interest, parental emotional support, bullying experiences)

*GLCM (Global Competence) first introduced in the latest (2018) survey (multi-dimensional domain measuring the students' capacity in understanding and acting on global and intercultural issues)
**ESCS is the PISA index of Economic, Social and Cultural Status (measuring student SES).

Student outcome variables: descriptive statistics for Greece





- In 2018, Greece ranked 42nd in Reading, 43rd in Maths and 44th in Science, amongst 80 countries
- We define as "high-level" a career in the following occupations: managers, engineers, architects, planners, surveyors and designers, medical doctors, veterinarians, dentists and legal professionals.

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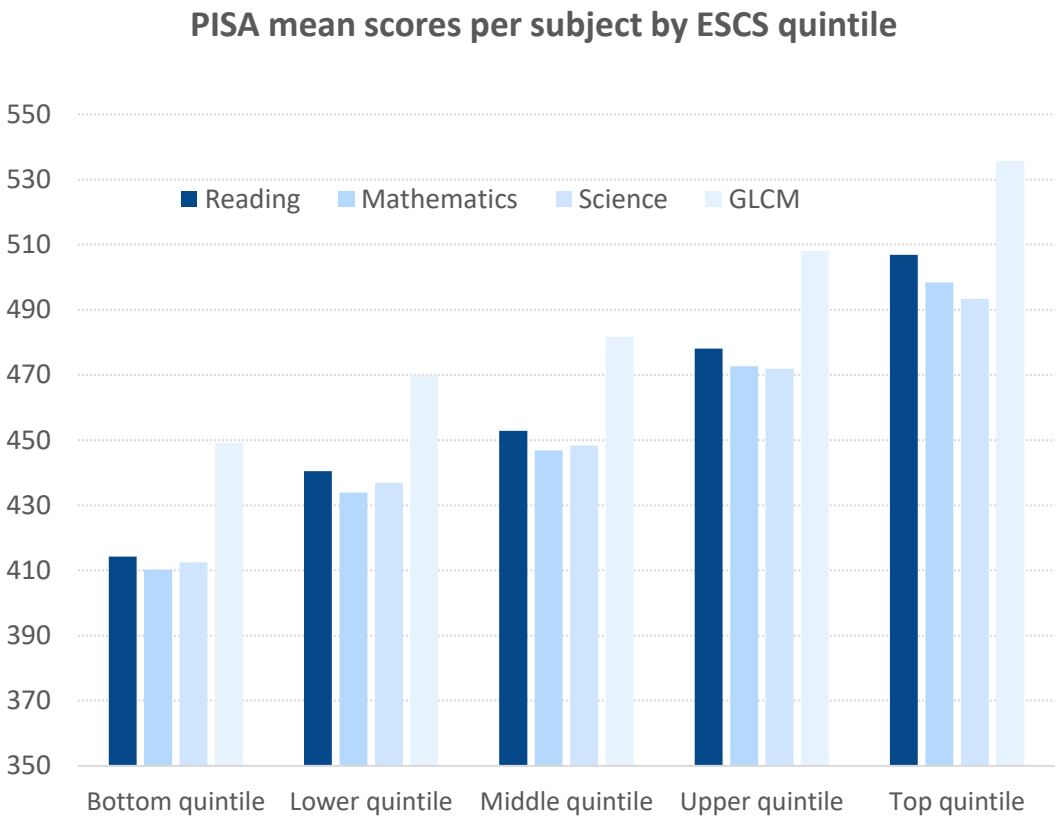
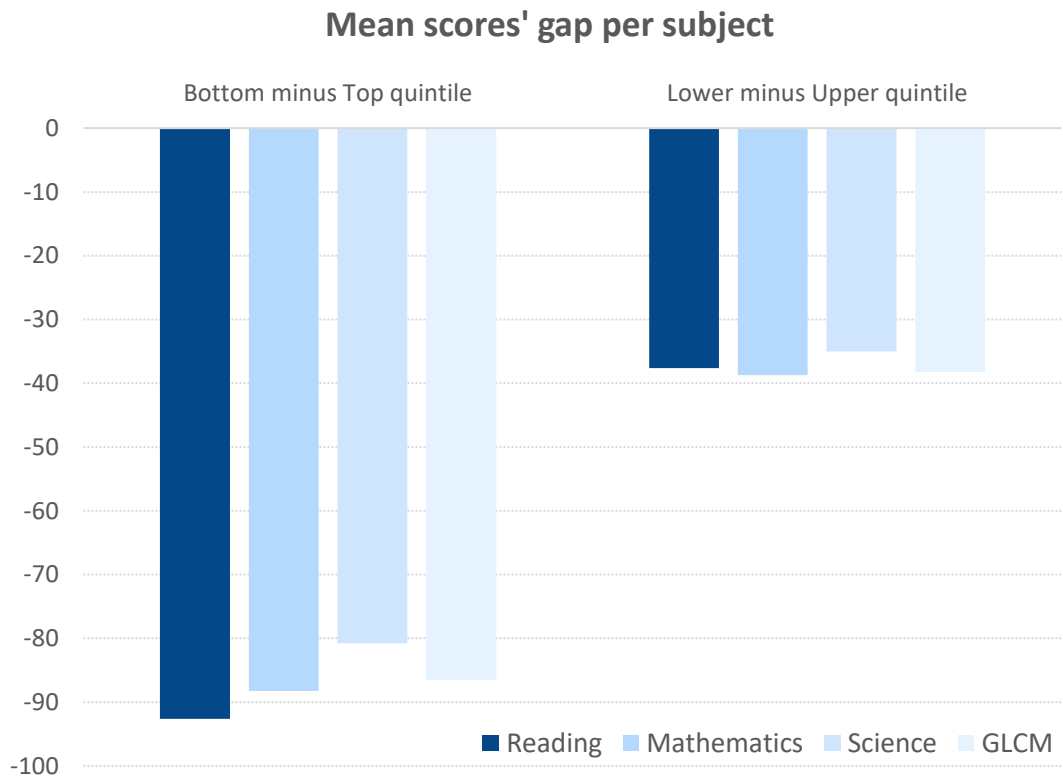
Socioeconomic gradients observed across all PISA domains in 2018





Source: PISA micro data set, authors' calculations

- Greek students stemming from more advantaged backgrounds perform better in PISA (all 4 domains)
- The largest performance gap is recorded in Reading, the lowest gap in Science

OLS regressions revealed various associations between PISA scores and a series of student, household and school-level characteristics (Greece, 2018)

	Global competence	Reading	Math	Science
Age	positive ***	positive***	positive***	positive***
Sex (male)	negative***	negative***	positive***	positive
Home educational resources	positive***	positive***	positive***	positive***
Home cultural possessions	positive***	positive***	positive***	positive***
Other home possessions	negative***	negative***	negative***	negative***
Mother: university education	positive***	positive*	positive**	positive*
Father: university education	positive**	positive***	positive***	positive*
Mother: high-level occupation	positive***	positive***	positive	positive*
Mother: other occupation [base:inactive]	positive***	positive***	positive***	positive***
Father: high-level occupation	positive	positive	positive	positive
Father: other occupation [base:inactive]	positive	positive	positive	positive
Student: second- generation immigrant	negative***	negative***	negative***	negative***
Student: first-generation immigrant	negative***	negative***	negative***	negative***
Suburban residence	positive	positive	positive	positive
Urban residence (base: rural)	positive	positive	positive	positive
Student: at least 2 years of ECEC	positive	positive	positive*	positive
Student: bullied	negative***	negative***	negative	negative***
Parental emotional support	positive***	positive***	positive***	positive***
Teacher's interest	positive*	positive	negative	positive
School type (public)	negative**	negative***	negative***	negative***
School size	0	0	positive	positive
Class size	positive***	positive***	positive***	positive***
Computers with internet (%)	negative	negative	positive	negative
Creative extra-curricular activities	positive	positive	positive	positive

Source: PISA micro data set, authors' calculations. Note: Asterisks *, **, *** denote statistical significance at the 90%, 95% and 99% level, respectively.

Logistic regressions revealed associations between aspirations and student, household and school-level characteristics (Greece, 2018)

	Plans to complete tertiary education	Plans to be high-level professional	Plans to be working in 5 years
Age	positive***	positive***	negative
Sex (male)	negative***	negative***	positive
Home educational resources	positive***	positive	negative***
Home cultural possessions	positive**	positive**	negative***
Other home possessions	positive	positive***	negative
Mother: university education	positive***	negative	negative
Father: university education	positive**	positive**	negative
Mother: high-level occupation	positive*	positive	negative*
Mother: other occupation *[base: inactive]*	positive	negative	negative
Father: high-level occupation	positive	positive	positive
Father: other occupation *[base: inactive]*	positive	negative	positive
Student: second-generation immigrant	negative**	positive**	positive
Student: first-generation immigrant	negative	negative	negative
Suburban residence	negative	positive	negative
Urban residence *[base: rural]*	positive	positive***	negative*
Student: at least 2 years of ECEC	positive***	negative	negative
Student: bullied	negative	negative	positive***
Parental emotional support	positive***	positive***	negative***
Teacher's interest	negative	negative	negative
School type (public)	negative**	negative	negative
Class size	positive**	negative	negative
Computers with internet (%)	negative	negative	negative
Creative extra-curicular activities	positive	negative	negative

Source: PISA micro data set, authors' calculations. Note: Asterisks *, **, *** denote statistical significance at the 90%, 95% and 99% level, respectively.

