

The Stock of Highly Skilled Individuals in Indonesia

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To win the football world cup, a country needs to do two things

1. Find 22 individuals extremely talented in football and nurture their talent
2. Ensure they continue to become footballers

The competition is global

The median football skills in a country does not matter



Economies need a number of very high skilled individuals

- Most workers are input in production processes. These individuals change production processes
- Invent productivity-enhancing technologies
- Enable firms to make full use of digital abundance (Benzell & Brynjolfsson, 2019)
- Larger contribution to growth than average-skilled individuals (Burhan et al, 2014; Rindermann et al, 2015)
- In increasingly knowledge-based economy, the need for very highly skilled individuals will only increase (Pritchett & Viarengo, 2009)

Economies need to do two steps to be globally competitive

1. Identify and nurture highly talented individuals

Highly talented individuals often do not become inventors, due to background, race, gender (Bell et al., 2019). Barriers exist even in a context where inequality is low and education has high quality (Aghion et al., 2017)

2. Ensure the talent is allocated to sectors / occupations that optimize social welfare

Private returns to talent must correspond to social returns (Murphy et al., 1989) – they often do not

We examine the Indonesian case

Research Questions

1. What is the stock of high skilled individuals in Indonesia?
2. What is the individual and schooling background of high skilled Indonesians?

Stock of highly skilled individuals in mathematics, per cohort in various countries (Pritchett & Viarengo, 2009)

- Mexico: 5,822 (0.29 / 100 students)
- Thailand: 15,419 (9.42 / 100 students)
- India: 182,904 (0.83 / 100 students)
- South Korea: 127,592 (18.2 / 100 students)
- USA: 272,407 (6.52 / 100 students)

Programme for International Student Assessment

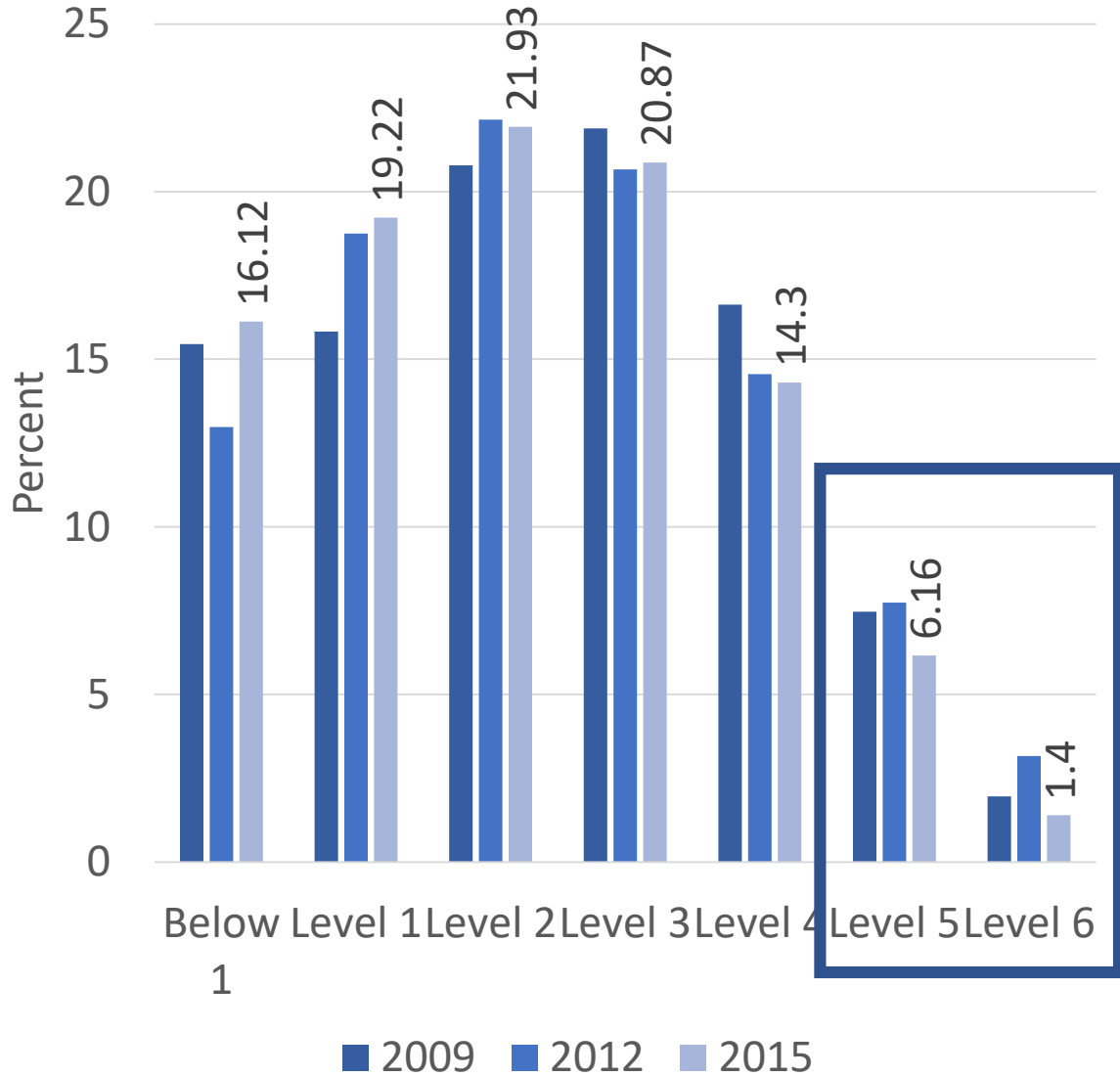
- Tests 15-year old students
- Numeracy, science, and reading assessments since 2000. Triennial
- Application of knowledge and skills for tasks relevant in adult life
- 88 economies have participated at least once
- Enables linking between student performance, individual background, and school characteristics



