

Annual Value-added School Effects from Various Models and their Inter-temporal Variability: Evidence from China

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Rome, 04.10.2012

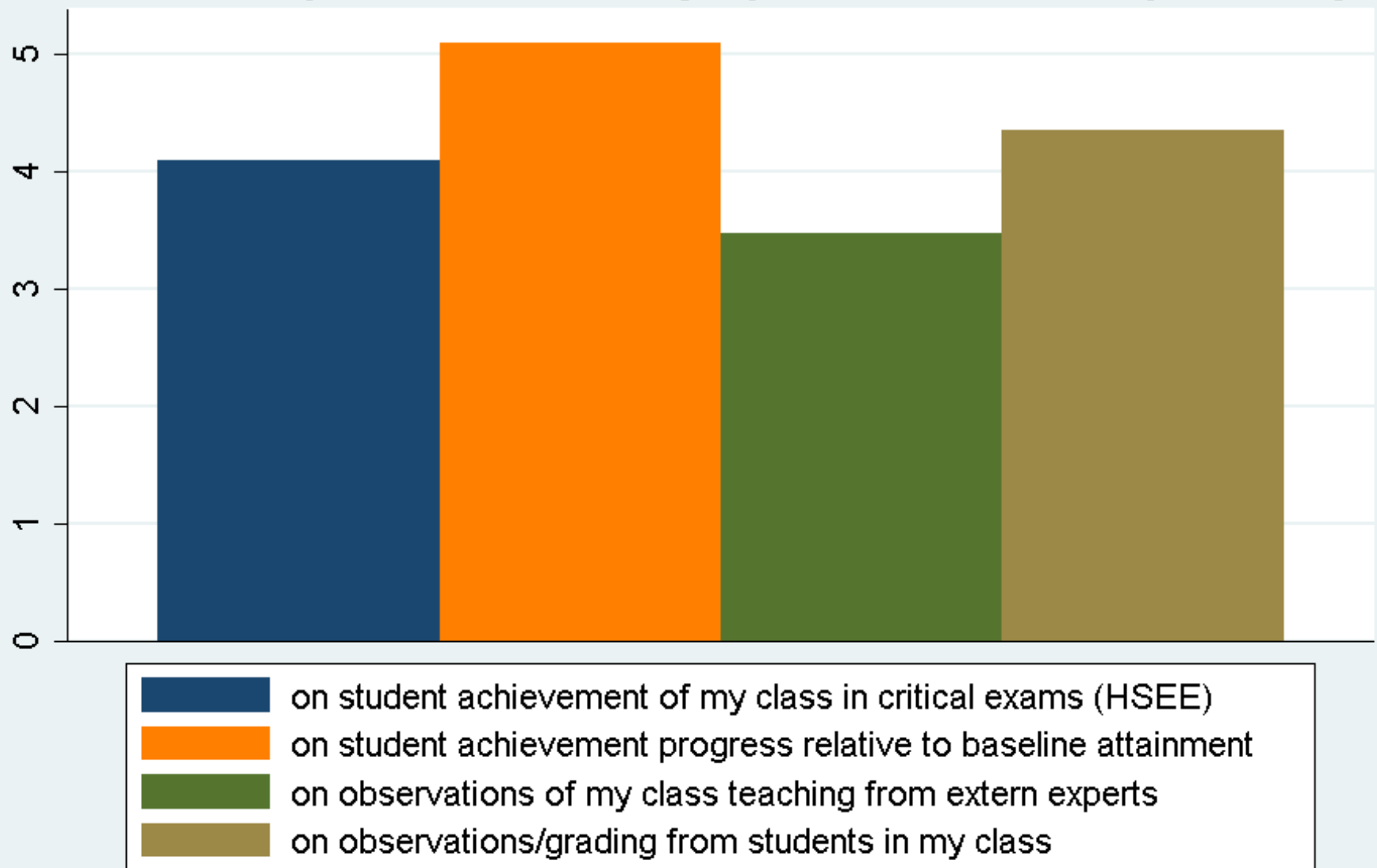
Background

- Growing interest in using value-added around the world (*Braun, 2005; OECD, 2008; Thomas, 2010*)
- In China: Student raw score in HSEE is the dominant school evaluation criterion.
- Adverse effect of raw score measure:
 - Widespread school choice behavior
 - Mathew Effect of schools
 - Good/bad practice in teaching not being identified
 - Lack of morale in schools with low-achieving intake

HSEE: High School Entrance Examination

Teachers' views of evaluating methods

To what extent do you think are the following ways reasonable to evaluate your teaching?