PISA scores and aspirations regressions: summary of main results (1/3)

- **Age (in months)** positively correlated with student outcomes
- **Gender** statistically significant in most of the models, but with a different effect (positive or negative) depending on the test domain
  - Being male:
    - Negatively and significantly associated with Global Competence and Reading scores, as well as with aspirations for pursuing tertiary education and a managerial or professional career.
    - Positively and significantly associated with Mathematics scores.
- **Educational resources and cultural possessions** associated with higher student performance and aspirations with a high level of statistical significance across almost all models
- By contrast, the **non-educational, non-cultural component of the aggregate household possessions index** is negatively associated with student outcomes with the effect being statistically significant in the PISA scores regressions

- Other things equal, educational and cultural possessions exhibit a positive association and other non-educational, non-cultural home possessions a negative one
- Analysis for the composite household possessions index (HOMEPOS) produces an overall positive and statistically significant result

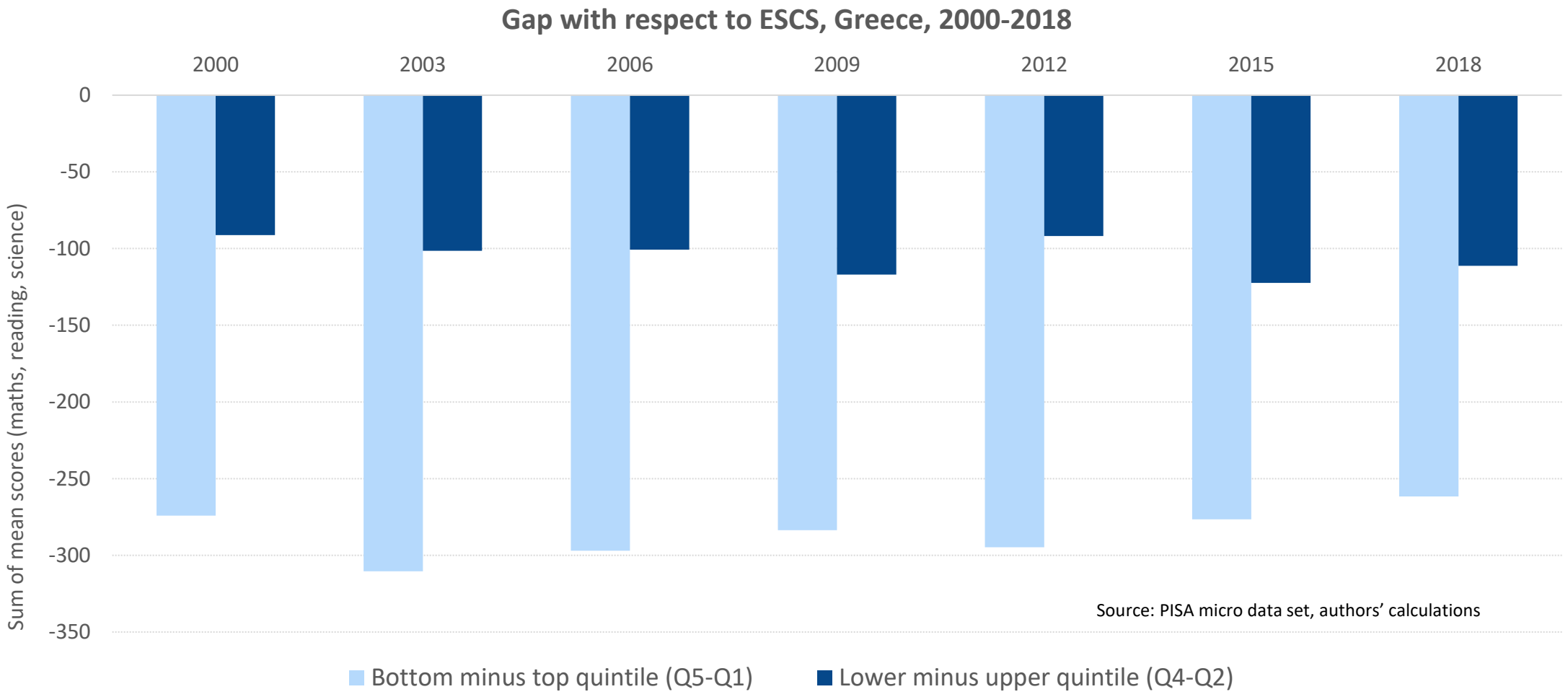
PISA scores and aspirations regressions: summary of main results (2/3)

- **Parental tertiary education** dummies: positive and statistically significant associations with student outcomes
- **Parental occupation**: relationship more prominent on the mother's side and in the PISA scores' regressions compared to the aspirations' regressions
- Negative and statistically significant relationship between **immigrant status** and PISA scores in all four domains (negative effects larger for first-generation immigrant adolescents).
  - Adverse effects are mostly limited to the PISA scores models
- No (statistically significant) **regional** disparities in student PISA scores outcomes
  - *Some exceptions in the aspirations models (a positive association between residence in urban areas and the plan to follow a managerial or highly paid professional career and a negative association with the intention to work in five years)*
- Similarly, having participated for at least two years in **early education and care (ECEC)** presents a significant relationship only with the aspiration variable on completing tertiary education and not on cognitive performance across domains according to PISA (exception: Mathematics, positive at the 10% level)

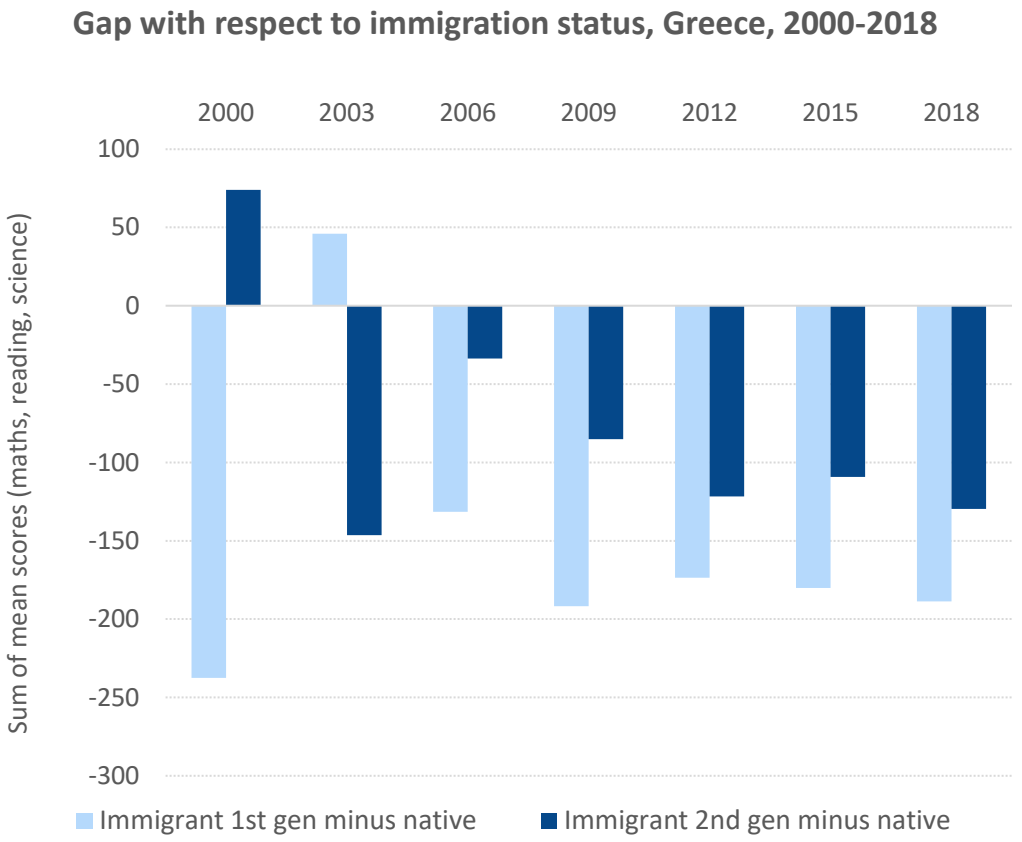
PISA scores and aspirations regressions: summary of main results (3/3)