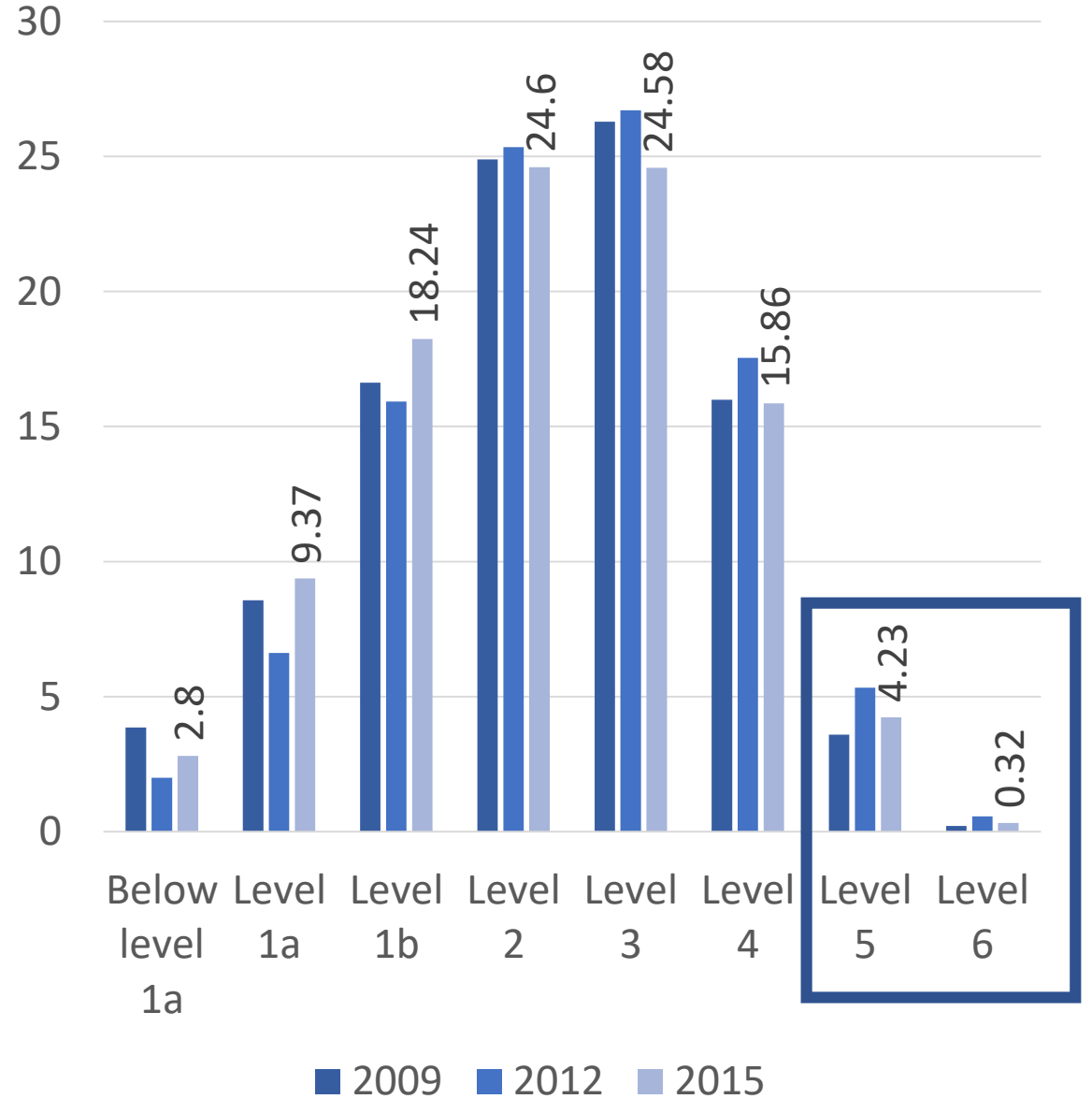
PISA creates global competency levels

- Reading: measure students' ability to use written information in real life situations
 - Seven levels, ranging from finding and collecting information; making sense of a text; drawing on knowledge, ideas, and values beyond the text.
- Mathematics: measure how well students can use and interpret mathematical concepts and apply their knowledge in real-life contexts
 - Six levels, ranging from recalling fact or concept; explaining real-life phenomena, interpreting data; analyze complex information.
- In both reading and mathematics
 - Level 2 means basic competency. Individuals can participate productively in a knowledge-based society.
 - Level 5 and 6 mean top performers. Focus of our paper.

