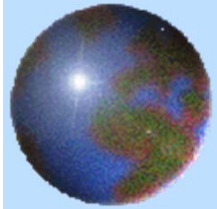

Cognitive Skills and Growth

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LSE Growth Commission
March 2012

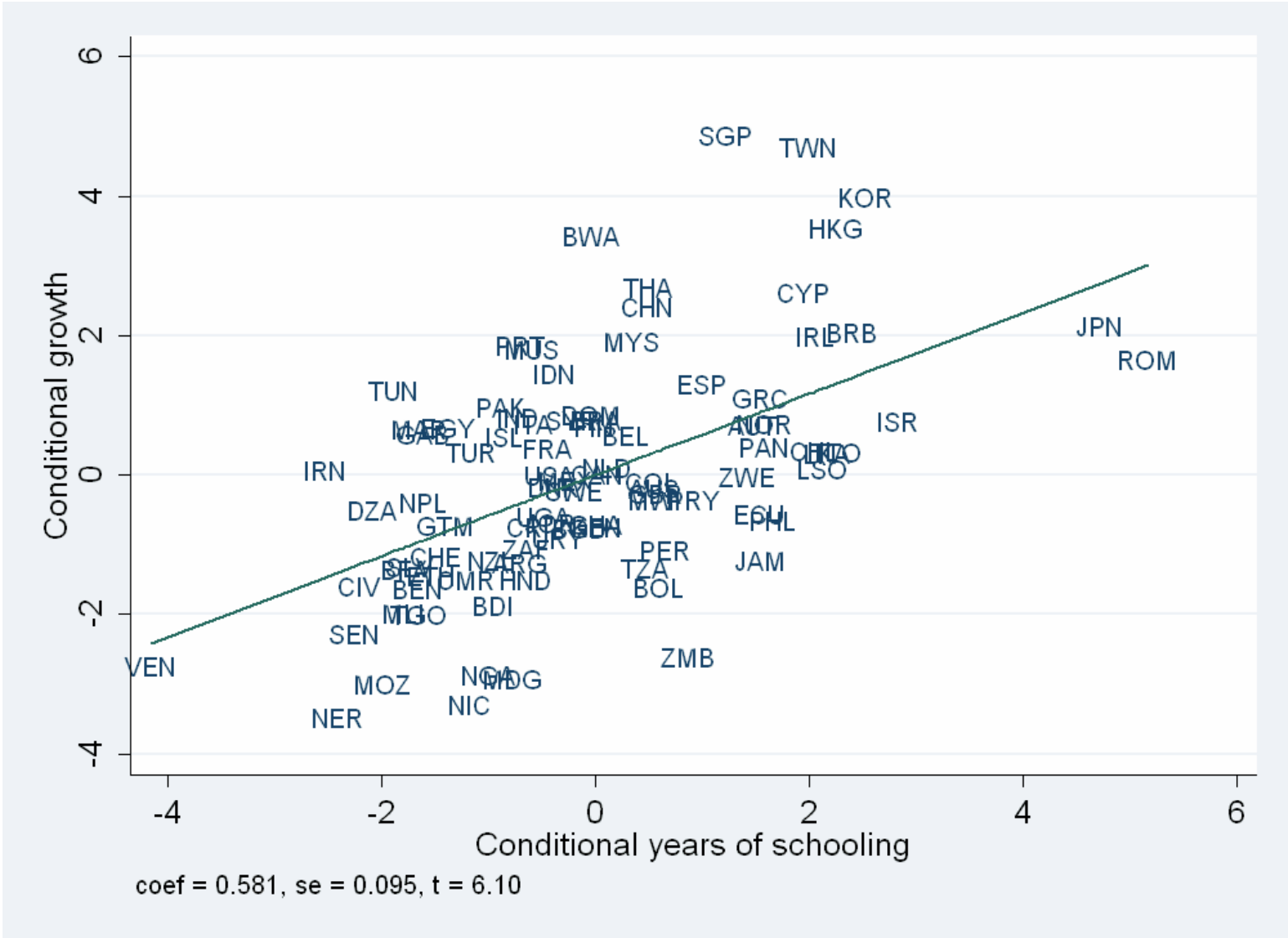
Plan for Discussion

- School quality and economic growth
  - Cognitive skills
  - Early versus late investment
- Special policy considerations
  - Basic skills v. advanced skills
  - Tertiary education
- Causation
- Teacher Quality

