How schools can help disadvantaged students to succeed in education? A statistical analysis of "resilient students" in PISA 2015

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Agenda

- The presentation is based on joint work realized with colleagues, that will appear as a OECD Working Paper next year

  - Motivation
  - Resilient students and their schools
  - Research questions
  - Student resiliency: definition
  - Resilient students: descriptive statistics
  - Modelling the determinants
  - Main results
  - Policy implications

Motivation

- Socioeconomic disparities in academic achievement
  - Disadvantaged students: + dropout, + repetition, - prestigious qualifications, - learning outcomes

- Resilient students
  - Students who are able to obtain good academic results despite their disadvantaged background ('beating the odds')
  - A wide literature identifying their psychological traits: (i) confidence in their ability, (ii) assertiveness, (iii) capacity to work hard, (iv) internal motivation to achieve (v) ambitious aspirations

- What is the role of schools and systems' (institutional) characteristics?

Resilient students and their schools

- Limited evidence about the specific role of the schools in helping disadvantaged students to become resilient ("high-flying" schools)

  - The possible positive impact of resources (Agasisti & Longobardi, 2014)
    - Contrasting results by Hanushek (2003) and Burtless (2011) which are valid for the "average" student
  - The crucial attitude towards close collaborations with the students, their families and the local community (Bryan, 2005; Ali & Jerald, 2001; Harris, 2007; Kannapel et al., 2005)
  - Mentors and counsellors dedicated to the support of disadvantaged students

Research questions

- Which school characteristics contribute more to the probability that disadvantaged students will be academically resilient?
- How much do these factors vary across countries?
  - The importance of international perspective (transferring good practices across countries)

- The theoretical perspective: interpreting the proportion of resilient students as an indicator of "equality" of the educational system (i.e. many students with a disadvantaged background can actually succeed as their better-off schoolmates)

Student resilience: definition (i)

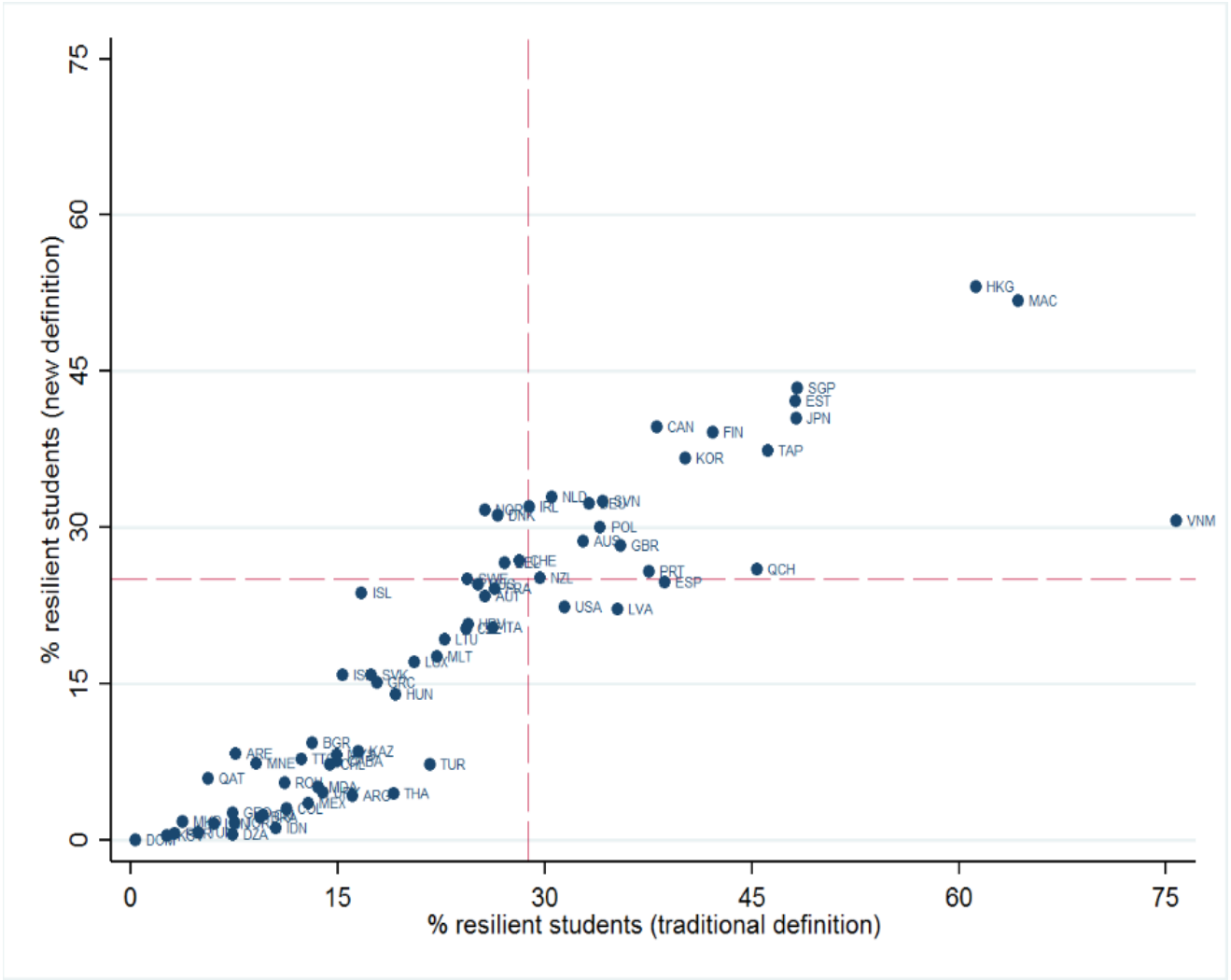
- The traditional definition adopted by OECD (2011):
  - "disadvantaged" student in relative terms: if he or she ranked among the bottom 25% of the most socio-economically disadvantaged students in his or her country (ESCS index)
  - "good performer" is the student scores in the top quarter of all in the major domain (after accounting for socio-economic status)