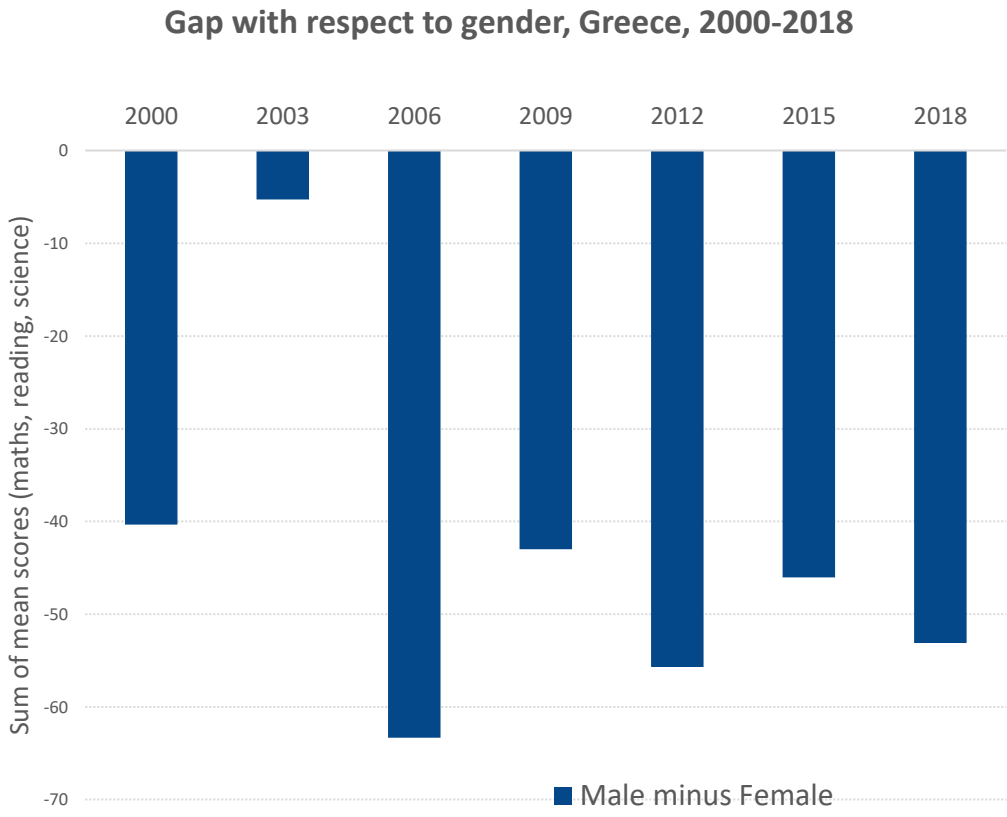
- **Bullying** negatively and statistically significantly associated with scores in 3 out of the 4 PISA domains in 2018 (Global Competence, Reading and Science)
  - Also, associated with a higher probability that the student plans to be working in 5 years from the time of the interview
- Particularly large and significant effect of **parental emotional support** across models
  - By contrast, the perceived teachers' interest does not produce statistically significant results (except for a positive association with Global Competency at the 10% level)
- Negative relationship between attending a **state-run school** and scores in all four PISA domains (significant at the 5% level), as well as with aspirations for higher education (at the 10% level)
- **Other school characteristics**: class size associated with higher PISA performance whereas the variables on school size, number of creative extra-curricular activities and proportion of computers connected to the internet have no statistically significant relationship with the outcome variables in the models

Intertemporal analysis: the ESCS performance gap in Greece has been persistent but rather stable across time



Persistent gaps also with respect to immigrant status and gender





Source: PISA micro data set, authors' calculations

Since 2006, the performance gap by gender and first-generation immigrant status have also been quite stable, while the respective gap by second-generation immigrant status has widened

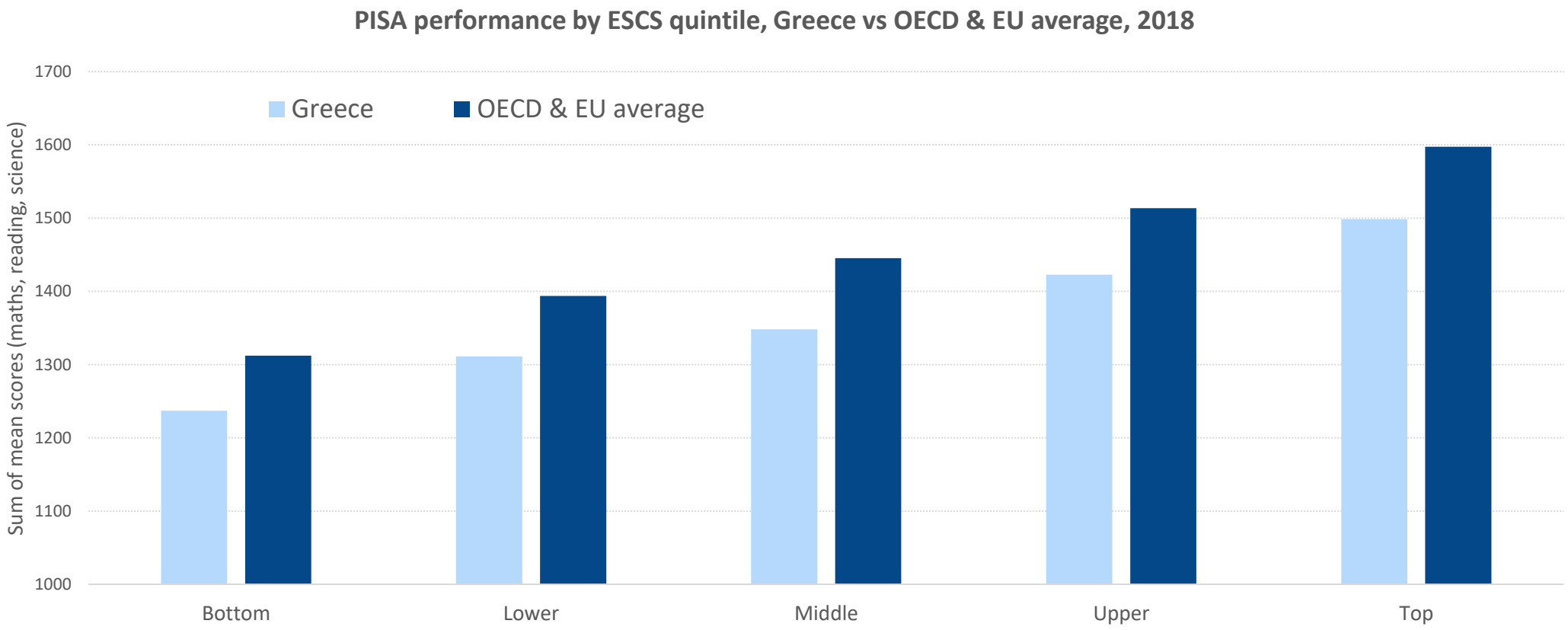
The relative stability of these relationships was confirmed by regression results for Greece across the PISA waves

	2000	2003	2006	2009	2012	2015	2018
Reading							
ESCS	positive***	positive***	positive***	positive***	positive***	positive***	positive***
First-generation migrant	negative***	negative	negative*	negative***	negative***	negative***	negative***
Second-generation migrant	positive	negative***	negative	negative*	negative*	negative*	negative***
Male	negative***	negative***	negative***	negative***	negative***	negative***	negative***
Age	positive**	positive	positive**	positive	positive	positive**	positive***
R-squared	17.50%	15.60%	19.4%	19.10%	19.80%	17.00%	16.20%
Mathematics							
ESCS	positive***	positive***	positive***	positive***	positive***	positive***	positive***
First-generation migrant	negative***	negative	negative***	negative***	negative***	negative***	negative***
Second-generation migrant	positive	negative***	negative	negative	negative***	negative***	negative***
Male	positive	positive***	positive	positive***	positive***	positive	positive
Age	positive	positive	positive	positive**	positive**	positive**	positive***
R-squared	10.80%	16.40%	16.20%	14.70%	17.00%	11.70%	13.10%
Science							
ESCS	positive***	positive***	positive***	positive***	positive***	positive***	positive***
First-generation migrant	negative***	positive**	negative***	negative**	negative***	negative***	negative***
Second-generation migrant	positive	negative***	negative	negative**	negative***	negative**	negative***
Male	negative***	negative**	negative***	negative***	negative***	negative**	negative***
Age	positive**	positive***	positive***	positive***	positive*	positive***	positive***
R-squared	12.90%	14.50%	16.70%	14.30%	15.60%	13.80%	12.70%

Source: PISA micro data set, authors' calculations. Note: Asterisks *, **, *** denote statistical significance at the 90%, 95% and 99% level, respectively.