Distribution of Levels - Mathematics



Distribution of Levels - Reading



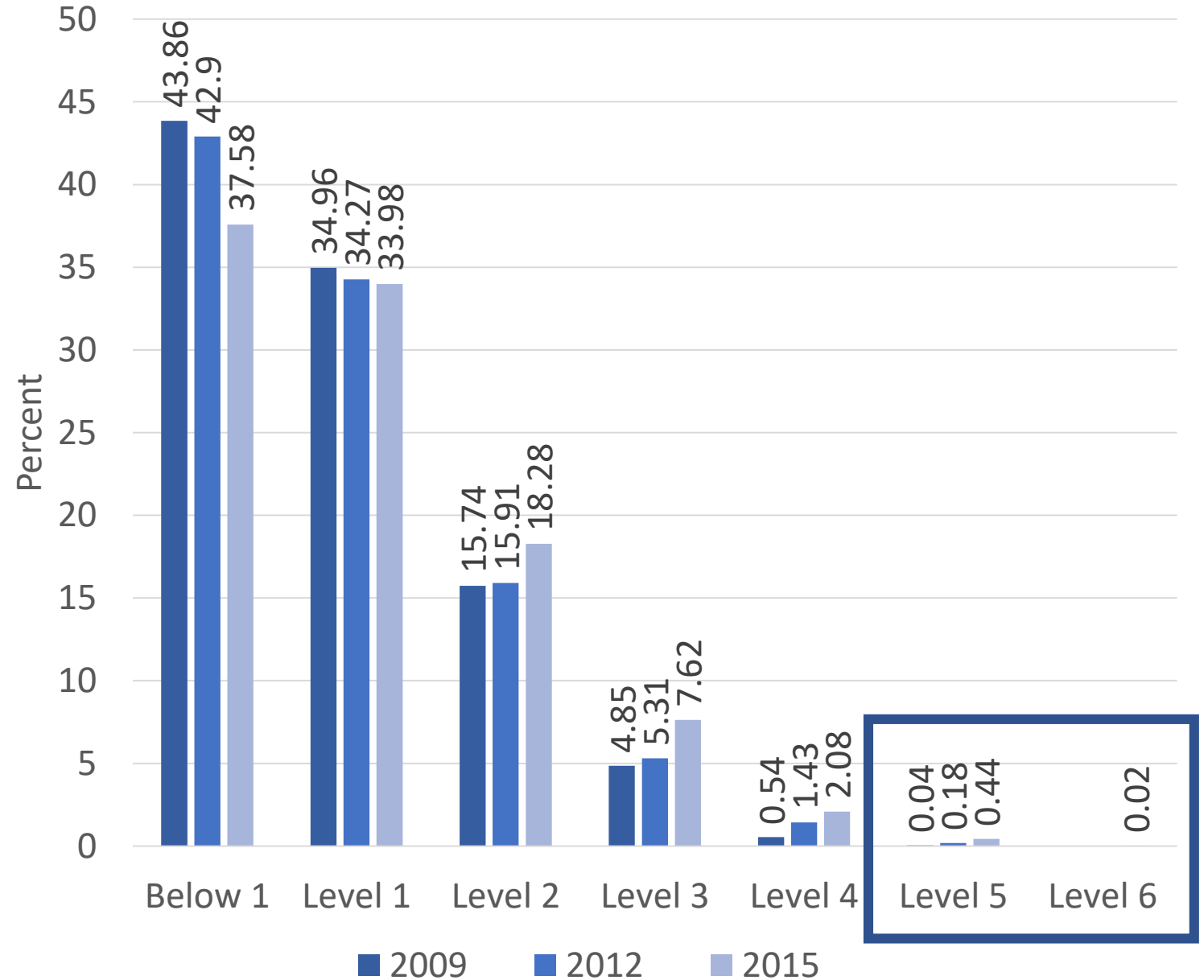
Distribution of PISA Levels in Indonesia