- The new definition proposed in this research:
  - "disadvantaged" student [=]
  - "good performer" if the student performs at least at Proficiency Level 3 in all the three domains (science, mathematics and reading)
    - no adjustment is made for the socio-economic context of countries or individuals when setting the threshold above which they are considered resilient

Student resilience: definition (ii)

- High correlation between the "old" and "new" definitions of resilience

- In the majority of countries: fewer socio-economically disadvantaged students can be considered resilient according to the new definition
  - Some exceptions (i.e. Nordic countries)



Resilient students: descriptive statistics

- Our dataset: 71 countries

- Country-average: around 25% of (disadvantaged) students are resilient
  - Hong Kong and Macao China: >50%
  - Countries with <1%: Algeria, Dominican Republic, Kosovo, Peru, Tunisia
  - Countries with >30%: Canada, Germany, Denmark, Estonia, Finland, Hong Kong (China), Ireland, Japan, Macao (China), Korea, the Netherlands, Norway, Poland, Singapore, Slovenia, Chinese Taipei and Vietnam

- Trends over time – between 2006 and 2015 globally, the proportion of resilient students is unchanged
  - For 23 countries: an increase of around 0.7% annually
  - For 9 countries: decrease of 1% annually
  - For 25 countries: no change

Modelling the determinants (i)

- The empirical analysis is based on an econometric model
  - multilevel logistic model with two levels: students and schools

- Literature review for deriving hypotheses about the most important school-level factors that can play a role in raising students' performance
  - School climate
    - positive collaboration between students and with teachers, high aspirations
  - School resources
    - #teachers, #computers, extracurricular activities

- School factors that can affect climate
  - Principal's managerial activities
    - Leadership style (i.e. instructional/transformational), teachers' experience and tenure

Modelling the determinants (ii)

Category	Variable	Description
Socio economic background	female	Gender (0=male; 1=female)
	forgn_lang	Foreign Language at home (0=no;1=yes)
	escs	Index of economic, social and cultural status
	escs_avg	School average of ESCS index
School climate	disclima_avg	School average of PISA index of disciplinary climate
	notruancy	School percentage of students who had skipped a whole school day in the two weeks prior to the PISA test.
School resources	extrac_sum	Number of extracurricular activities at school
	ratcomp	Ratio of computers at school by the number of students (%)
	clsize	Average class size
Factors related to teachers and school leadership (climate model only)	fixed_term1	Fixed-term contract for a period of 1 school year or less
	exper_tot	Year(s) working as a teacher in total
	exper_atsch	Year(s) working as a teacher at this school
	tclead	Transformational leadership teachers view (WLE)