- Coefficients (not shown here) are negative and larger for first-generation migrants (indication of their gradual integration)
- Some differences with the detailed 2018 regressions (e.g., gender), as we do not control for additional variables

Educational outcomes vary across socioeconomic and demographic characteristics at the international level

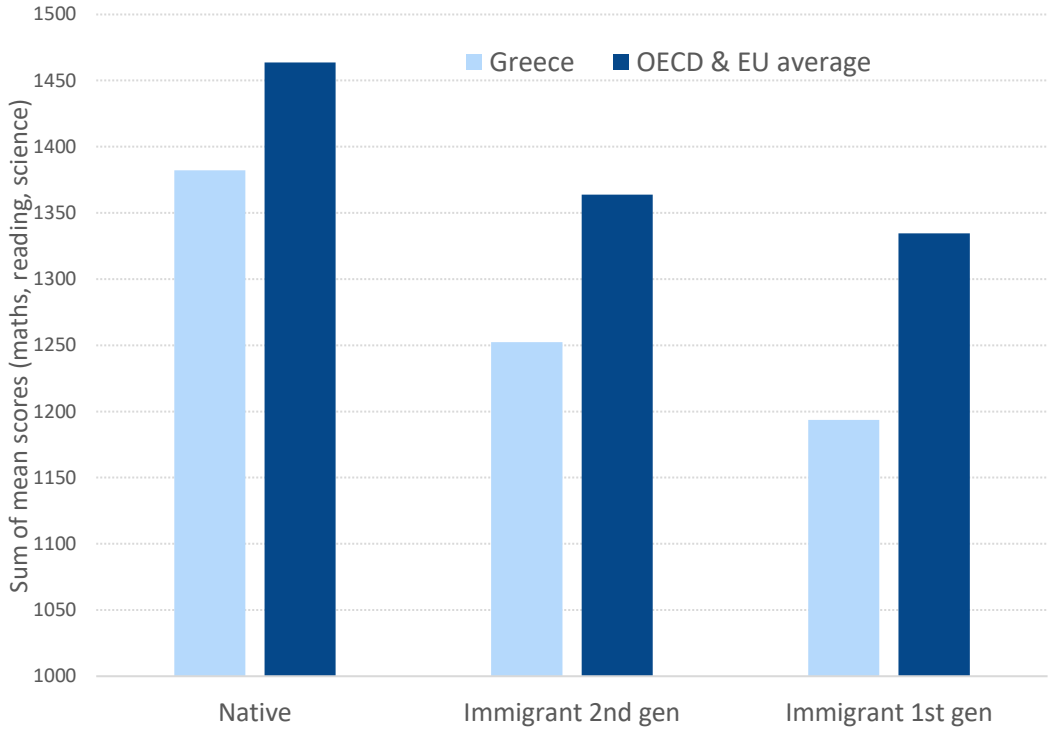


Source: PISA micro data set, authors' calculations

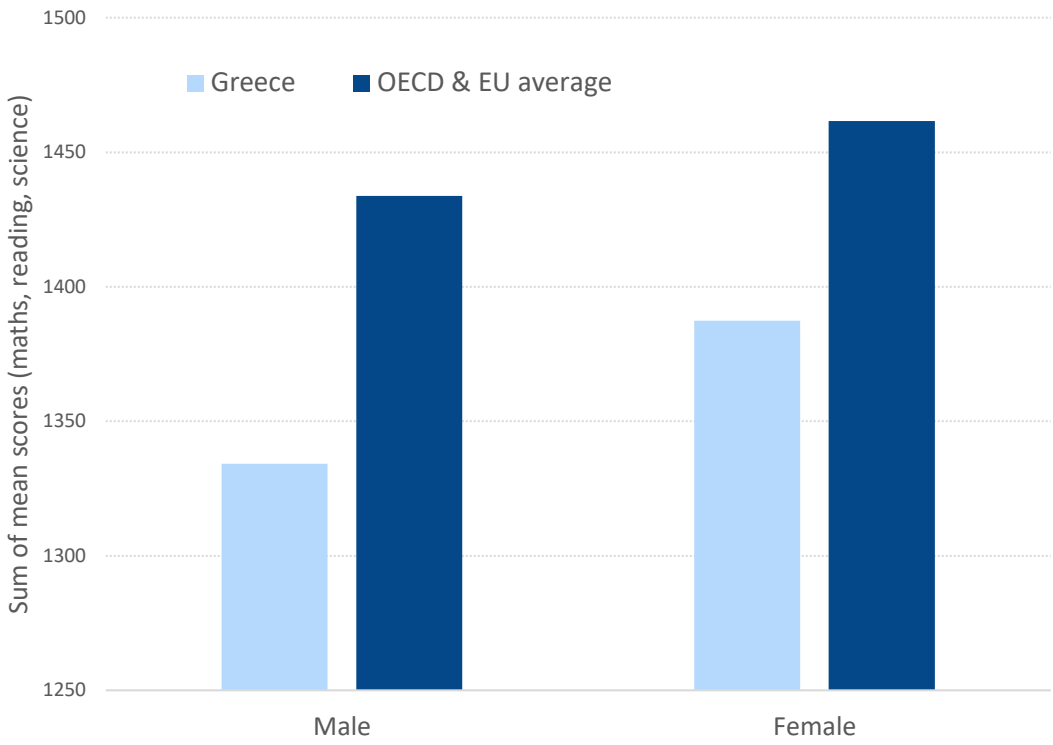
The performance gap by ESCS background between Greece and the "OECD & EU" average in 2018 has been smaller for the Bottom (Q5) quintile, but larger for middle (Q3) and top (Q1) quintiles

Educational outcomes vary also by immigration status and gender

PISA performance by immigration status, Greece vs OECD & EU average, 2018



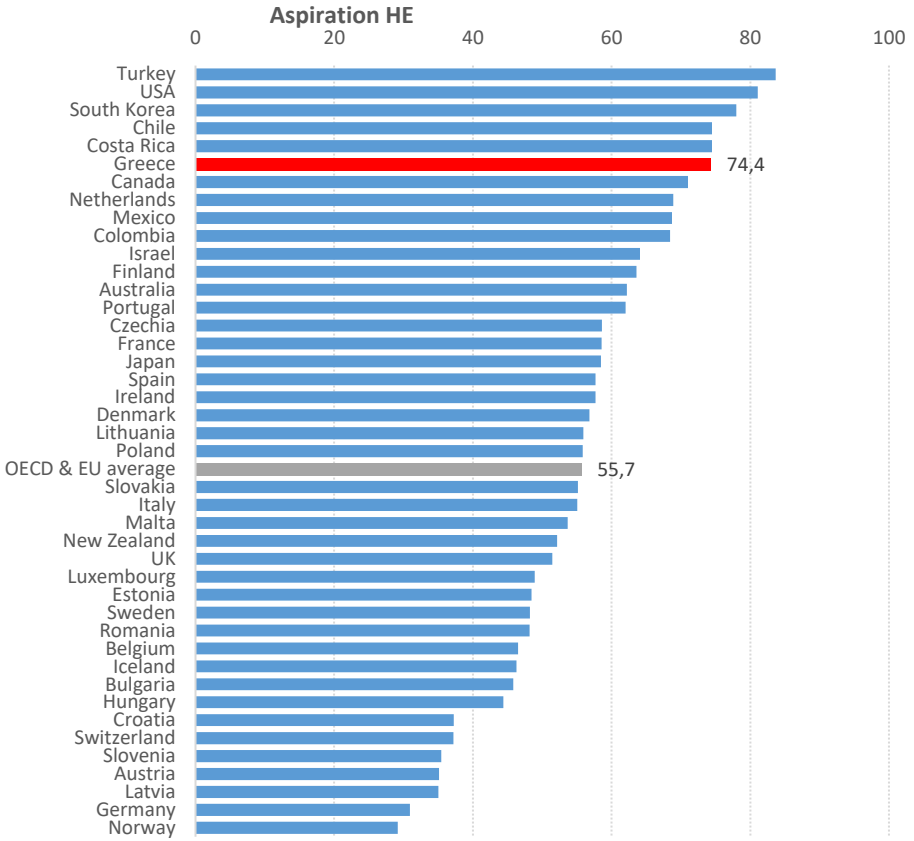
PISA performance by gender, Greece vs OECD & EU average, 2018