Human Capital in Empirical Growth

- Simple cross-country growth regressions
  - Enrollment rates
- Wide variety of measurement alternatives
  - Literacy
  - School enrollment and attainment

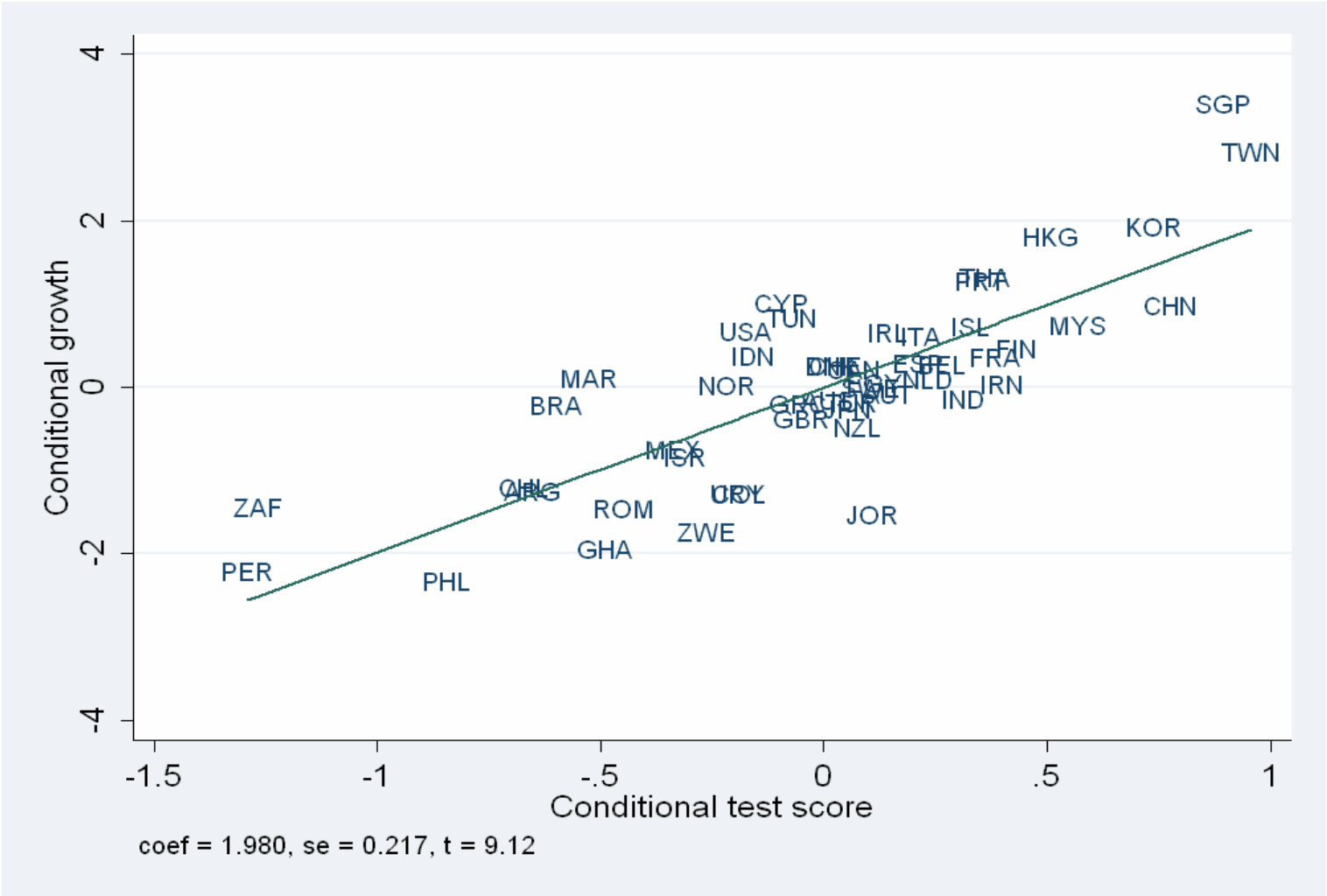
Years of Schooling and Long Run Economic Growth