Main results (i)

- Step I. The determinants of students' resilience

Variable	Coef. Model 1	Odds. Ratio	Coef. Model 2	Odds. Ratio	Coef. Model 3	Odds. Ratio	Coef. Model 4	Odds. Ratio
Individual-level characteristics								
female	-0.096***	0.908	-0.118***	0.889	-0.113***	0.893	-0.135***	0.874
	(0.023)		(0.042)		(0.024)		(0.024)	
langfor	-0.653***	0.52	-0.626***	0.535	-0.632***	0.532	-0.610***	0.543
	(0.065)		(0.065)		(0.064)		(0.065)	
escs	0.523***	1.687	0.515***	1.674	0.527***	1.694	0.519***	1.68
	(0.032)		(0.031)		(0.032)		(0.032)	
School-level characteristics								
escs_avg	1.764***	5.836	1.441***	4.225	1.59***	4.904	1.315***	3.725
	(0.048)		(0.047)		(0.052)		(0.048)	
disclima_avg			0.677***	1.968			0.664***	1.943
			(0.042)				(0.041)	
notruancy			0.023***	1.023			0.023***	1.023
			(0.002)				(0.227)	
extrac_sum					0.055***	1.057	0.04***	1.041
					(0.012)		(0.012)	
ratcmp					0.000	1.000	0.000	1.000
					(0.066)		(0.062)	
clsize					0.021***	1.021	0.018***	1.018
					(0.003)		(0.003)	
constant	0.215***	1.24	-1.883***	0.152	-0.55***	0.577	-2.447***	0.087
	(0.057)		(0.203)		(0.127)		(0.235)	

Main results (ii)

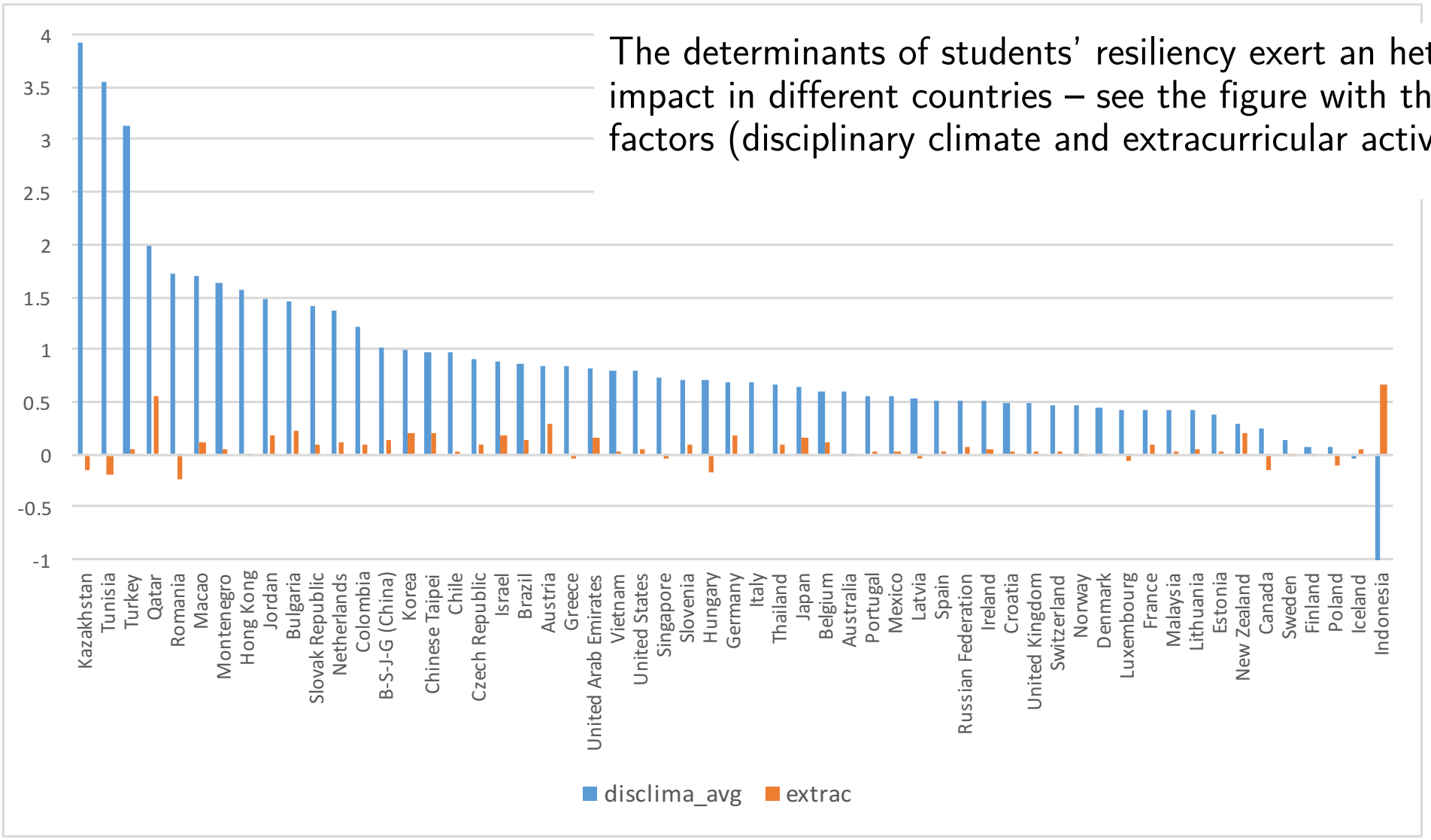
- Step I. The determinants of students' resilience