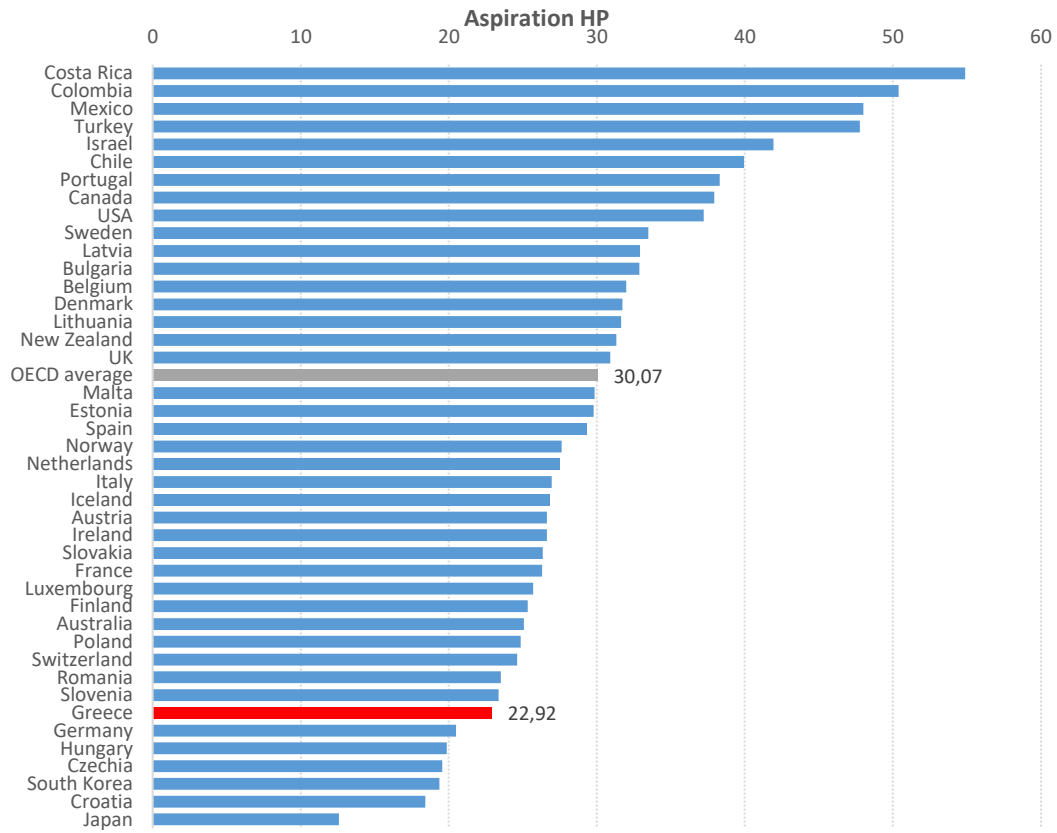


Source: PISA micro data set, authors' calculations

- The performance gap by immigration status between Greece and the "OECD & EU" average in 2018 has been larger for first generation immigrants, followed by second generation immigrants, while it is smaller for natives
- The performance gap between Greece and the "OECD & EU" average in 2018 has been larger for male than for female students

Students' aspirations about their future career plans exhibit variations across countries

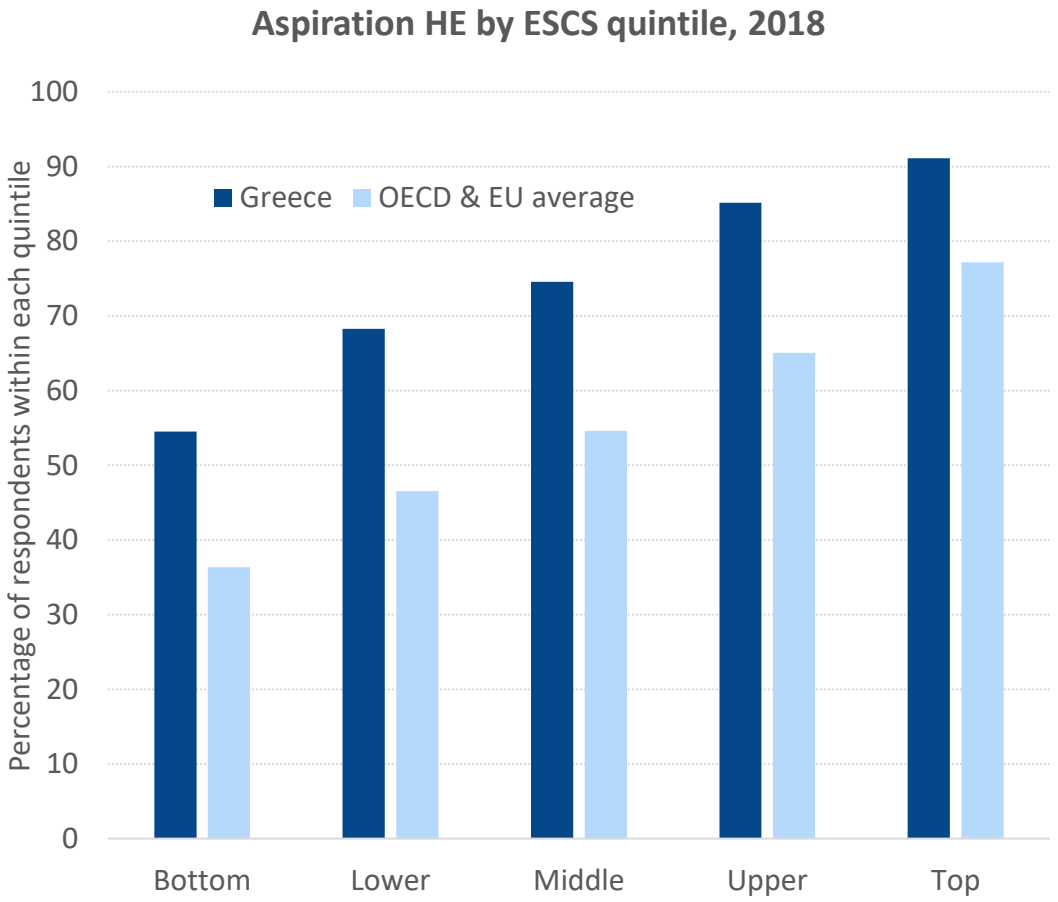


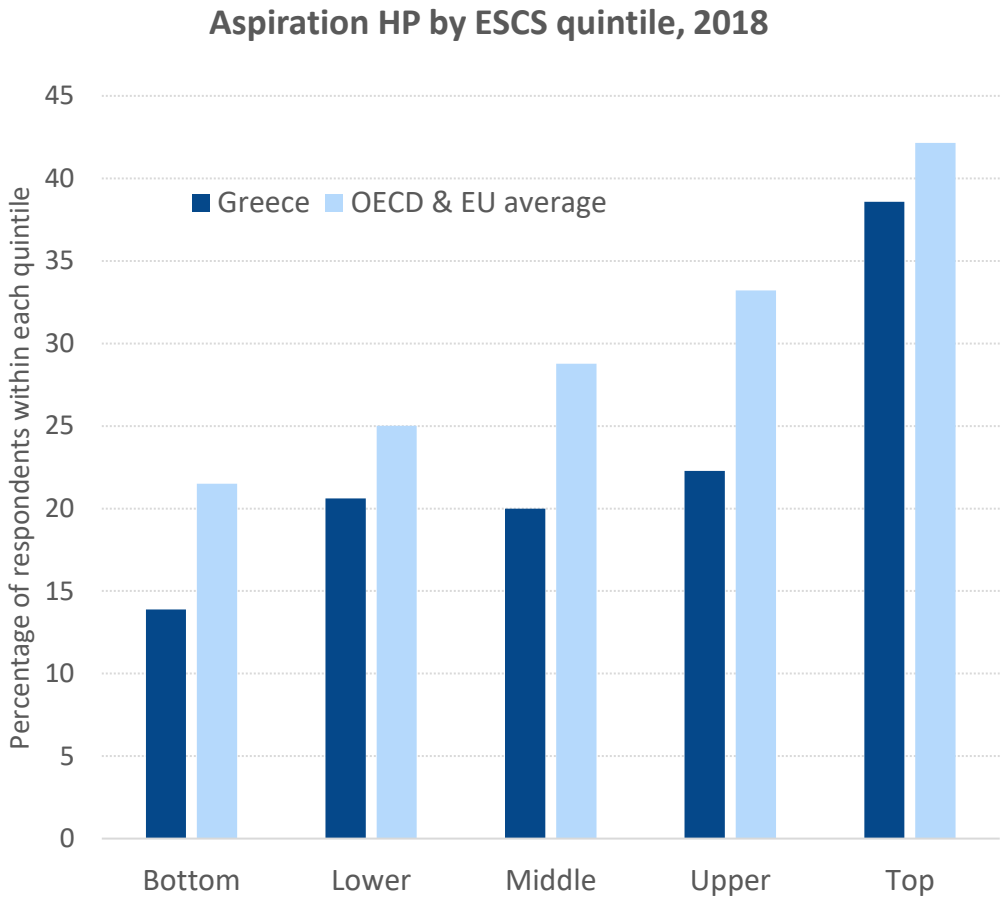


Source: PISA micro data set, authors' calculations. Note: Aspiration HE reflects the share of students who responded positively to whether they wish to pursue Higher Education studies. Aspiration HP reflects the share of students who responded that they wish to follow a career as managers/ high-status professionals.