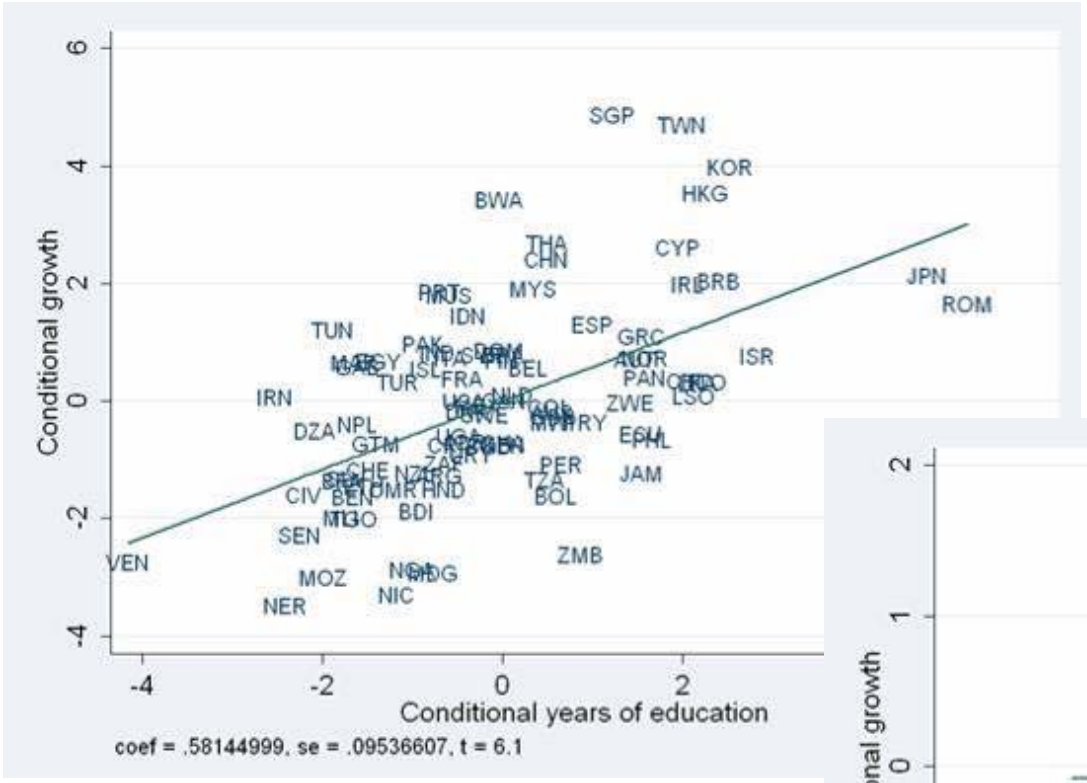
Human Capital in Empirical Growth

- Simple cross-country growth regressions
  - Enrollment rates
- Wide variety of measurement alternatives
  - Literacy
  - School enrollment and attainment
- Cognitive skills
  - Measuring knowledge, not sitting in the classroom
  - International tests of students' performance in cognitive
    - 12 testing occasions, 36 separate test observations (age levels, subjects)