  - Individual variables
    - Female less likely to be resilient (odd ratio = 0.87), as well as foreign students (0.54)
    - Strong role of ESCS (less disadvantaged students are more likely to be resilient)

  - School variables
    - High impact of school-average ESCS
    - Both variables for disciplinary climate are statistically significant ➜ resilient students attend schools where the students report a better climate and they do not skip school days
    - Among school resources ➜ relevant role for the extracurricular activities and (slightly) for class size

Main results (iii)

The determinants of students' resiliency exert an heterogeneous impact in different countries – see the figure with the two main factors (disciplinary climate and extracurricular activities)



Main results (iv)

- Step II. The determinants of school disciplinary climate

Covariate	Only controls		full model	
	Coef.	s.e.	Coef.	s.e.
Individual-level variables				
female	0.112***	0.007	0.114***	0.007
langfor	-0.087***	0.023	-0.108***	0.025
escs	0.023***	0.004	0.026***	0.004
School-level variables				
escs_avg	0.136***	0.011	0.118***	0.013
fixed_term1			-0.001	0.001
exper_tot			-0.002	0.002
exper_atsch			0.006***	0.002
mtclead			0.058***	0.012
extrac_sum			0.019***	0.006
ratcmp			0.000	0.023
clsize			-0.004***	0.001
constant	0.052	0.009	0.071	0.054

Main results (v)