Greek students exhibit relatively high aspirations with respect to following higher education studies but low aspirations for managerial or highly paid professional careers

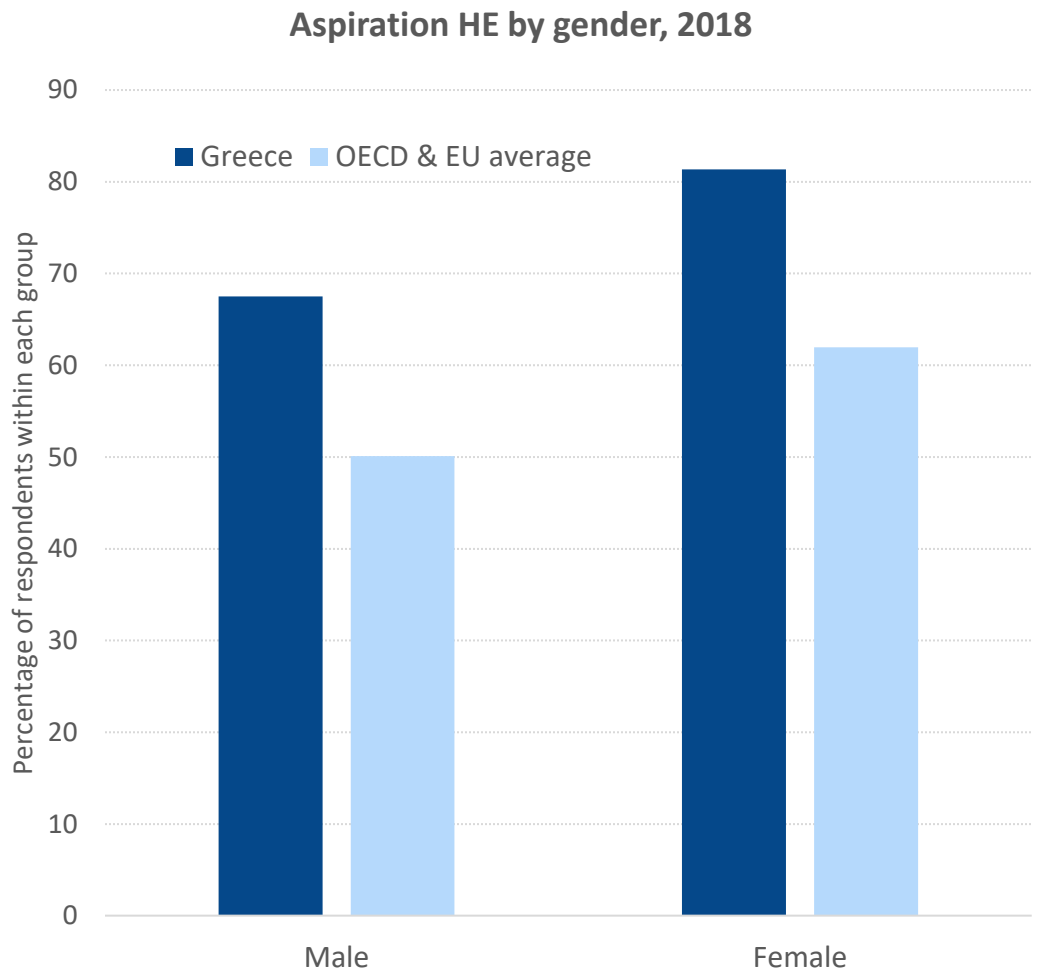
Aspiration gaps by ESCS are observed both in Greece and the OECD & EU average

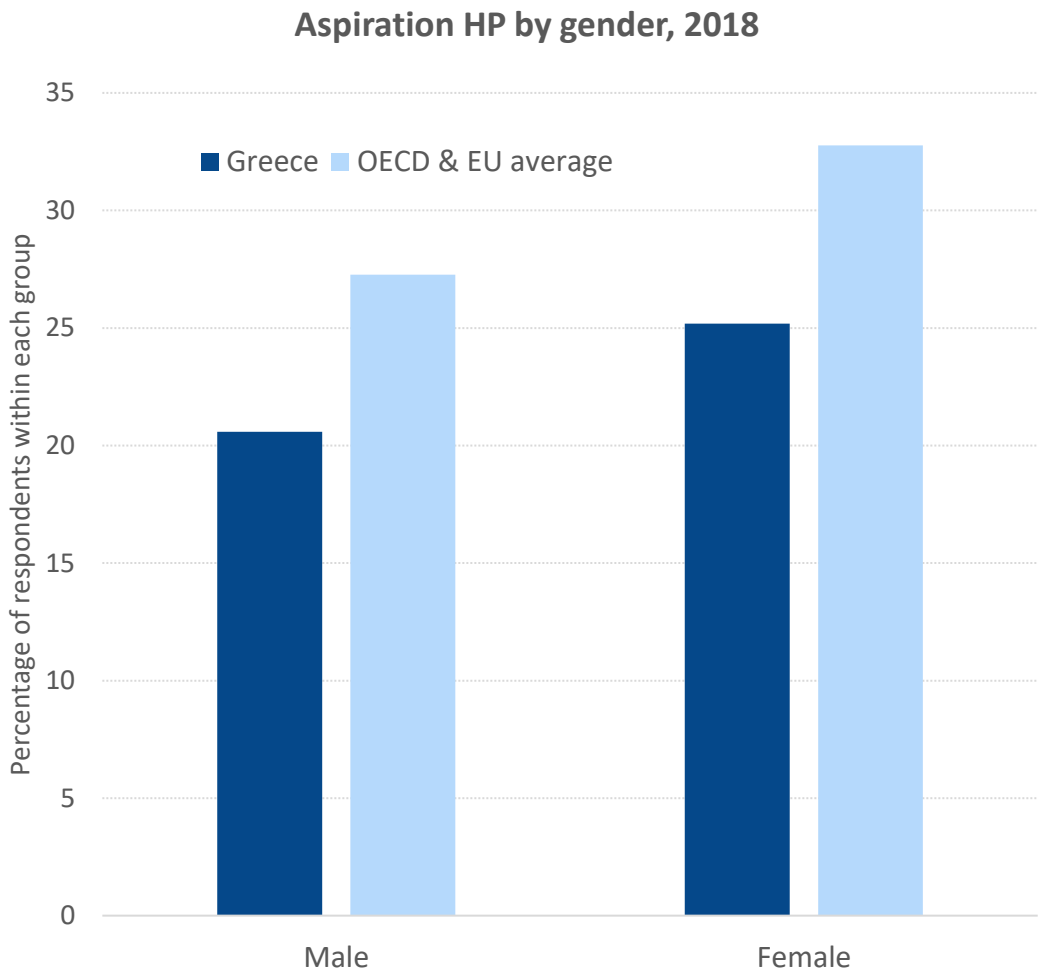




Source: PISA micro data set, authors' calculations. Note: Aspiration HE reflects the share of students who responded positively to whether they wish to pursue Higher Education studies. Aspiration HP reflects the share of students who responded that they wish to follow a career as managers/ high-status professionals.

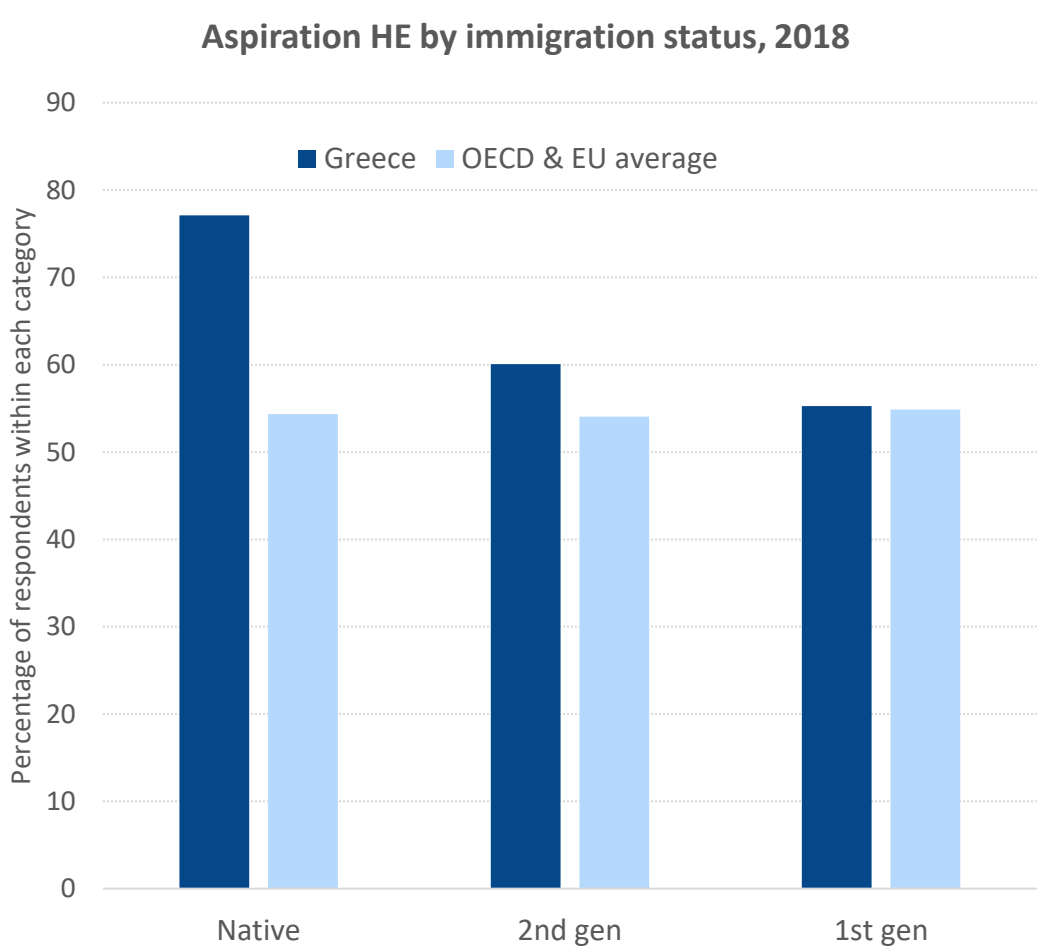
The same goes for aspiration gaps by gender