Cognitive Skills and Economic Growth

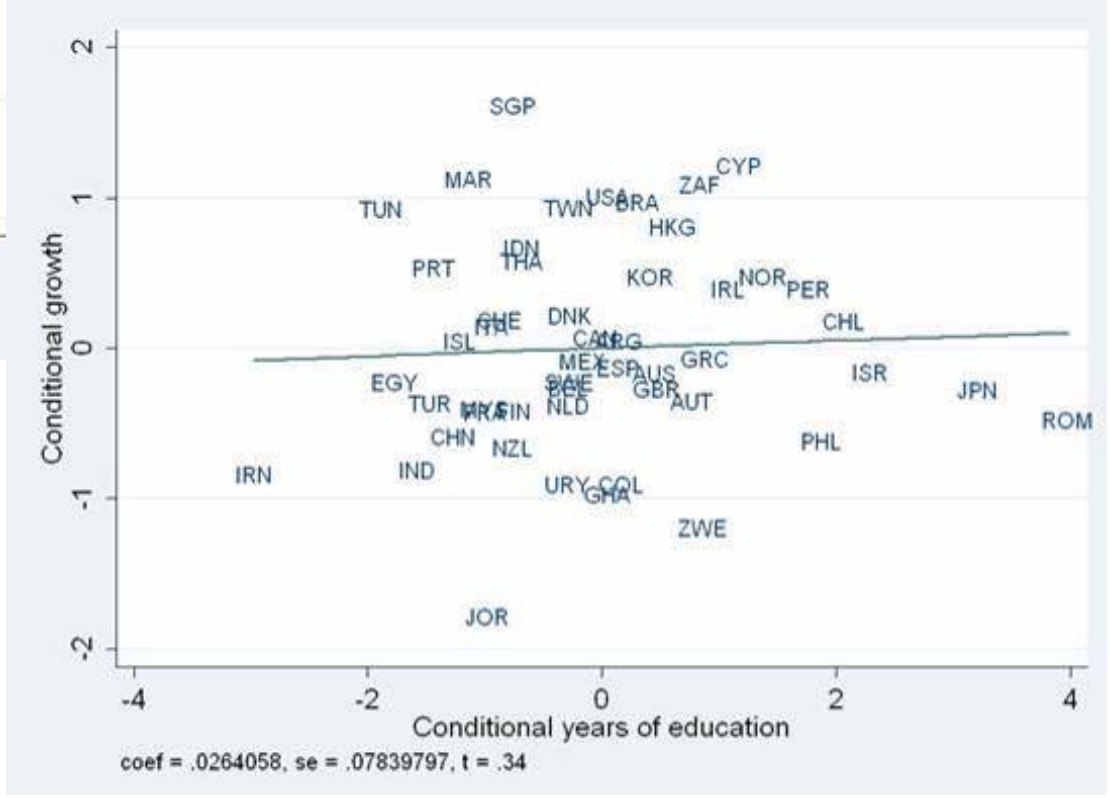


Years of Schooling and Economic Growth



Without quality control

With quality control



Rocket Scientists or Basic Education for All?

- Should policy concentrate on lowest or highest achievers?

Rocket Scientists or Basic Education for All?

- Should policy concentrate on lowest or highest achievers?
  - BOTH seem important
  - Rocket scientists more important in developing countries
- Does more tertiary education make sense?
  - Frontier vs. off-frontier
  - No evidence for developing or developed *after considering cognitive skills*

Estimating the Value of School Reform

- Reform that increases achievement
  - 20 years to reach new levels
- Assume future growth like 1960-2000 growth
  - Holds for former communist members
- Discount future at 3 percent
- Growth without education reform at 1.5 percent
- Calculate present value over lifetime of person born today
  - 80 year expected life
  - 40 year working life

Present Value of Achievement Gains
United Kingdom

Achievement change	Present value ($billion)	% GDP
Plus ¼ standard deviation (Australia, Germany)	$6,862	268%
Achievement = Finland (51 PISA points)	$14,982	630%
Eliminate “below level 1” (14.4%< 400 PISA)	$9,642	405%