2009, 2012, 2015

17 thousand students in 628 schools – repeated cross section

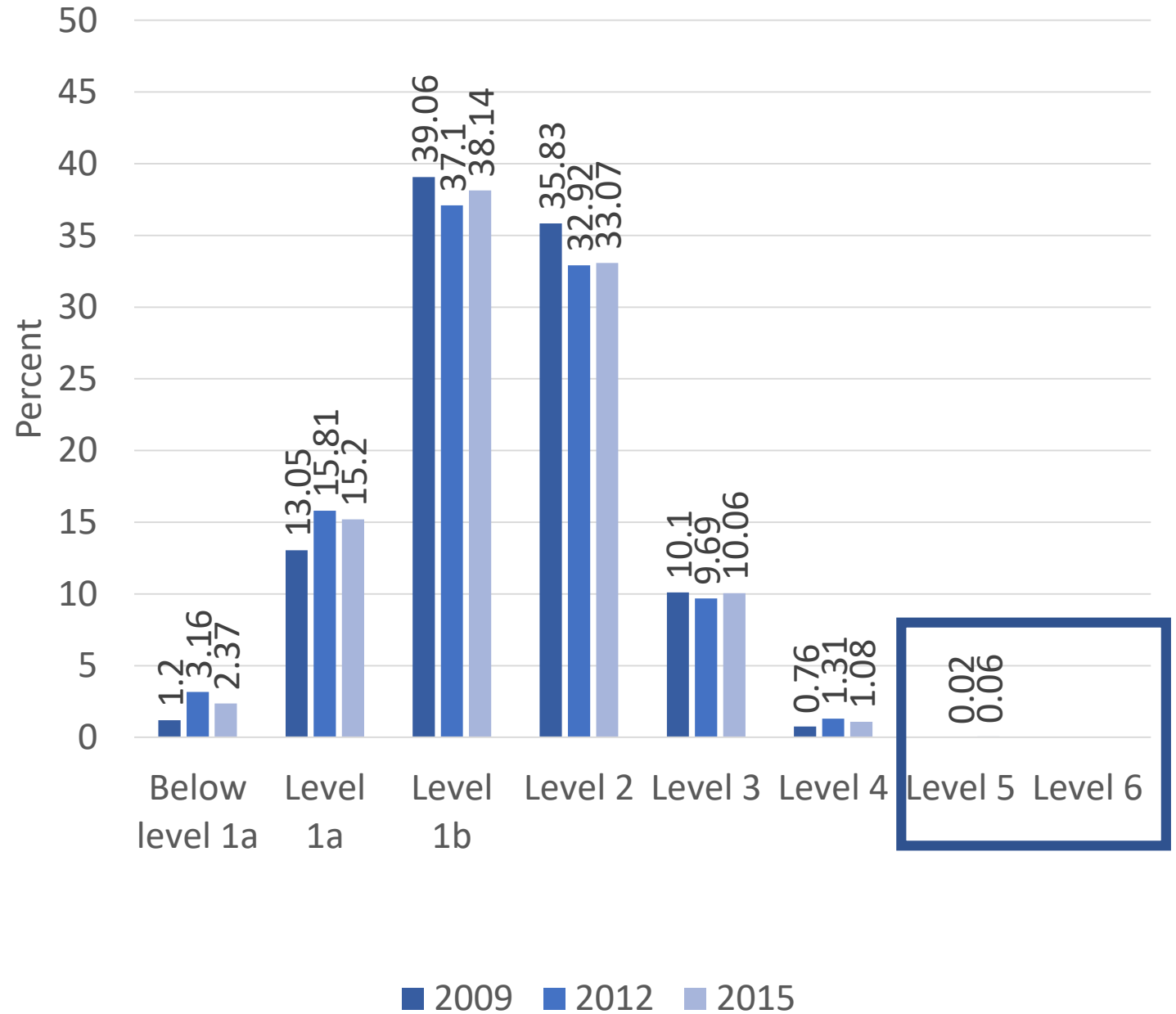
Share of top performers in mathematics increased between 2009 and 2015, from a base of practically zero

- Four out of 10,000 students reached Level 5 (2009), then to 44 out of 10,000 (2015)
- Two out of 10,000 students reached level 6 (2015)
- Absolute numbers: 15,700 individuals
- Below Level 2 still at 71% in 2015.



Proportion of top performers in reading is practically zero.