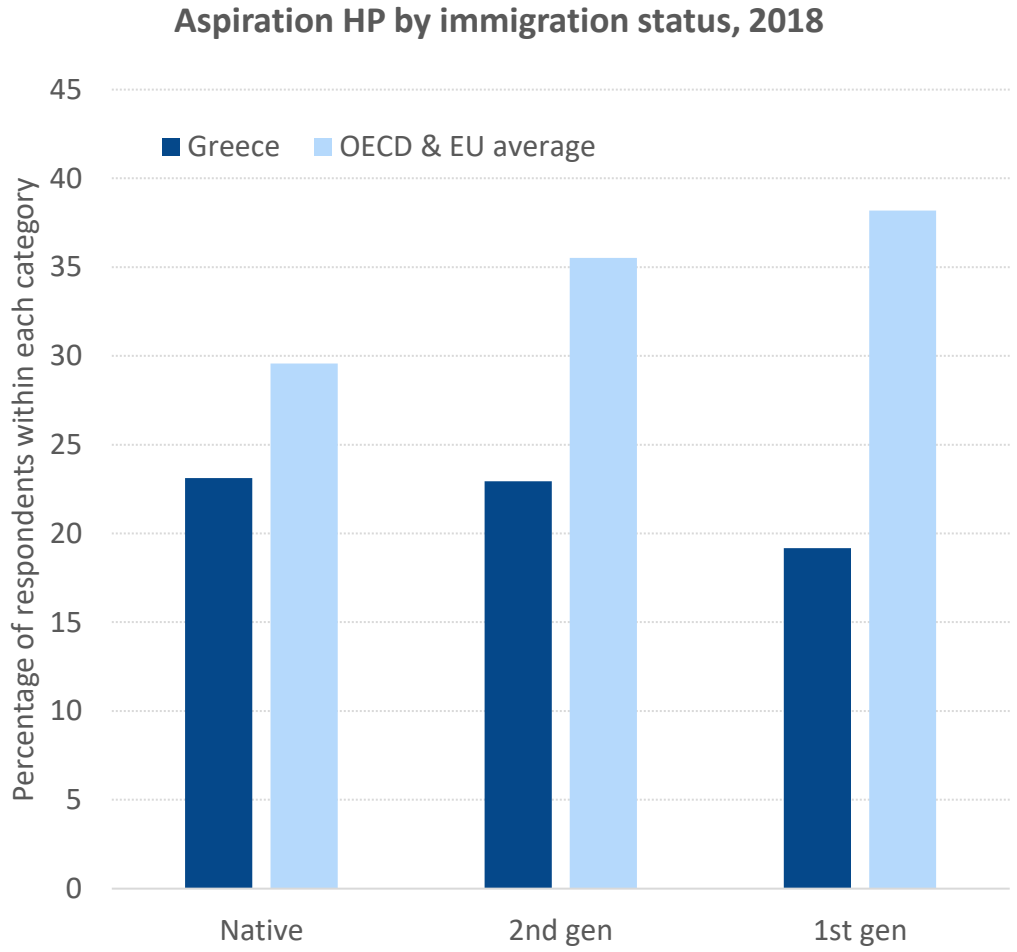




Source: PISA micro data set, authors' calculations. Note: Aspiration HE reflects the share of students who responded positively to whether they wish to pursue Higher Education studies. Aspiration HP reflects the share of students who responded that they wish to follow a career as managers/ high-status professionals.

The aspirations gap in pursuing higher education is pronounced among immigrants in Greece, but not in the average OECD & EU country

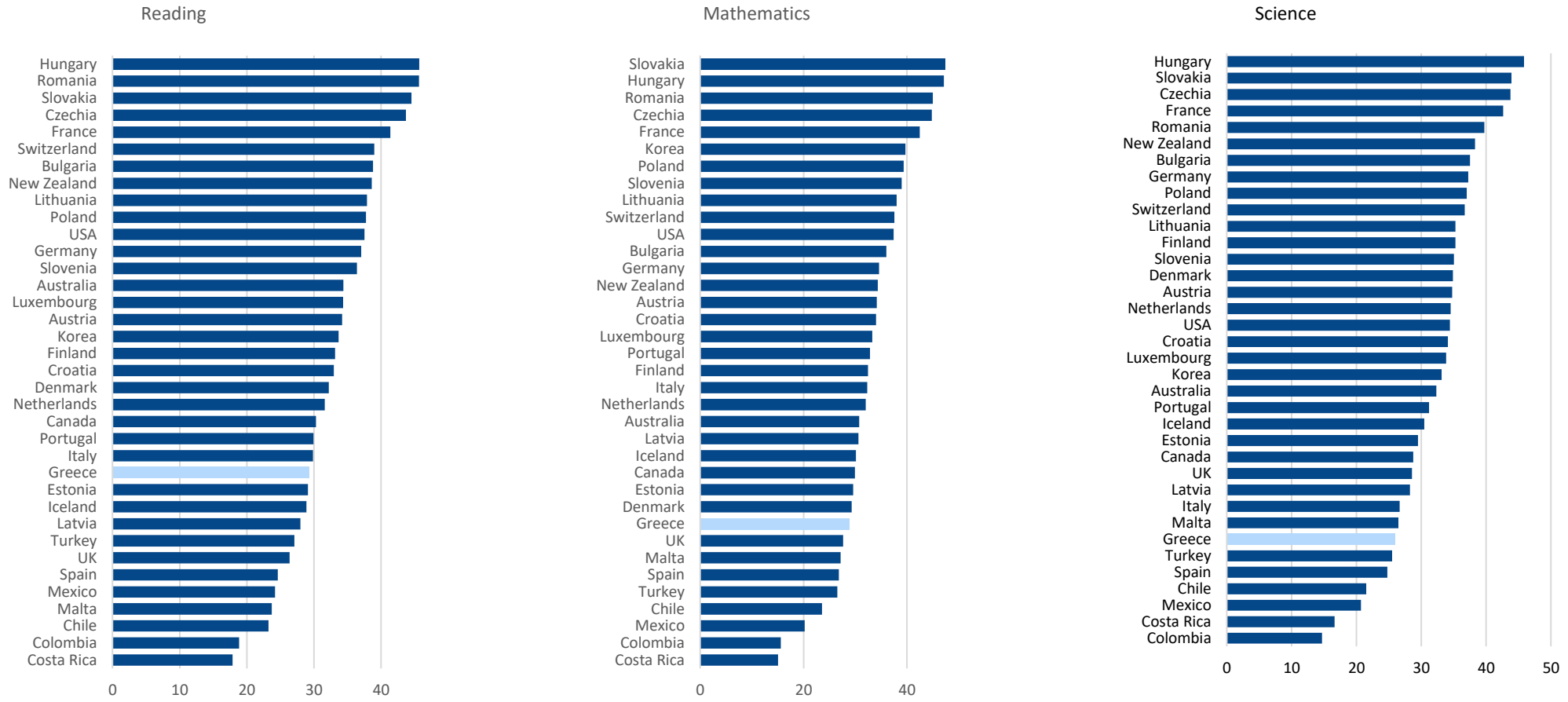




Source: PISA micro data set, authors' calculations. Note: Aspiration HE reflects the share of students who responded positively to whether they wish to pursue Higher Education studies. Aspiration HP reflects the share of students who responded that they wish to follow a career as managers/ high-status professionals.

Regressions show that the association between ESCS and PISA scores is not as high in Greece as in many other OECD & EU countries

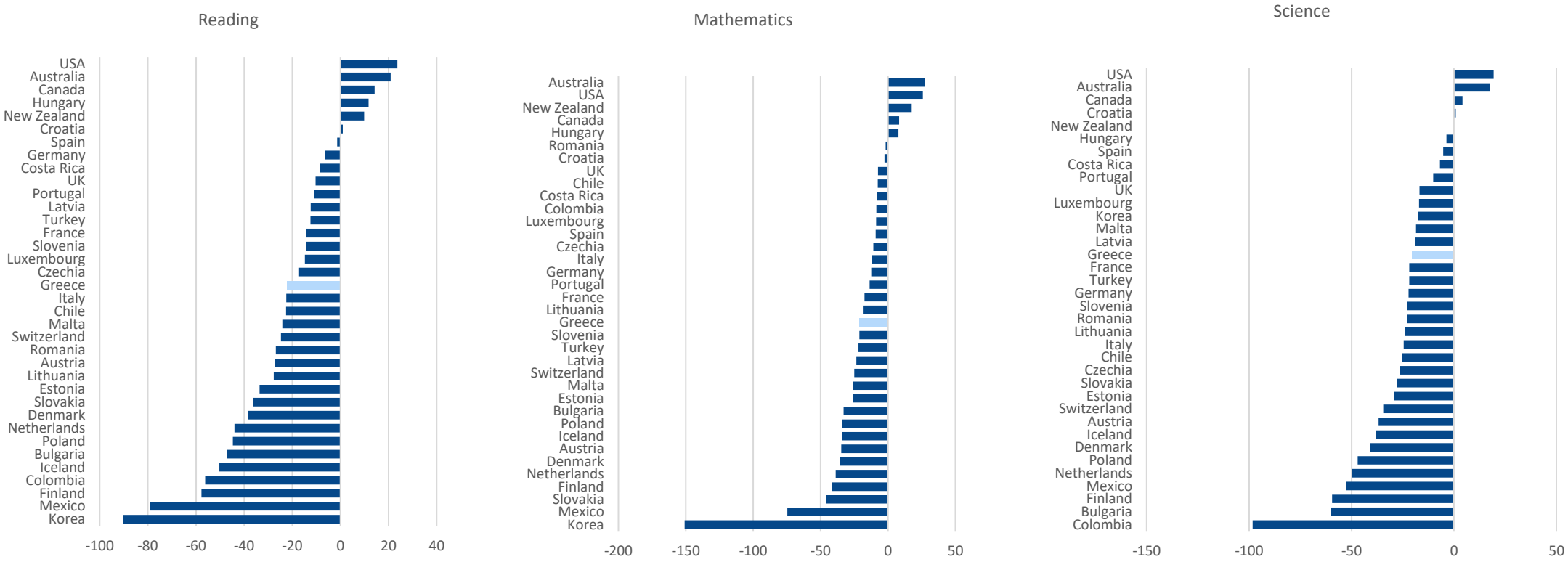
Regression coefficients for the ESCS index per OECD & EU country and cognitive domain, 2018



