Analysis of ILSA data: Comments on Gustafsson and Chmielewski & Dhuey

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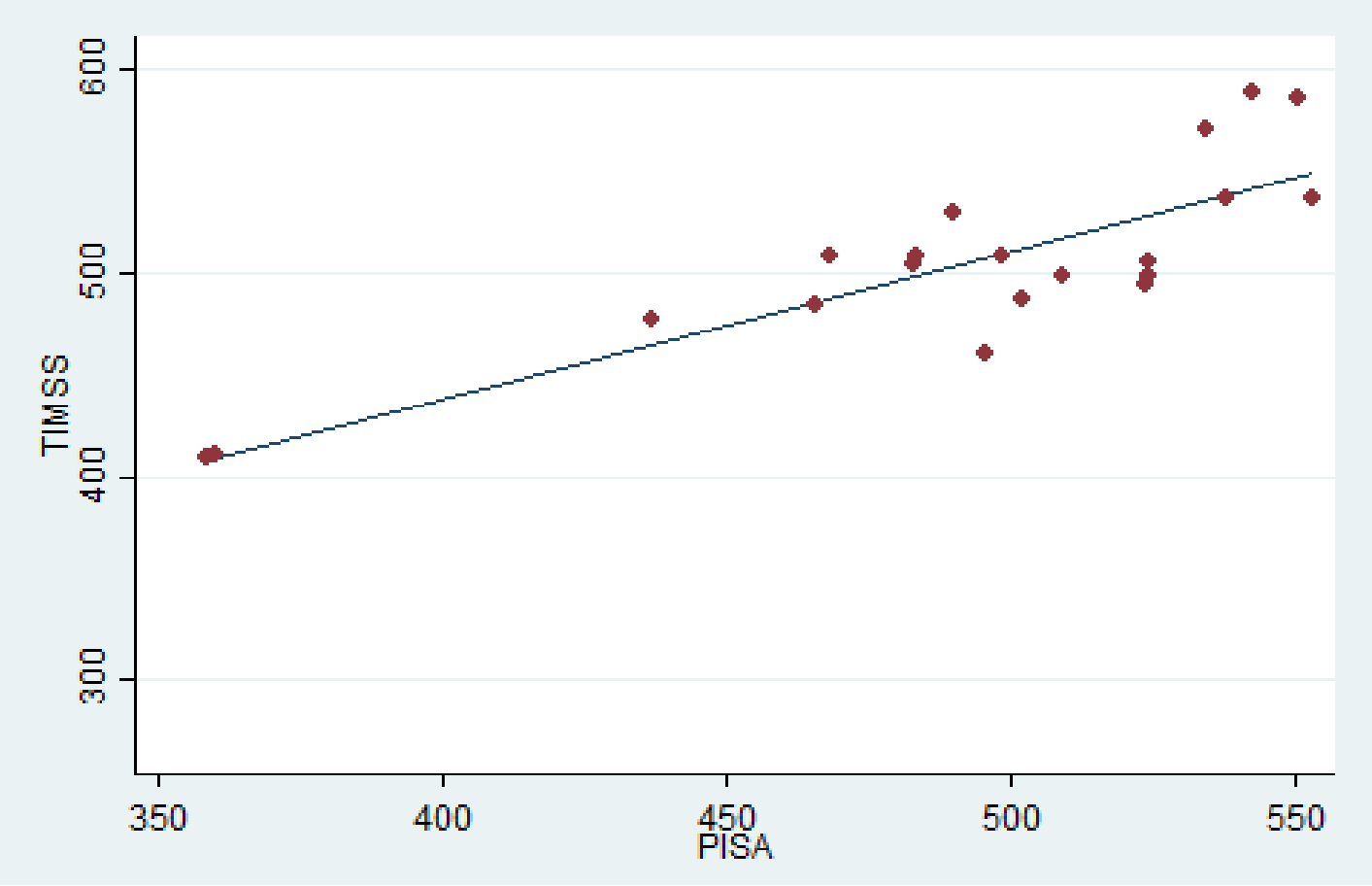
"You can't fix by analysis what you've bungled by design."
Light, Singer, & Willett, 1990

Today: "You can't entirely compensate by analysis for what is unavoidably limited by design"

Some threats to robust inference with ILSAs

1. Inconsistencies between tests across countries (interactions between test design and curricula)
2. Differences among ILSAs in scaling and conditioning
3. Differences in sample design and nonresponse
4. Weak set of predictors
   a) Limited in scope and source
   b) Survey variables may behave differently across countries
   c) Direct measures may vary in meaning across countries
   d) Proxies rely on untested similarities in relationships with causal factors
   e) Cross-national comparisons create additional omitted variables