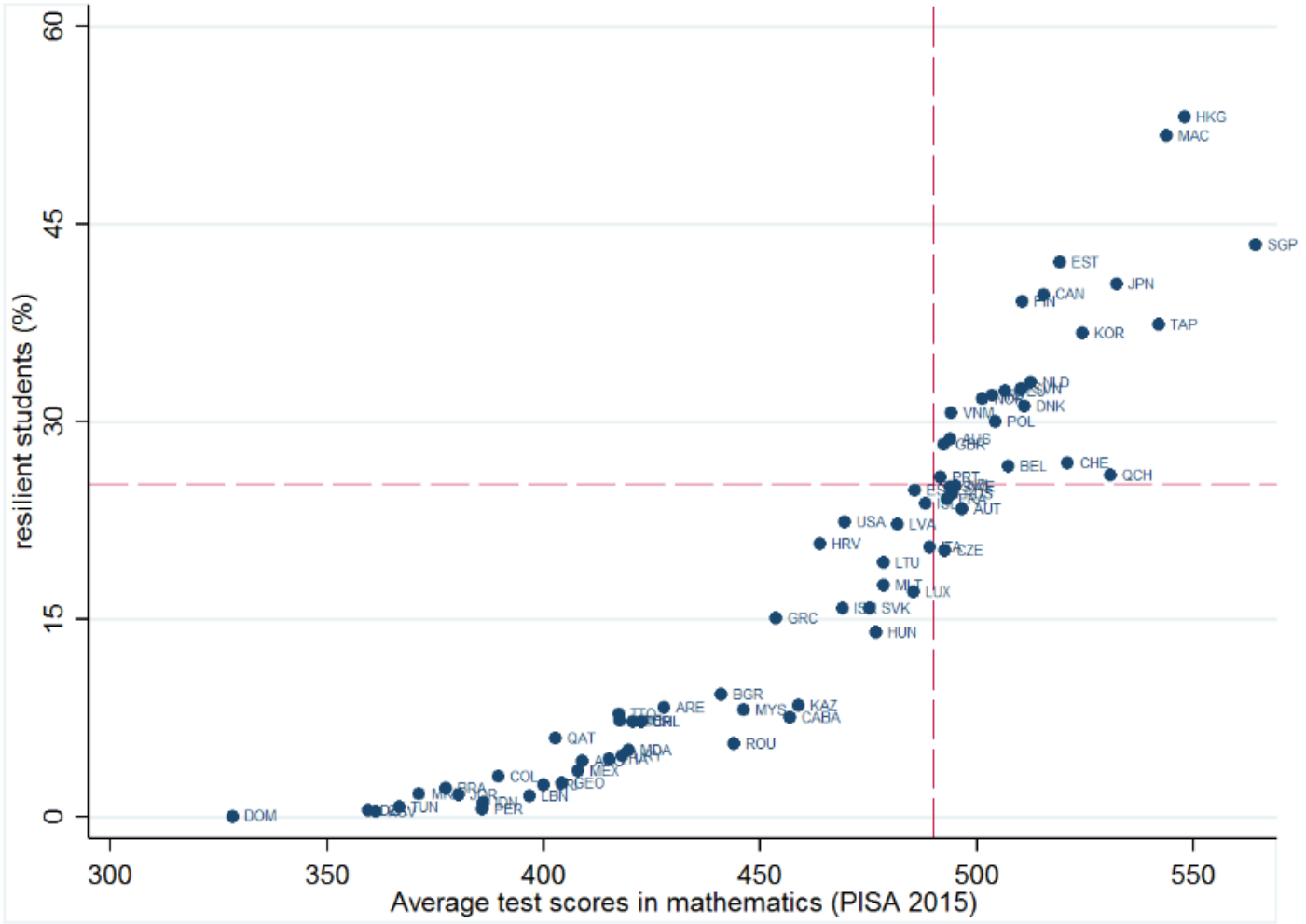
- Step II. The determinants of school disciplinary climate

  - Individual variables
    - Female, better-off and not-foreign students report a better school climate

  - School-level variables
    - Students report better climate in schools where the number of extracurricular activities is higher
    - Lower turnover of teachers (i.e. higher experience at the specific school) is associated with better climate
    - Schools where the climate is reported as better are managed by a principal with transformational leadership style (i.e. developing capacity and keeping teachers oriented towards the strategic goals)

Policy implications (i)

- The focus on disadvantaged students must be a priority for government
    - Not only equity reasons, but <u>efficiency</u> ones (for example, positive correlation between % of resilient students and average academic performance, at country level)



Policy implications (ii)

- The role of resources
  - The schools attended by resilient students are NOT those with smaller classes or more facilities (i.e. computers)
  - Beyond a minimum (secure) level, resources do not play the major role in helping disadvantaged students to succeed

- The positive effect of the number of extracurricular activities
  - In part, a "resources" effect
  - A possible proxy for academic motivation and creativity
  - Engaging activities to foster key competences
  - Prioritizing resources towards the development of these activities

Policy implications (iii)

- Positive (disciplinary) school climate
  - The literature already demonstrates that is beneficial for performance ➜ specific and additional benefit for disadvantaged students

- School climate can be influenced by policies and managerial choices
  - Experience of teachers in a given school
    - reducing turnover, i.e. with incentives for teachers who remain in the school, rewarding collaborations between teachers
  - Principal's leadership style
    - Assigning leaders with a transformational approach (focus on organizational goals) to schools with a higher proportion of disadvantaged students

- Opportunity for benchmarking in the international perspective
  - Share good pratices and evaluating results in different contexts