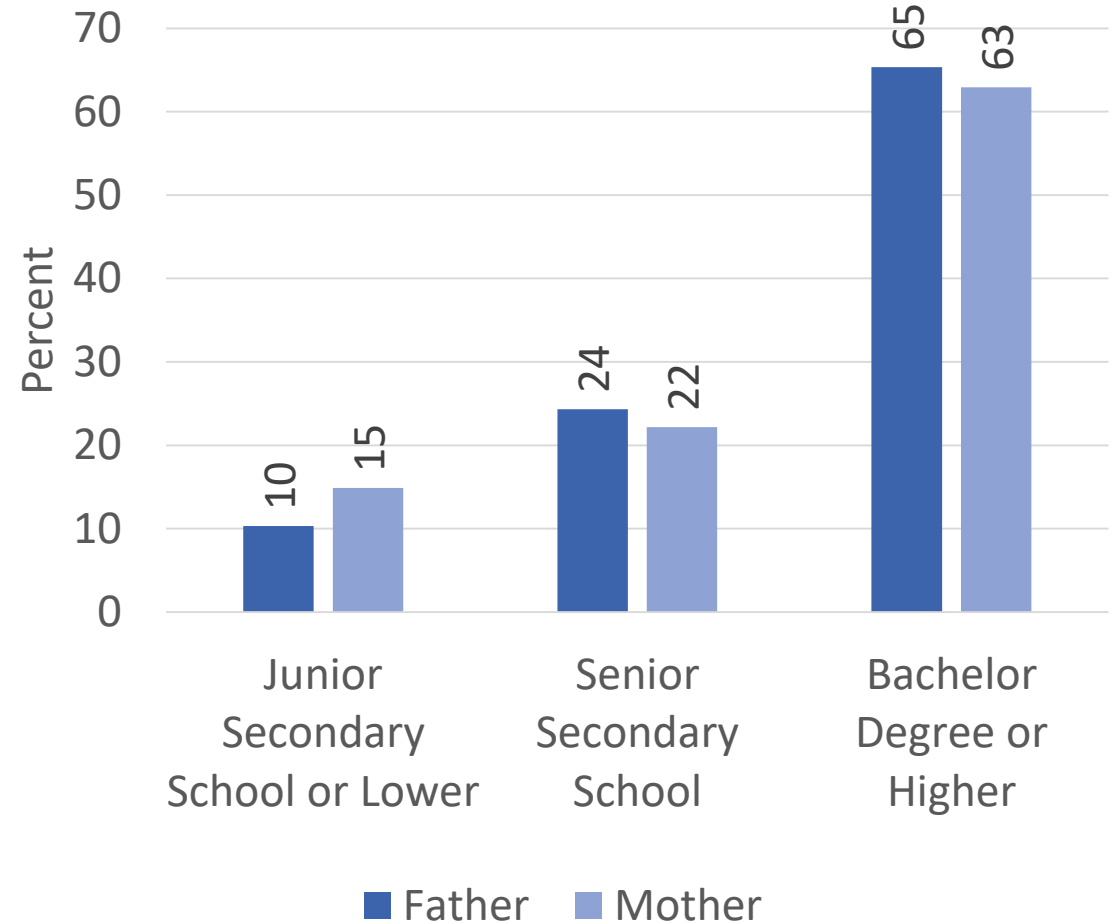
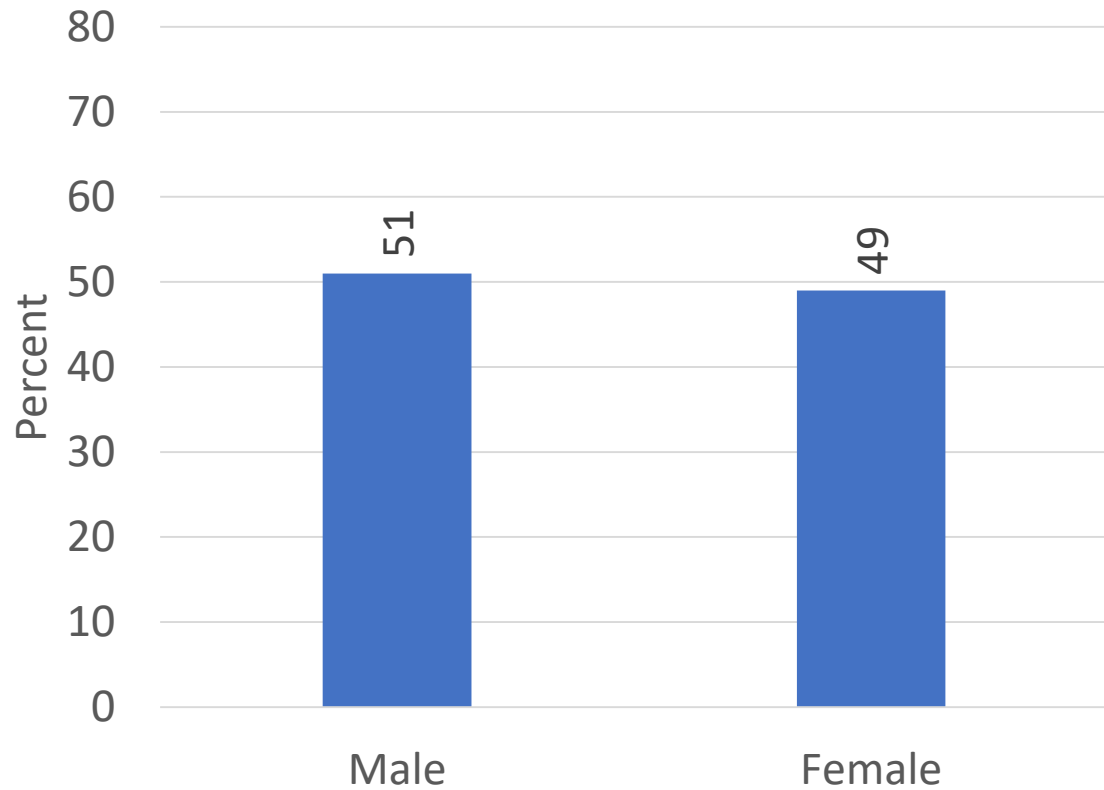
- In 2015, six out of 10,000 students reached Level 5.
- In absolute numbers: 1,900.