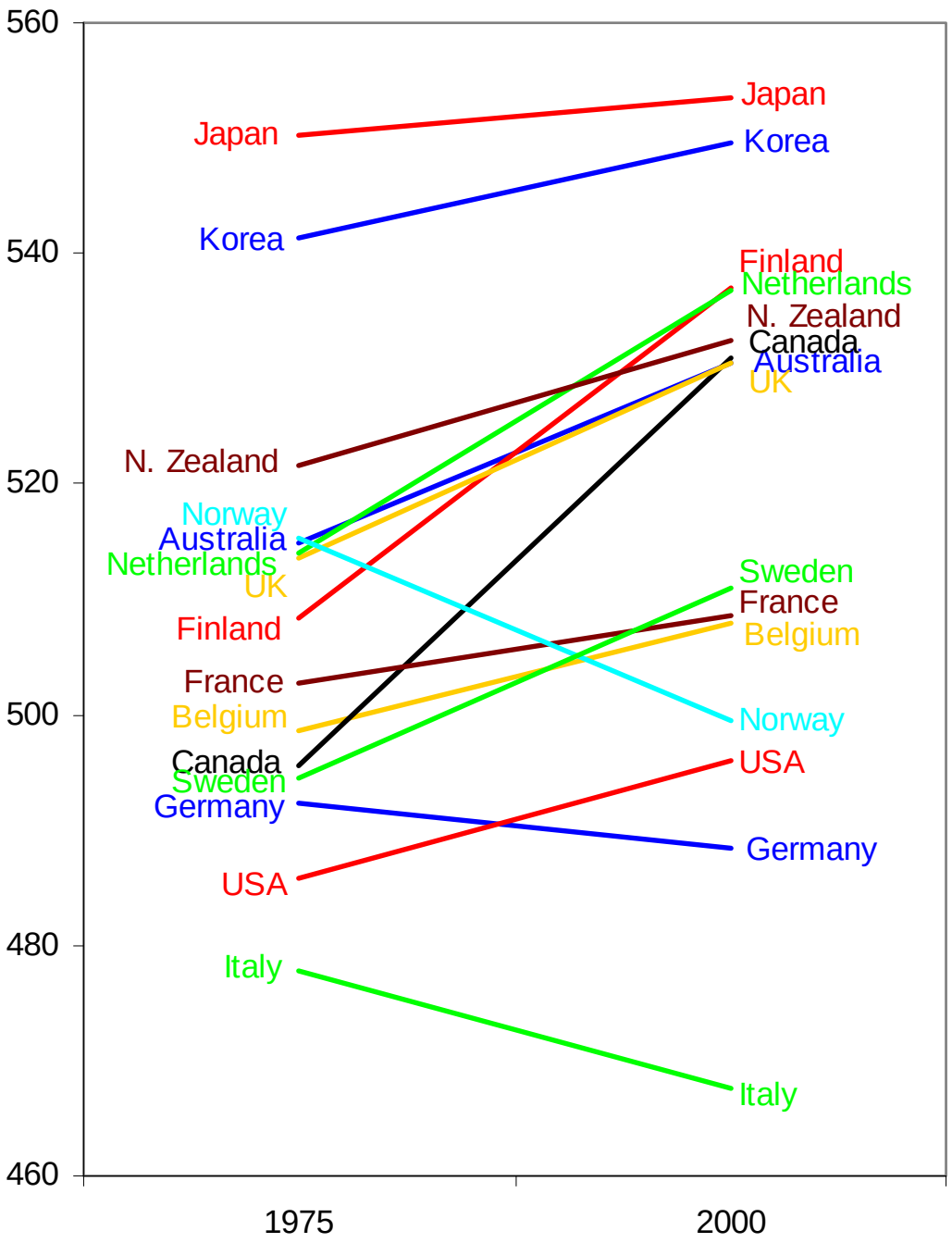
Do Skills Cause Growth?

- Simple reverse causation
- Omitted factors
  - Institutions (openness, property rights)
  - Regulations
  - Culture