2003 TIMSS & PISA math

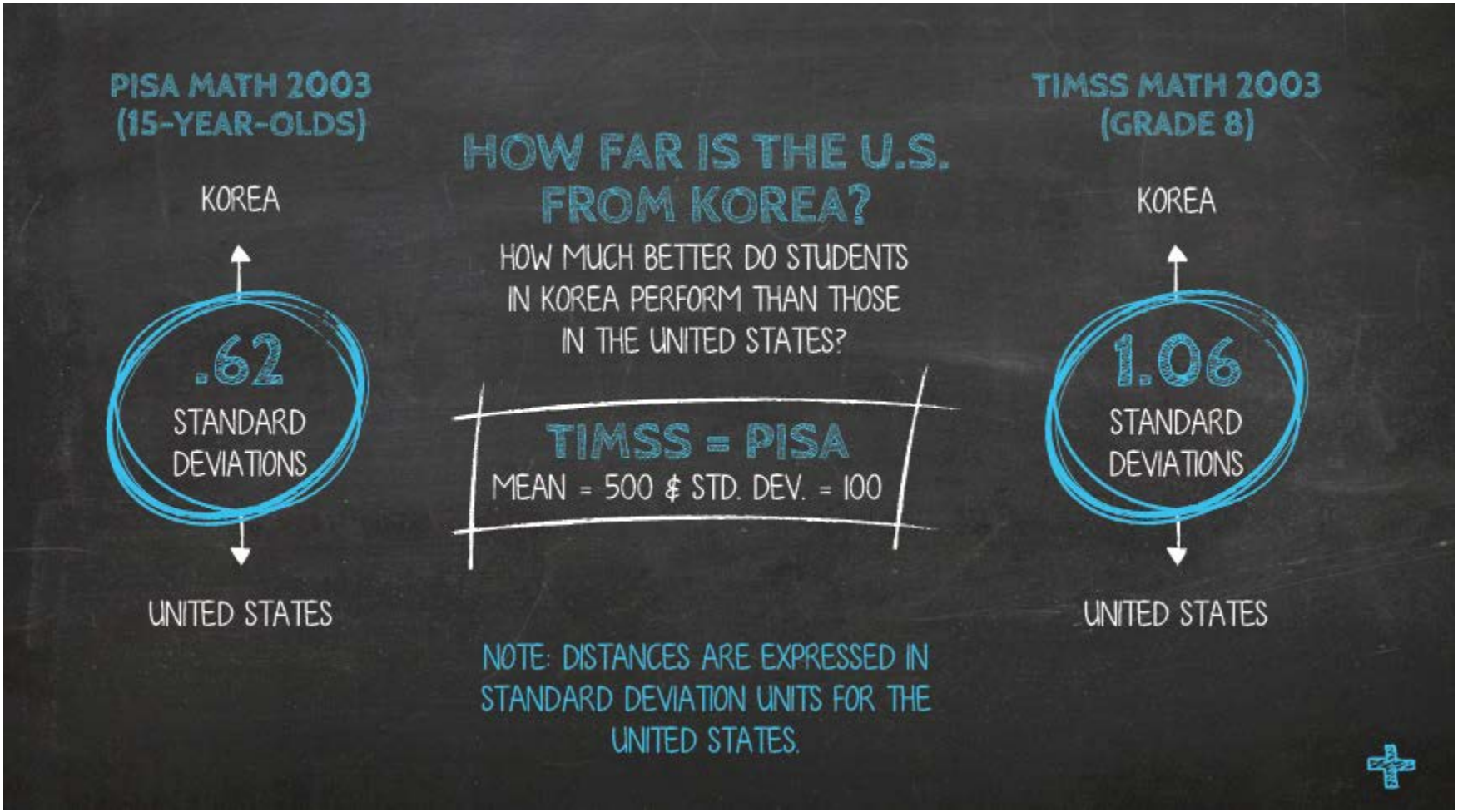


$r = .84$

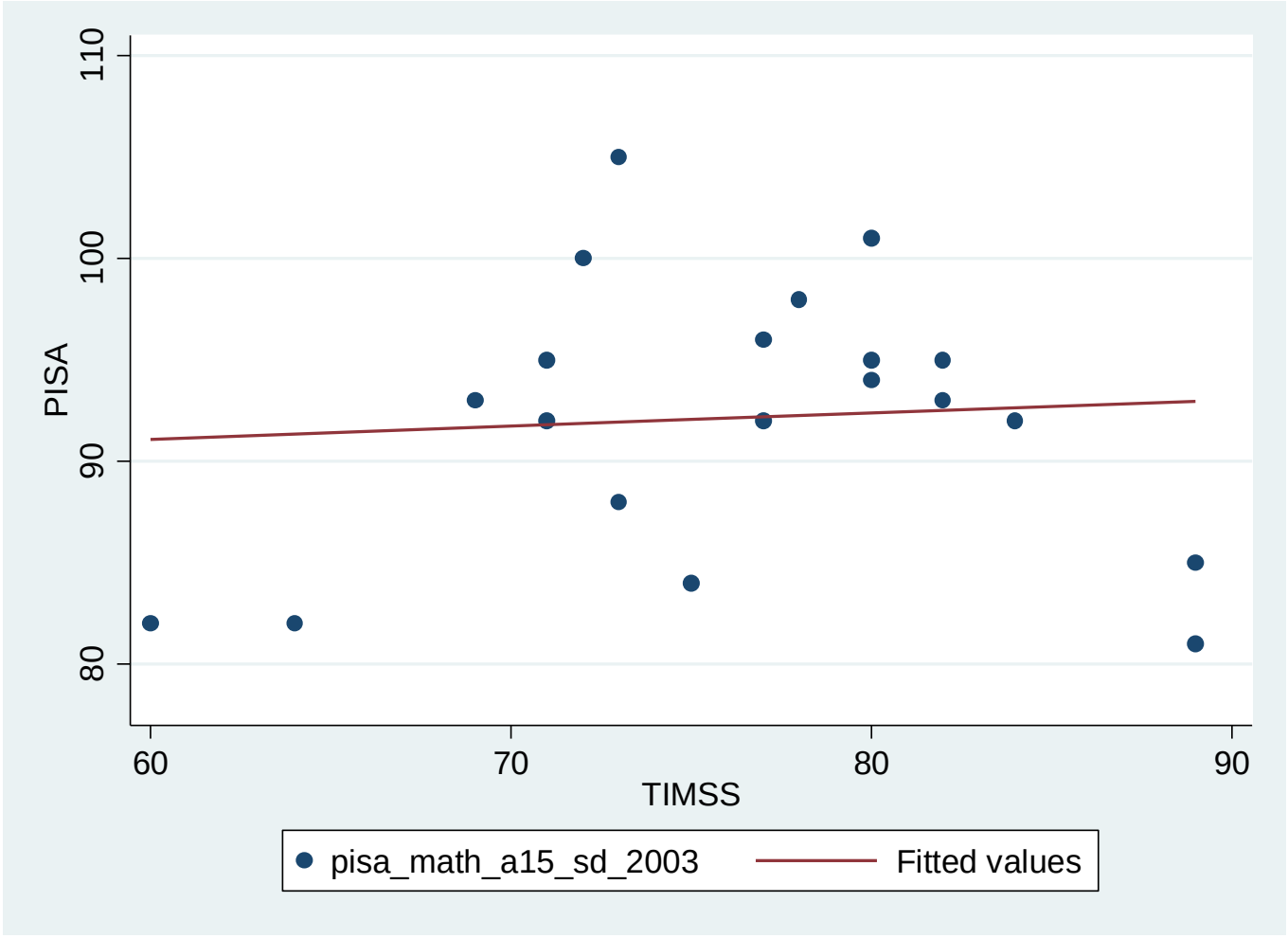
Correlations for comparison

TIMSS vs. PISA, all	0.84
TIMSS vs. PISA, -2	0.67
CUNY, Regents vs. SAT math, student	0.77
CUNY, Regents vs. SAT math, school	0.86
ITBS G8, reading vs. math, student	0.73
ITBS G8, reading vs. math, school	0.88