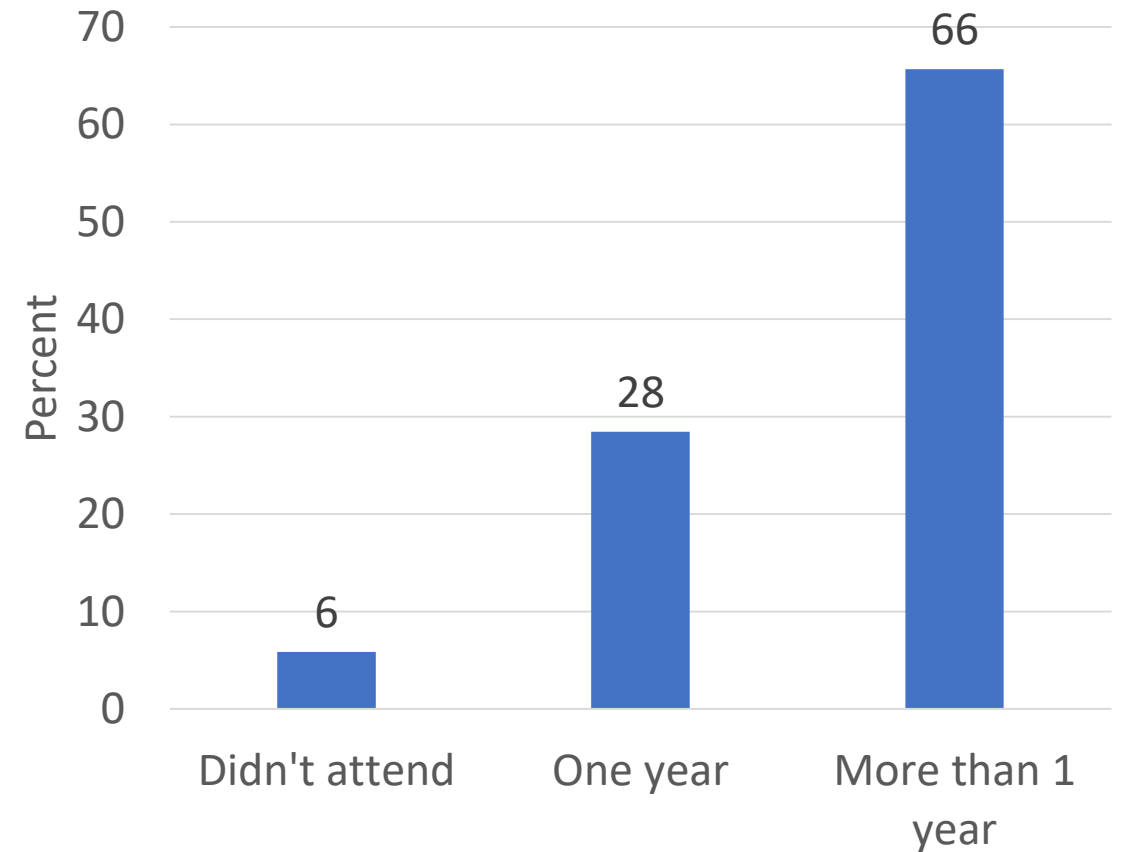
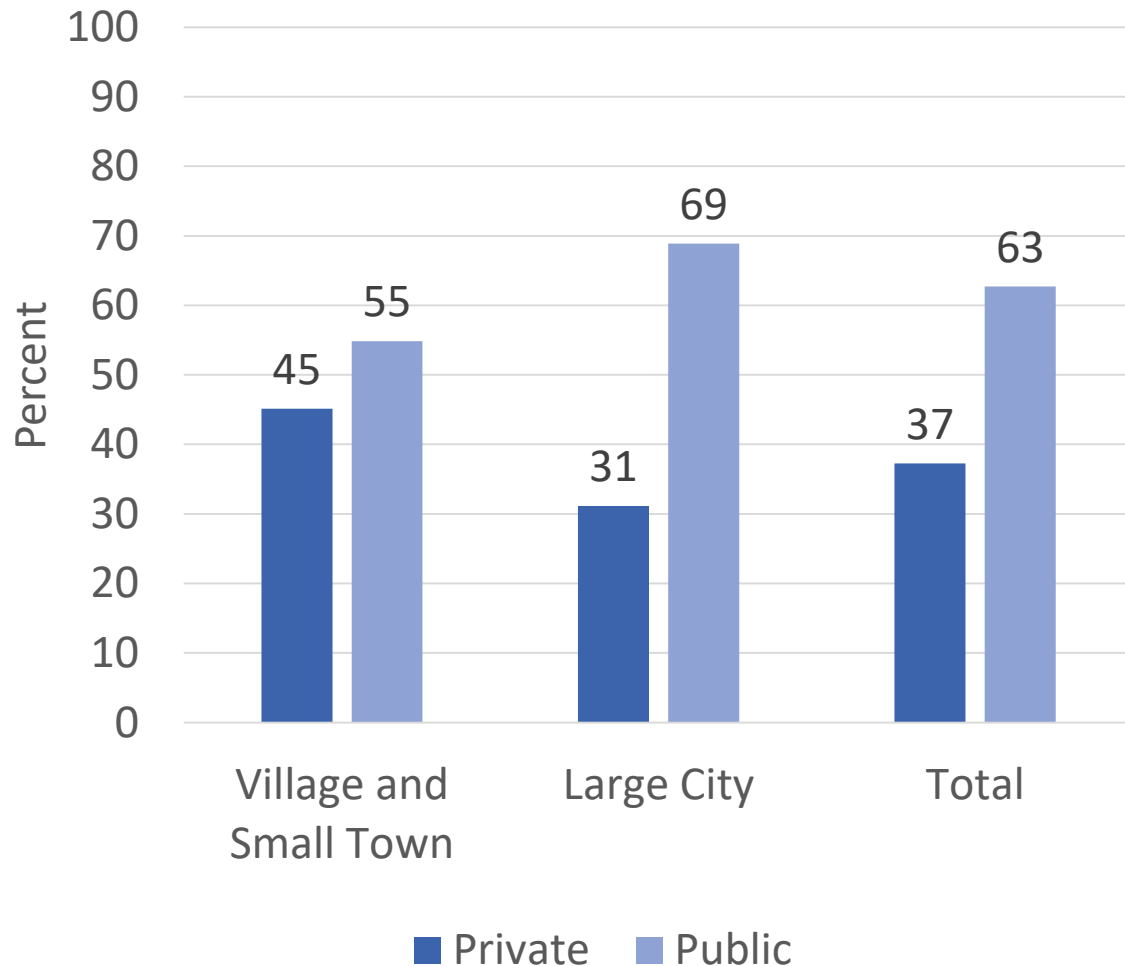
What is the background of high performers in mathematics?