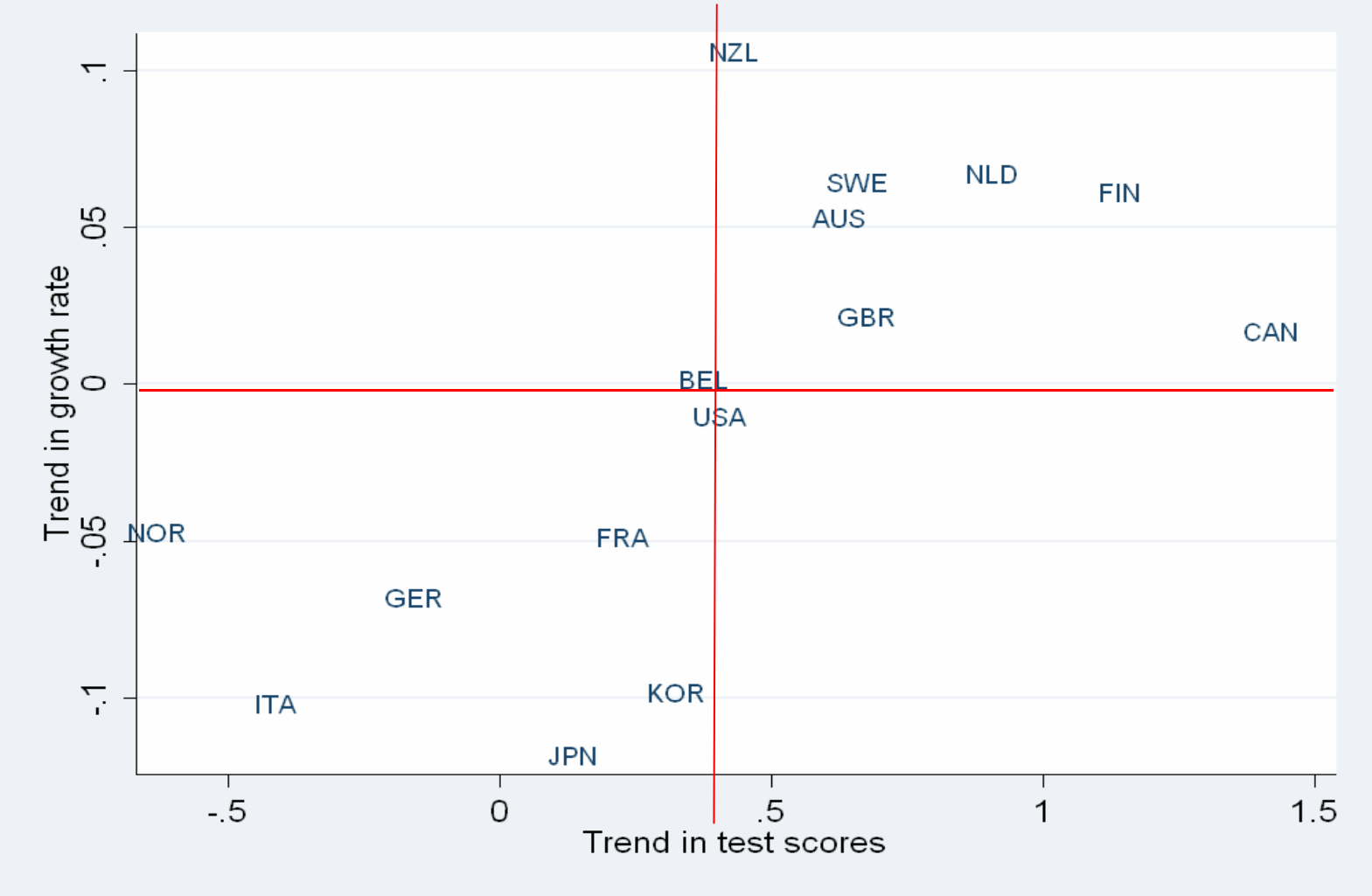
Causation

- **Robustness** of cognitive skills and growth
  - Time period, test measures, country sample, outliers, region
- **IV models**: Variation in cognitive skills driven by school systems
  - exit exams, school choice, Catholic schools
- **DiD model I**: Skill improvement and improved growth
- **DiD model II**: Comparing the impacts of U.S. and home-country education on the U.S. labor market