TIMSS/PISA: Korea-US

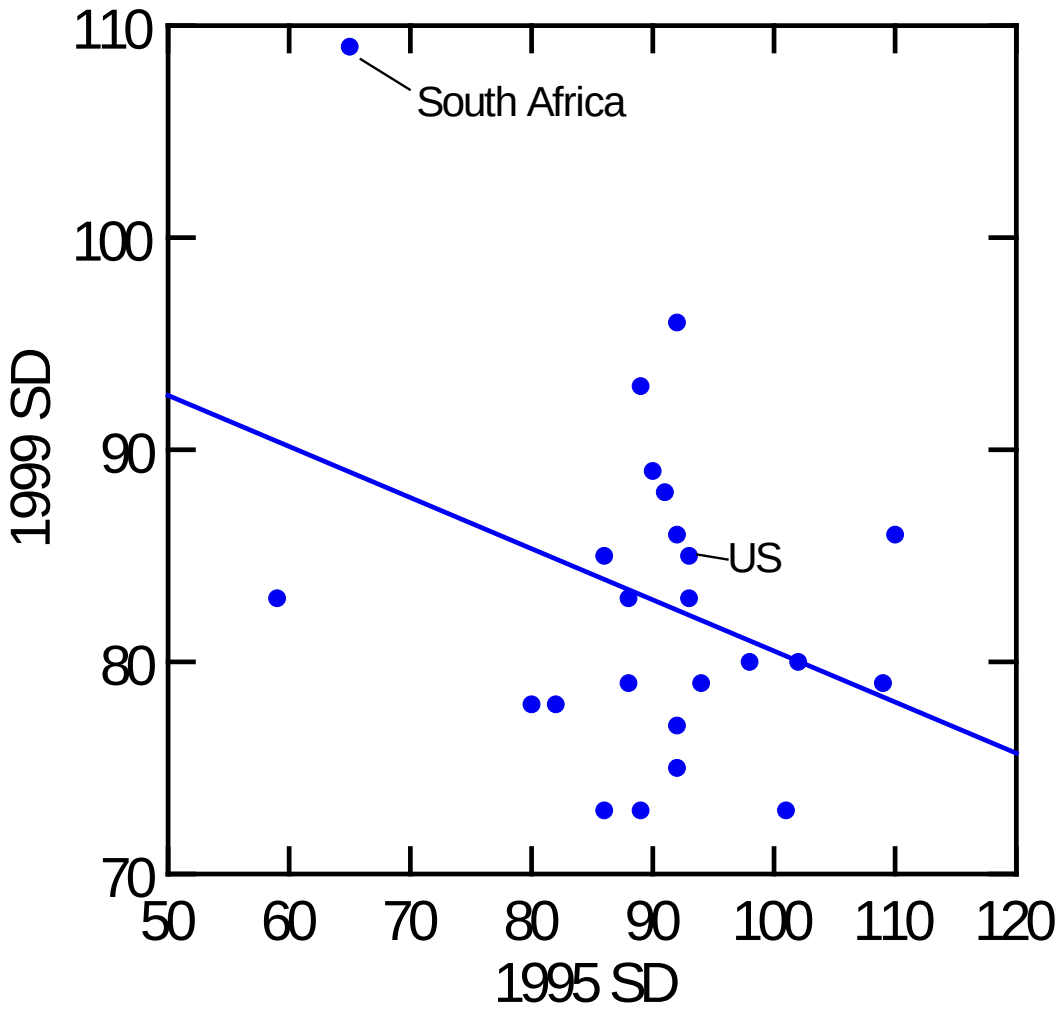


Math SDs, 2003, PISA & TIMSS grade 8



$$r = 0.07$$

TIMSS G8 math SDs, 24 countries, 95 & 99



Variation in age (synthetic cohorts)

Relative inequality increases in every country with tracking except the Slovak Republic, while relative inequality decreases in every country without tracking except for Sweden and Latvia.

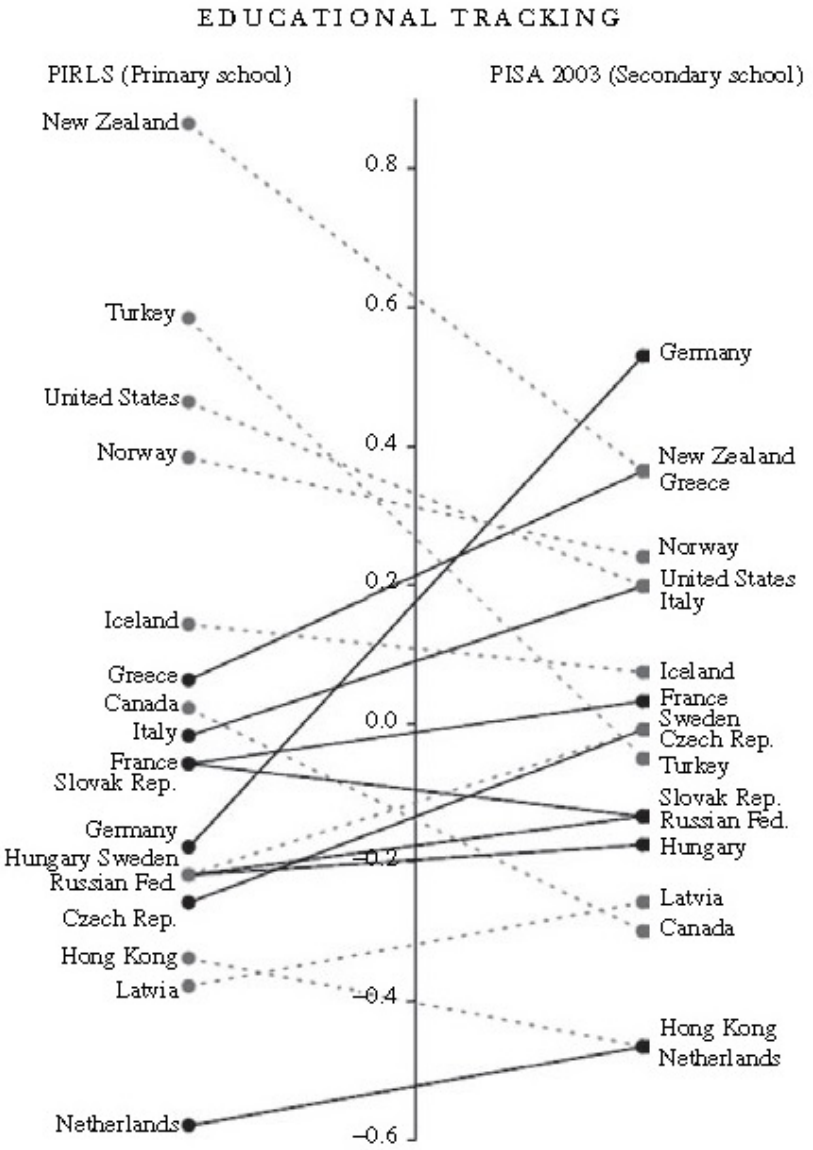


Fig. 1. *Inequality in Primary and Secondary School*

Notes. Standard deviation of test scores in the national population (difference from international average of national standard deviations in each test). Countries with a tracked school system before the age of 16 have solid lines, countries without tracking before age 16 have dashed lines.