Levels 4, 5, 6 in PISA 2009 - 2015

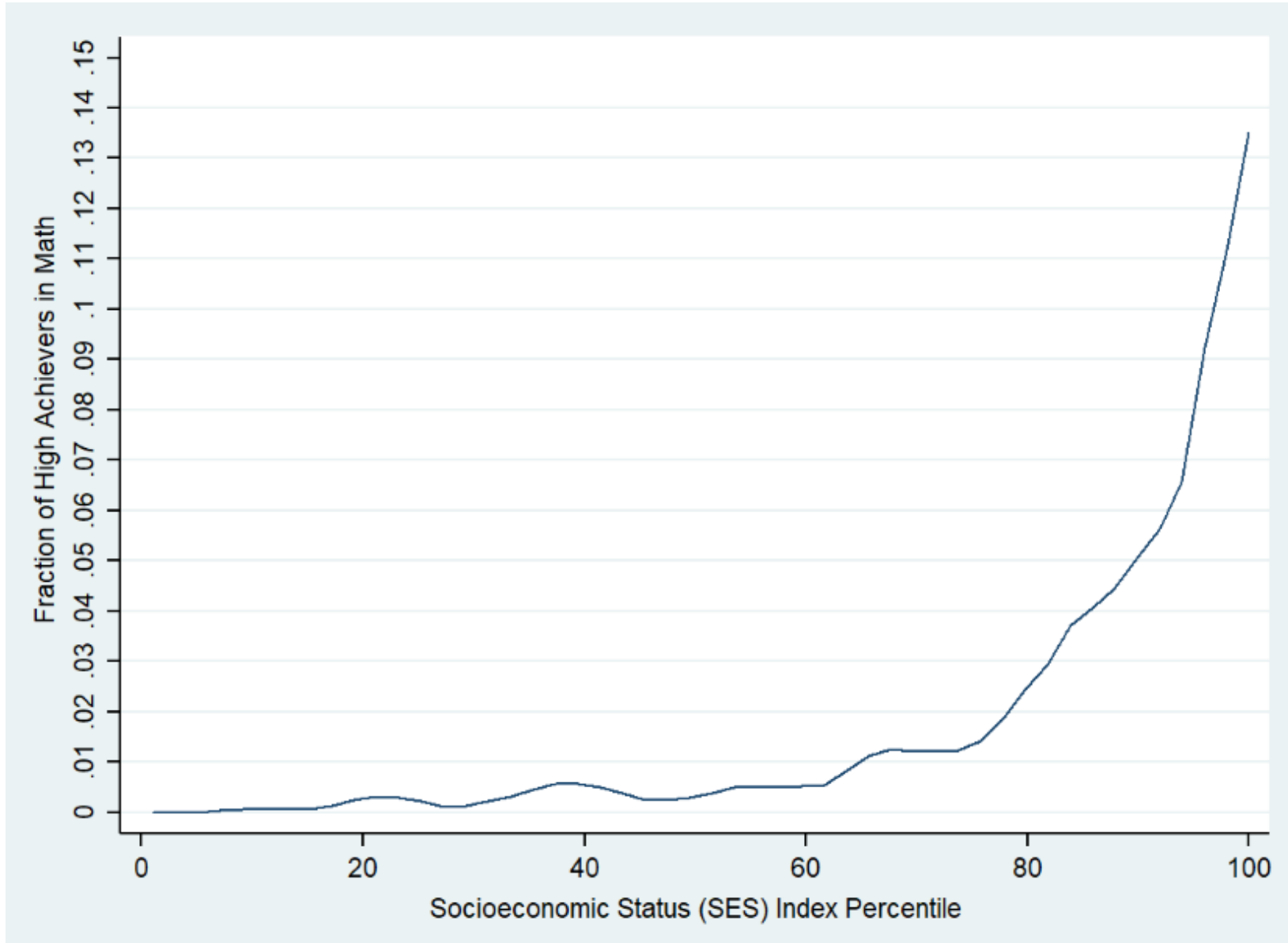
Equally divided by sex; most have highly educated parents