Trends in Test Scores



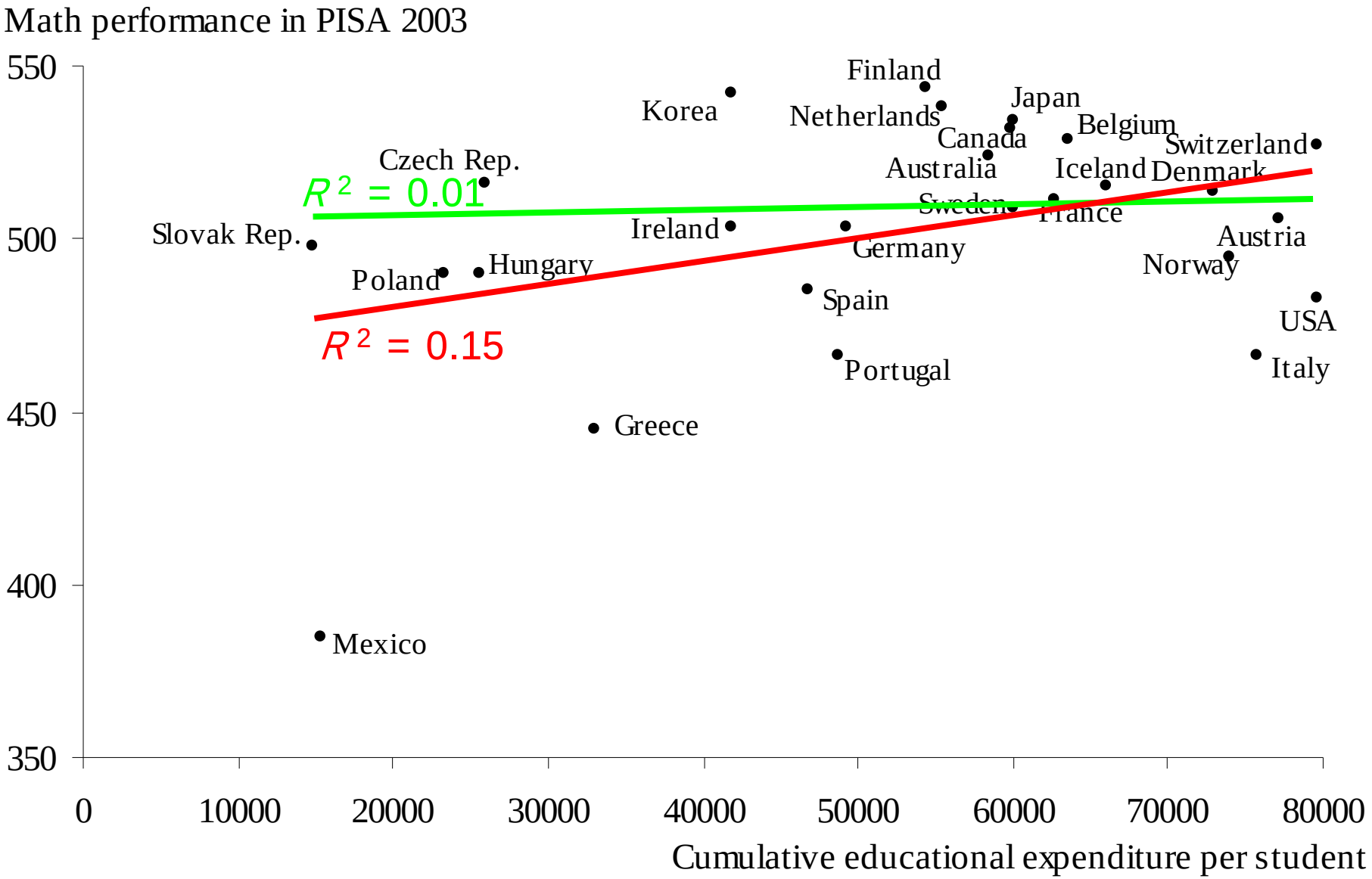
Trends in Growth Rates vs. Trends in Test Scores