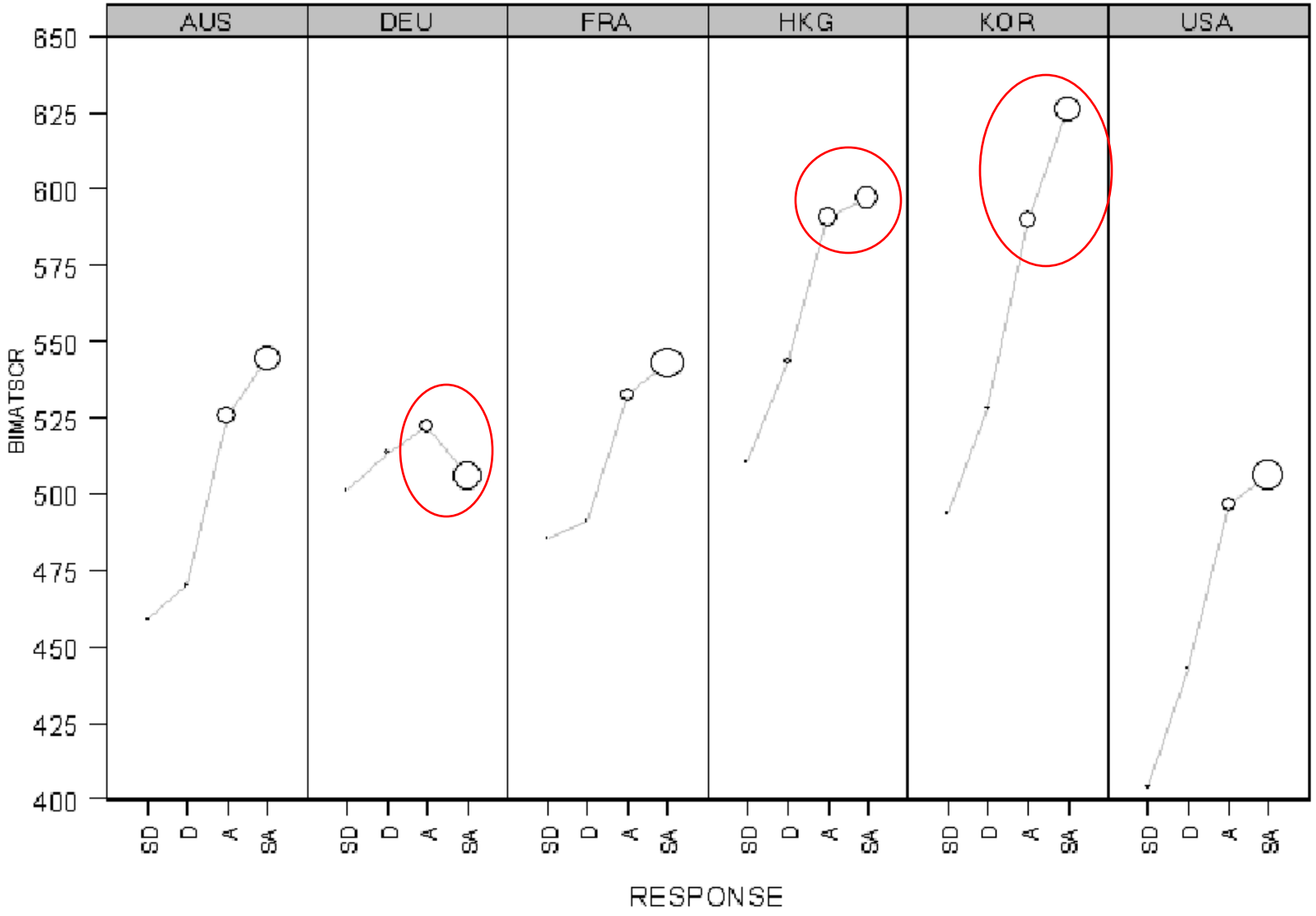
Source: Hanushek & Woessmann 2006

PISA 2003: robustness across strands: top 10 performers by strand

Key RHS variables in Gustafsson

- ‘Parental support for learning’
- Amount of homework

TIMSS 1995, “Mother thinks it’s important for me to do well in math,” BSBMMIP2

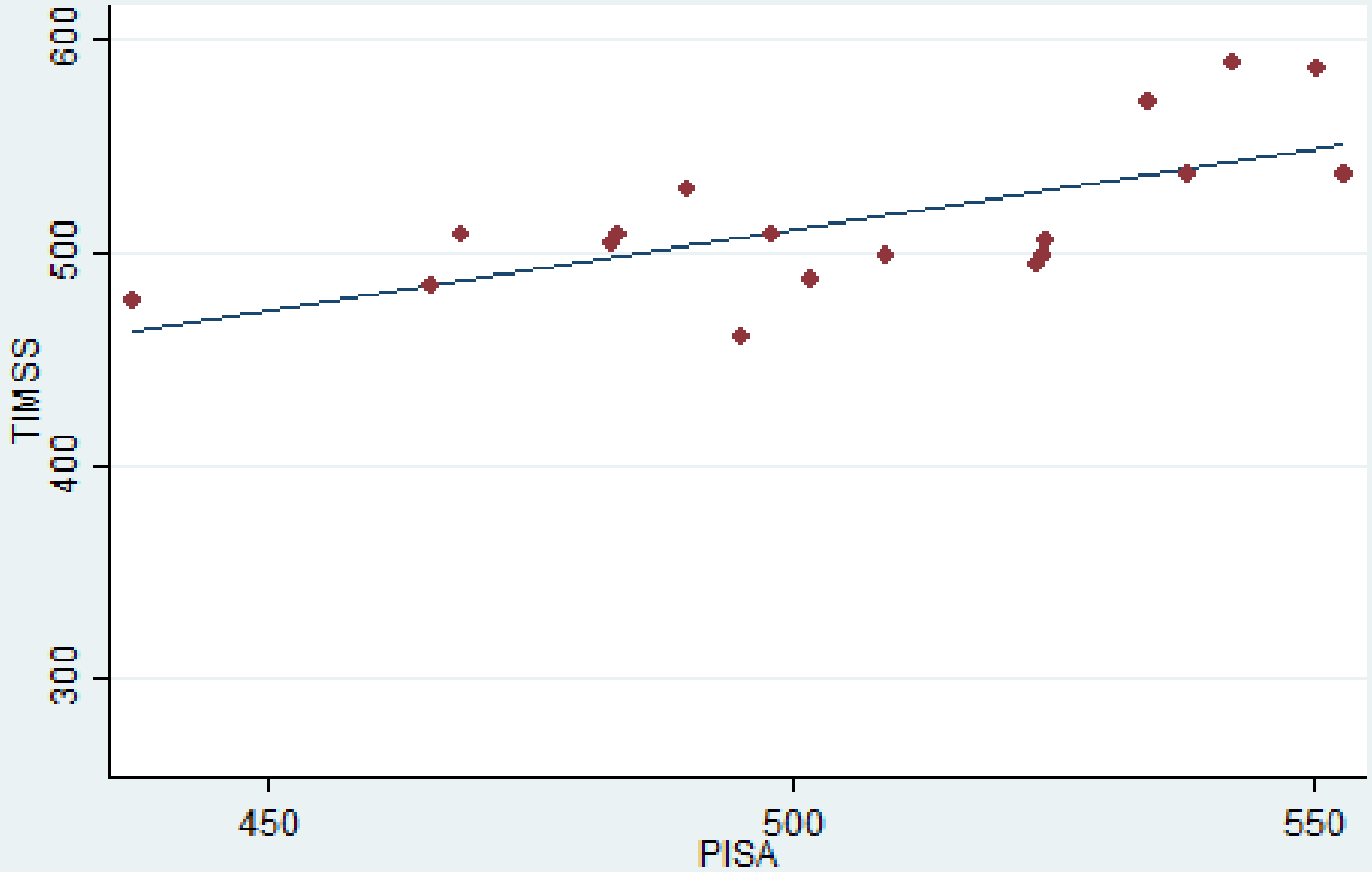


Conclusions

- ILSAs offer advantages, but also necessarily entail both design limitations and compromises
- Appropriate use requires evaluating each use (causal or descriptive) against limitations as well as opportunities
- Risks include:
  - (Unrecognized) failure to replicate
  - Conflating differences among surveys with predictors
  - Misinterpretation of RHS variables
- Avoid analysis that “is beyond the carrying capacity of the data” (H. Braun)