56% live in large cities; most go to public schools; have more than one year of kindergarten



SES – high skills gradient very steep at 90th percentile



What schools do high performers in
mathematics go to?

Levels 4, 5, 6 in PISA 2009 - 2015

High performers are concentrated in a small number of schools

- Range in share of high-performing students in a school: 0% to 64%
- 89% of schools have no high performers (Type 1)
- 7% of schools have max 10% students are high performers (Type 2)
- 4% of schools have more than 10% of students are high performers (Type 3)



Type 3 schools are somewhat different than Type 1 schools, but not by much

- Similar principal practice regarding using assessments, promoting research-based teaching practice, problem solving
- Similar principal authority to hire and fire teachers, formulate student assessment policy, determine school budget allocation
- Similar student-teacher ratio
- But 1SD higher share of certified teachers: a higher probability to be a Type 3 school by 1.8 percentage points. This is a large correlation
- Public schools: a higher probability to be Type 3 by 3.2 percentage points
- Schools in large city or capital city: higher probability to be Type 3 by 4 to 7 percentage points

Parents with certain characteristics appear to choose schools with certain characteristics

	Whole Sample	
	(1)	(2)
Individual Characteristics		
Current school grade	0.010*** (0.001)	0.004* (0.002)
Female (Yes=1)	-0.003 (0.002)	-0.008*** (0.002)
Attended more than one year of kindergarten (Yes=1)	0.019*** (0.003)	0.000 (0.003)
Parental Education		
Mother has tertiary education (Yes=1)	0.040*** (0.006)	0.016*** (0.005)
Father has tertiary education (Yes=1)	0.012*** (0.005)	0.004 (0.004)
Home Conditions		
Has more than 100 books at home (Yes=1)	0.014*** (0.005)	0.007 (0.005)
Has a quiet place to study at home (Yes=1)	0.002 (0.002)	0.001 (0.002)
Home asset index	0.011*** (0.001)	0.002 (0.001)
Constant	-0.097*** (0.011)	-0.022 (0.022)
Year fixed effects	Yes	Yes
School fixed effects	No	Yes
R-squared	0.071	0.288
Number of observations	15,275	15,275
Sample mean of dependent variable	0.019	

Three takeaway points

1. Economies must have highly skilled individuals to be globally competitive – a distinct concept from median skills of workers
2. Indonesia has an extremely small number of high skilled individuals
 - Mathematics levels 4, 5, or 6: 79,000 individuals in a cohort of 3.1 million
 - Reading levels 4, 5, or 6: 35,900 individuals in a cohort of 3.1 million
3. High performers have high-SES background, highly educated parents, live in large cities, and more pre-school education
 - Evidence of concentration in a small number of schools: public, high rate of certified teachers
 - Parent selection of schools appear to be strong

Policy recommendations

1. Actively search for and nurture talent
2. Ensure efficient allocation of talent
 - Very critical given the small number of talent

To realize the optimal social benefit, the most skilled individuals must be engaged in occupations that would give them the highest private returns and simultaneously the highest social returns.

This huge endeavor would require policy reforms and investments in health, education, and labor markets.

But unlike building a world cup winning team, an economy must also care about equity and the median worker.