Source: PISA micro data set, authors' calculations

Regarding the performance of second-generation migrant students (compared to natives), Greece ranks closer to the middle position

Regression coefficients for second-generation migrants compared to natives per OECD & EU country and cognitive domain, 2018

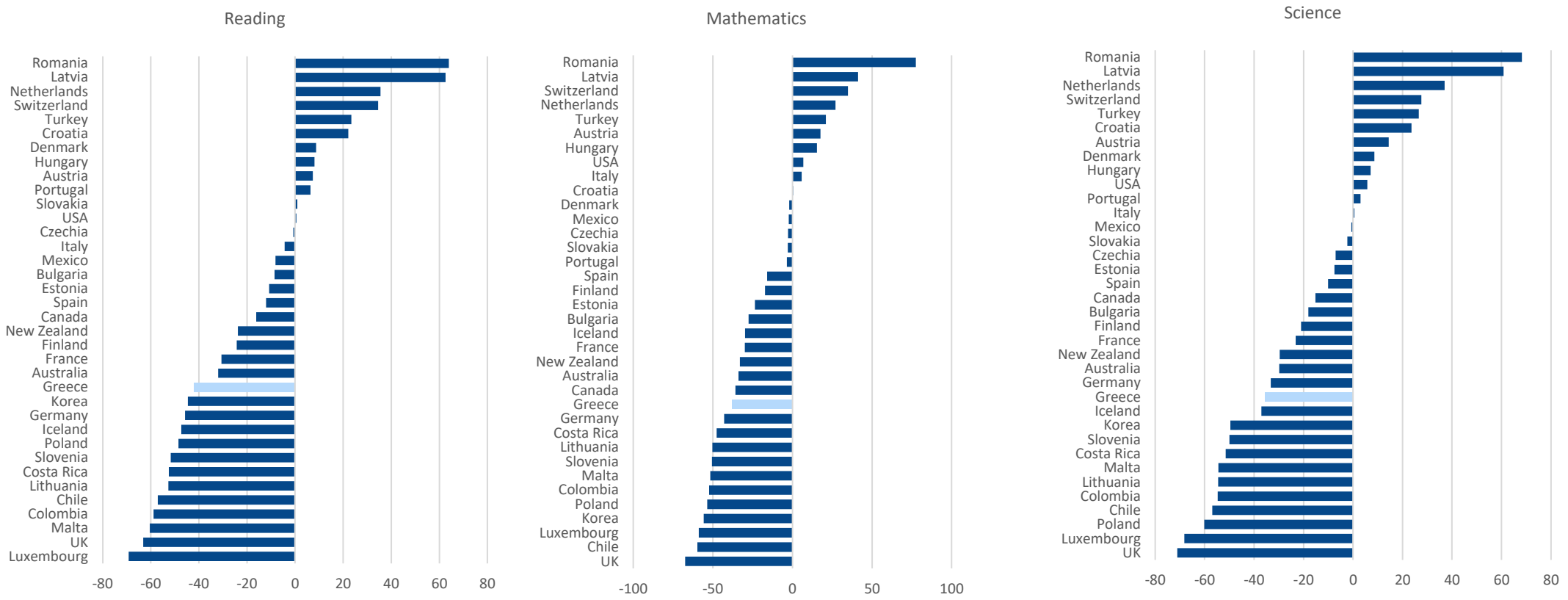


Source: PISA micro data set, authors' calculations

At the top of this ranking are countries with a long history of migration integration, such as the USA, Australia, Canada and New Zealand, where the second-generation migrants tend to perform even better than the native students

In most, but not all countries, students at state-run schools perform worse compared to private school students

Regression coefficients for public school students compared to private school students per OECD & EU country and cognitive domain, 2018



Source: PISA micro data set, authors' calculations

Particularly large difference for Luxembourg and the UK, Chile and Colombia. In this particular ranking, Greece is placed in the bottom half, ranking 24th in the Reading domain, 25th in Mathematics and 25th in Science

Contents

- Motivation & objectives
- The Greek education system and social mobility
- Data, methods and variables
- Results
- **Conclusions**

Main findings (1/2)

- We explore intergenerational mobility in education by focusing on **PISA performance** and **future aspirations of high-school students** (also in an intertemporal and cross-country comparative context)
- We found **large and significant associations** between student outcomes and certain elements of socioeconomic and parental background that seem to matter for children most: **educational resources at home, cultural possessions at home and parental emotional support**
- **Parental socioeconomic position** appears to be channeled to children through such cultural and emotional routes in addition to private school attendance throughout the models examined

Main findings (2/2)

- **Immigrant status and bullying** negatively and significantly associated with student cognitive outcomes and plans about the future
- Differences according to **gender** were also revealed (indication that sectoral segregation starts from a very young age)
- Limited associations with **school-level characteristics** with the exception of private versus public (state-run) school split and class size
- In **Greece,** the **relationship between socioeconomic status and student outcomes** is evident, statistically significant and broadly stable across PISA survey years
- Greece is not an outlier in terms of the relationship between ESCS, immigration status, school type (public versus private) on one hand and PISA performance on the other

Some policy proposals (1/2)

Key finding #1: Higher levels of educational and cultural resources available at home are associated with higher student performance and aspirations

- Provision of tax incentives to households prioritising the purchase of educational and cultural goods
- Review and expansion of programmes subsidising the purchase of books and other educational and cultural goods

Key finding #2: Higher levels of emotional support provided by the student's parents are associated with higher student performance and aspirations

- Effective implementation of family policies enhancing work-life balance

Key finding #3: Bullying is associated with lower student performance and aspirations

- Establish full-time psychosocial support services available at the school level
- Develop and implement anti-bullying protocols
- Train teachers

Some policy proposals (2/2)

- **Key finding #4:** Attendance of state-run schools is associated with lower student performance and aspirations
- Map school needs in human resources and infrastructure at the national level
- Introduce incentives-based evaluation mechanisms for teaching staff
- Evaluate and upgrade school educational material and curricula
- Provide additional education resources in underperforming schools
- Strengthen the initial and continuous vocational education and training system

- **Key finding #5:** Immigrant background and gender are associated with student performance and aspirations
- Provide adequate and effective career guidance programs in all schools
  - ❑ Prepare student for modern challenges in the labour market
  - ❑ Support children from migrant and other vulnerable backgrounds
  - ❑ Combat gender-related sectoral segregation in education (and later, in studies and careers).

Annex. Selected references

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Annex. Methodological notes

- Point estimates based on PISA data can be derived with standard statistical and econometric techniques, using the sample weights provided in the dataset.
- However, the PISA survey has a complex test and sampling design, which complicates the estimation of standard errors and thus the inference when testing for the statistical significance of the results (Caro & Biecek, 2017).
- In particular, the assumption underlying standard inference techniques that the observations are independent is not substantiated, given first that the student sample is drawn randomly from a sample of schools (two-stage sampling), and second the fact that students within a school tend to have similar socioeconomic and other characteristics.
    - The complex sample design of PISA creates sampling variation that need to be taken into account in the estimations.
- In addition, PISA uses a rotated test design where test items are clustered in a way that allows comparability of the results across students, even though each student answers a relatively small subset from the otherwise very extensive pool of test items.
    - While the results are comparable across students, this procedure generates imputation variance around the plausible values that are used as indicators of student performance, which should also be taken into account in the estimation of the standard error.
- To take into account the sampling and imputation variations that come from the sample and testing design of PISA, in our econometric estimations we employ the instvy package (Caro & Biecek, 2017).
    - It is developed with the aim to take explicitly into account the sampling and imputation variation of PISA and other large international assessment surveys and is recommended by the OECD for users of the R software (R Core Team, 2022).
    - It estimates linear and logistics models, generating the appropriate standard errors, yet a key limitation is that (at the time of preparation of this analysis) it does not extend to other useful for our analysis techniques, such as instrumental variables estimation.