Supplementary slides

2003 TIMSS & PISA math, excl. Indonesia, Tunisia

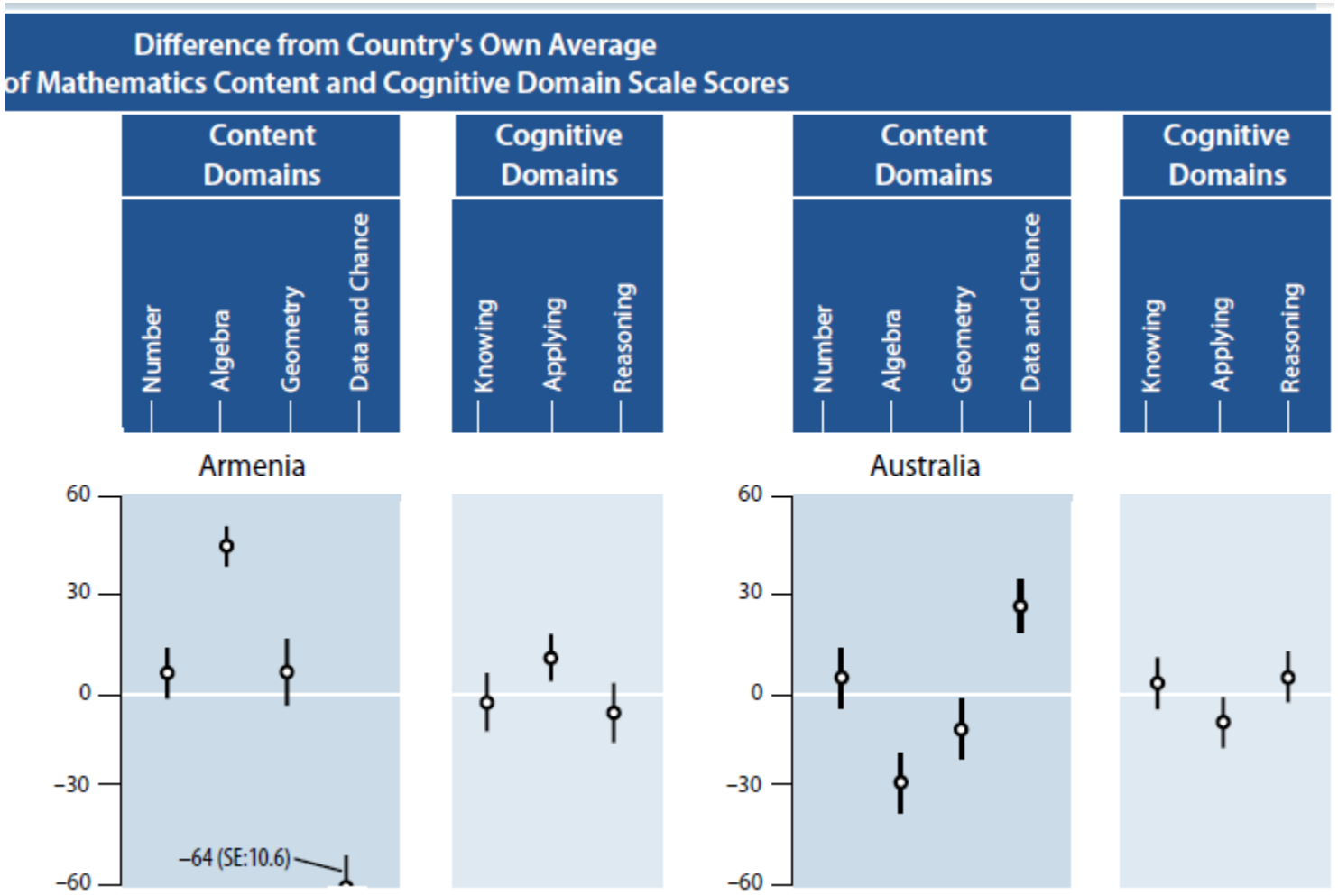


$r = .67$

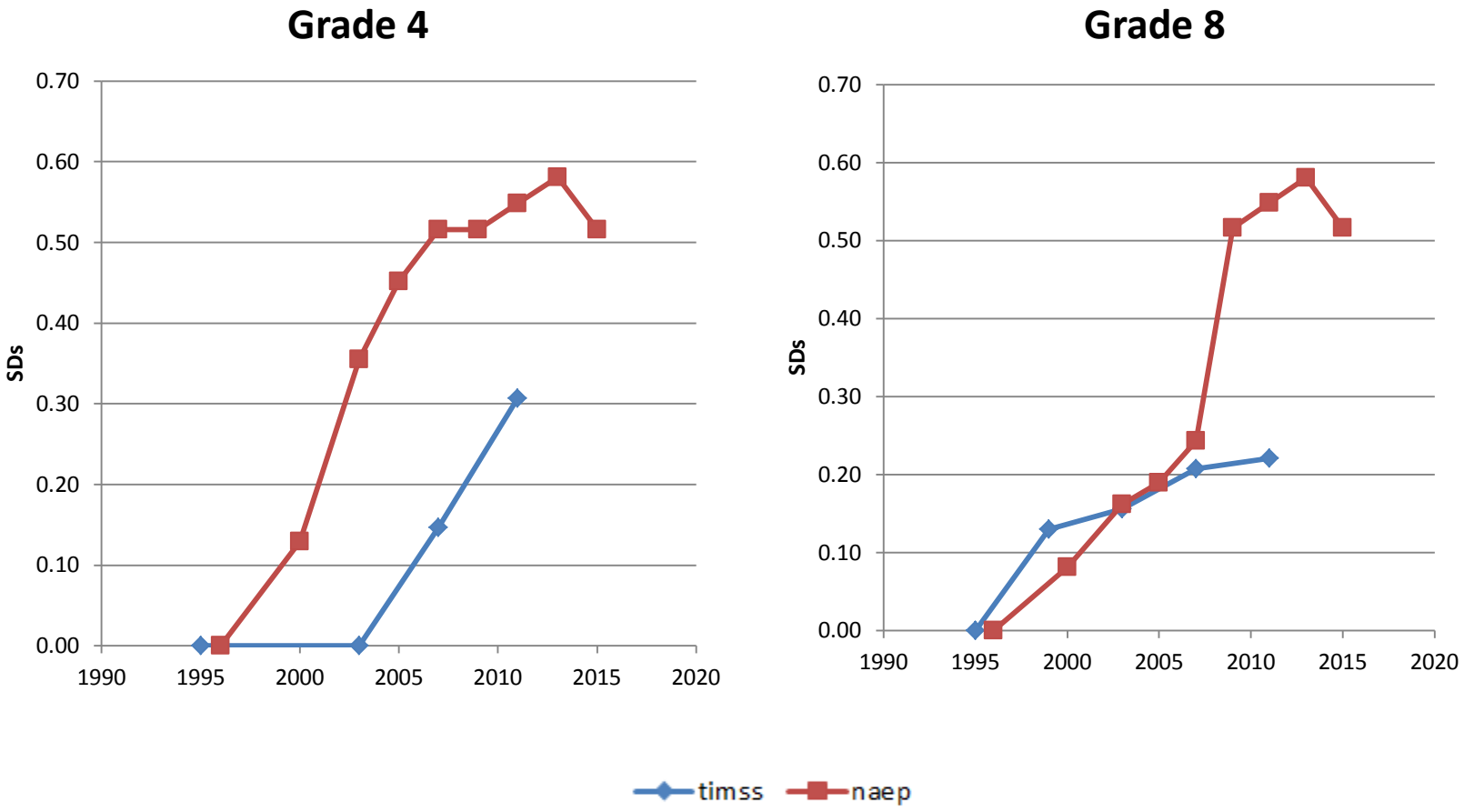
TIMSS 2011 G8 & PISA 2012 math subscale correlations