Policy options

- **Spending**

Resources and Performance across Countries



Policy options

- **Spending**
- **Teacher quality**

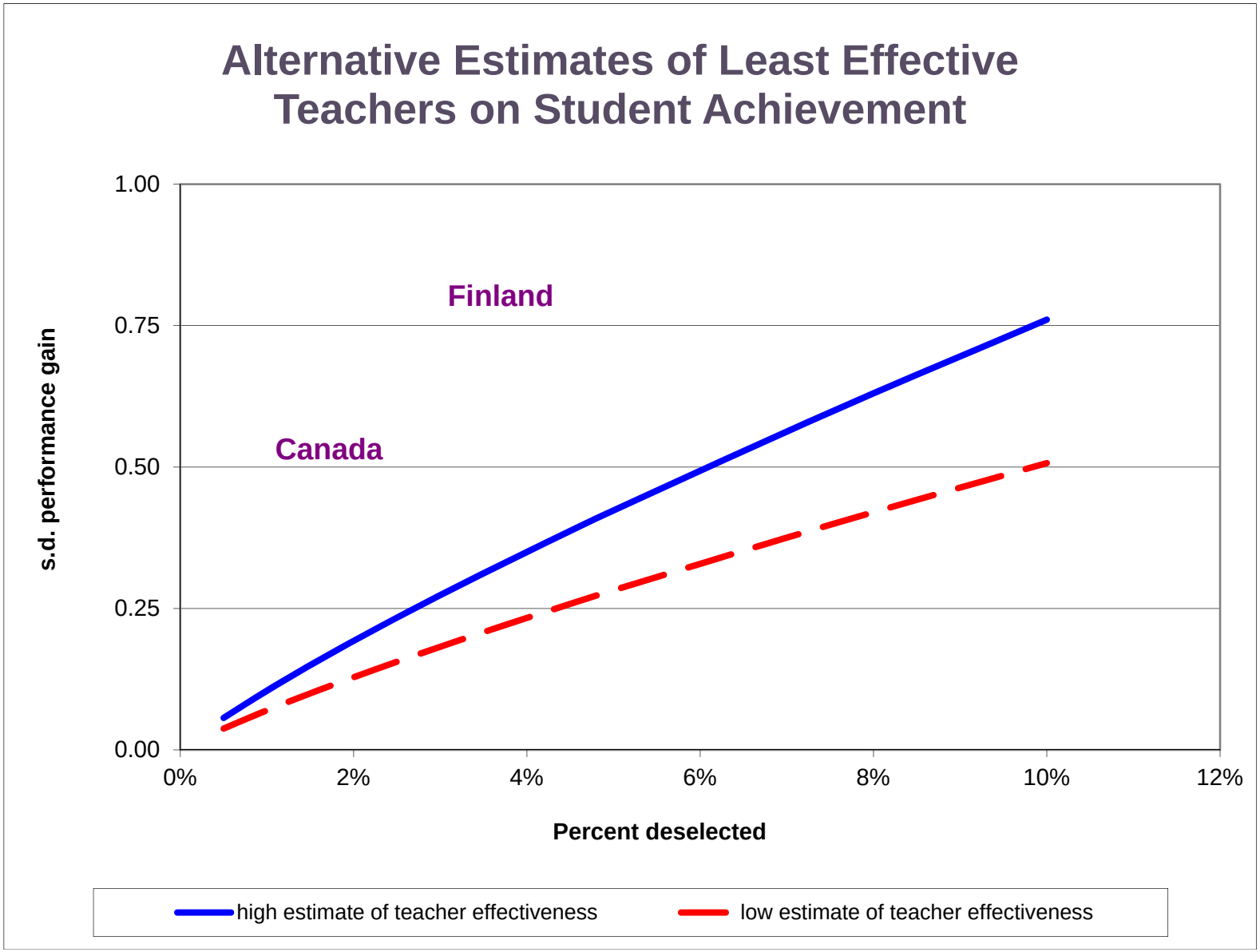
Teacher Quality

- Strongest evidence on systematic effects
- Not related to common measures
- Observable through both student performance *and* supervisor ratings

Teacher Effectiveness (σ_W)

		reading	math
Rockoff (2004)	New Jersey	0.10	0.11
Nye, Konstantopoulos, and Hedges (2004)	Tennessee	0.26	0.36
Rivkin, Hanushek, and Kain (2005)	Texas	0.10	0.11
Aaronson, Barrow, and Sander (2007)	Chicago		0.13
Kane, Rockoff, and Staiger (2008)	New York City	0.08	0.11
Jacob and Lefgren (2008)	Undisclosed city	0.12	0.26
Kane and Staiger (2008)	Los Angeles	0.18	0.22
Koedel and Betts (2009)	San Diego		0.23
Rothstein (2010)	North Carolina	0.11	0.15
Hanushek and Rivkin (2010)	Undisclosed city		0.11
AVERAGE		**0.13**	**0.17**

Teacher Deselection



Conclusions

- Europe 2020
  - Correct to emphasize human capital development
  - Incorrect to headline quantity
    - Reduce dropouts to less than 10 percent
    - 40 percent of 30-34 year olds with tertiary education
- Early versus late investment strategies
- Vocational v. general education
- Huge benefits to quality
- Must deal with myopic pressures of fiscal problems