	TIMSS 2011 G8		PISA 2012	
Minimum	0.87	data, algebra	0.90	uncertainty, space
Maximum	0.97	number, geometry	0.96	uncertainty, change
Mean	0.95		0.94	

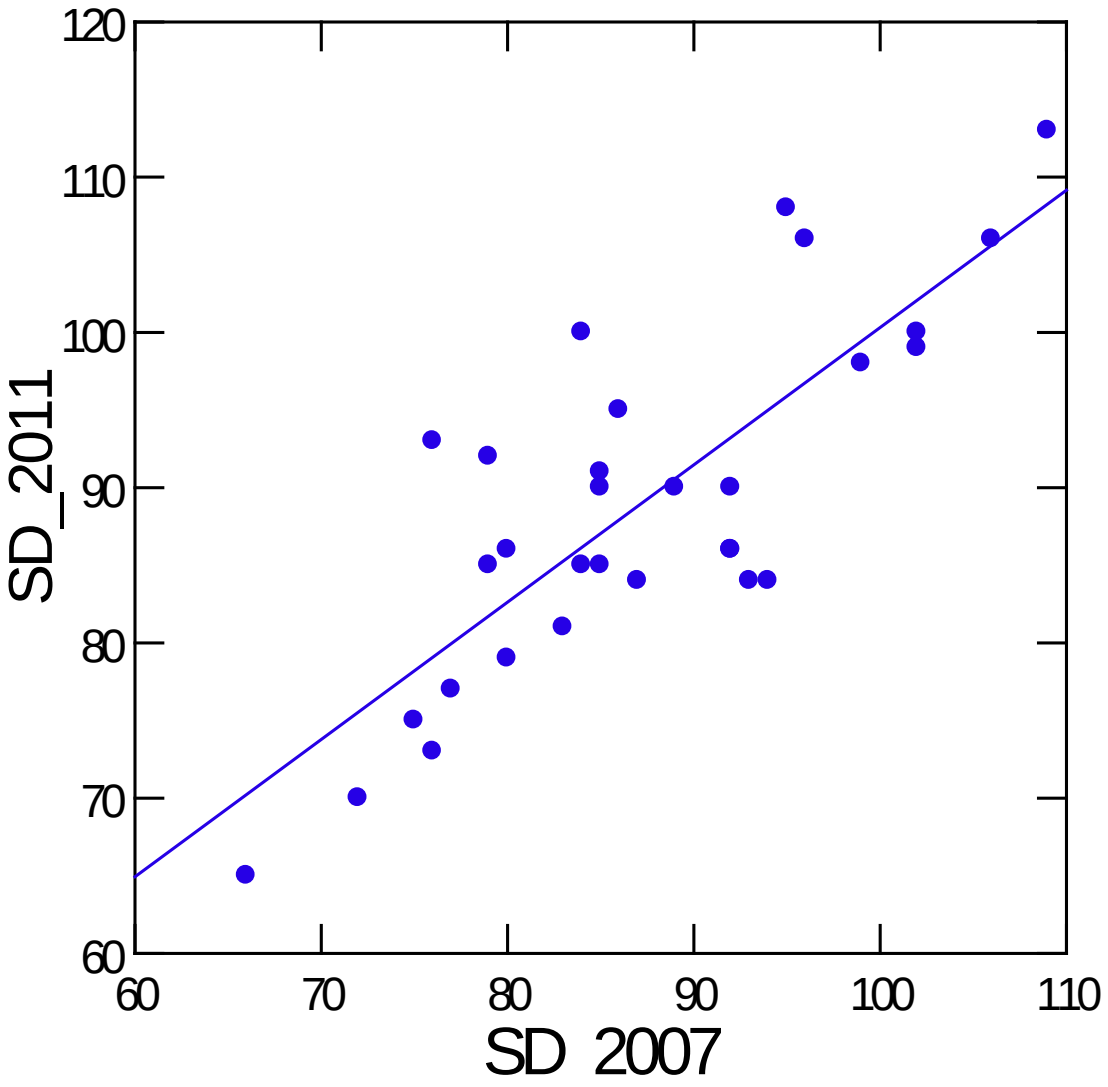
TIMSS 2007 grade 8: lack of robustness across parts



US Math trends, NAEP vs. TIMSS



TIMSS G8 SDs, 2007 & 2011



$r = 0.80$

TIMSS 1995, maternal education