Research Questions

- What are the **conceptual differences** of some commonly used value-added models and their specifications?
- In Chinese contexts, are estimated annual value-added school effects **consistent across models**?
- To what extent are estimated annual value-added school effects **stable from grade to grade (year to year)**?

Various editions of value-added

- *Linear regression value-added models*

$$Y_{ij2} = a_0 + \alpha_1 Y_{ij1} + \sum \beta_{pij} X_{pij} + \varepsilon_{ij} \quad \varepsilon_{ij} \sim N(0, \sigma^2)$$

- *Fixed-effects value-added models*

$$Y_{ij2} = a_0 + \alpha_1 Y_{ij1} + \sum_p \beta_{pij} X_{pij} + \theta_j + \varepsilon_{ij} \quad \varepsilon_{ij} \sim N(0, \sigma^2)$$

- *Random-effects or multi-level value-added models*

$$Y_{ij2} = a_0 + \alpha_1 Y_{ij1} + \sum_p \beta_{pij} X_{pij} + \zeta_j + \varepsilon_{ij}$$
$$\zeta_j \sim N(0, \tau^2) \quad \varepsilon_{ij} \sim N(0, \sigma^2)$$

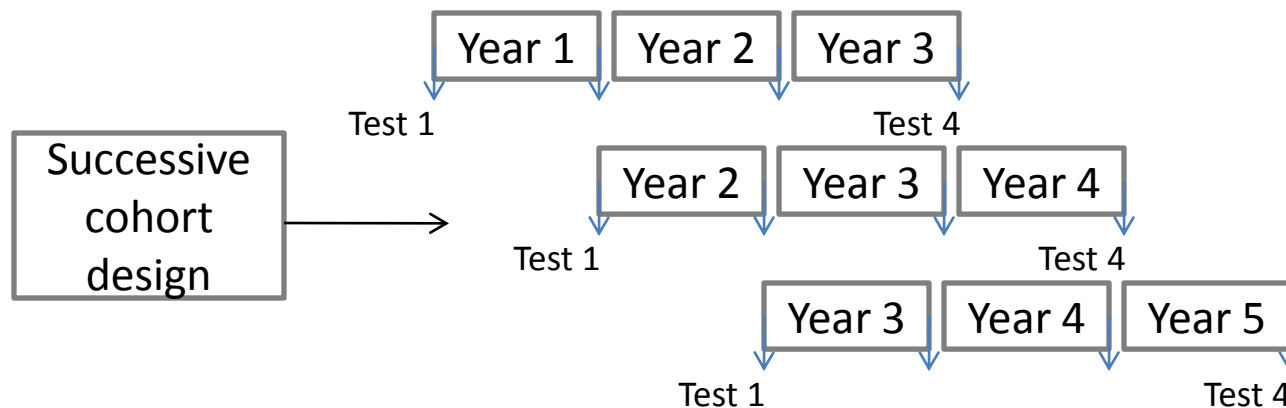
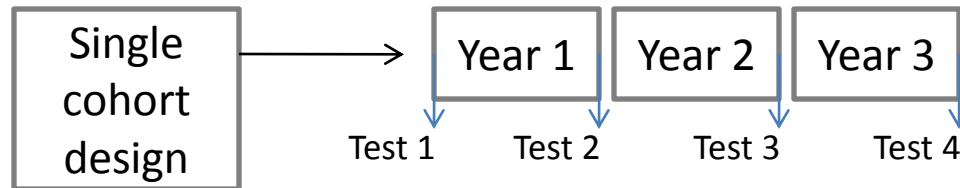
- * all models are based on single-cohort data
* not gain score

Different model specifications

- Control for what in the model?
(school cannot control)
 - Prior attainment only
 - Prior attainment and student SES (Type A)
 - Prior attainment, student SES and school aggregated variable (e.g. school mean prior attainment, school mean SES) (Type B)

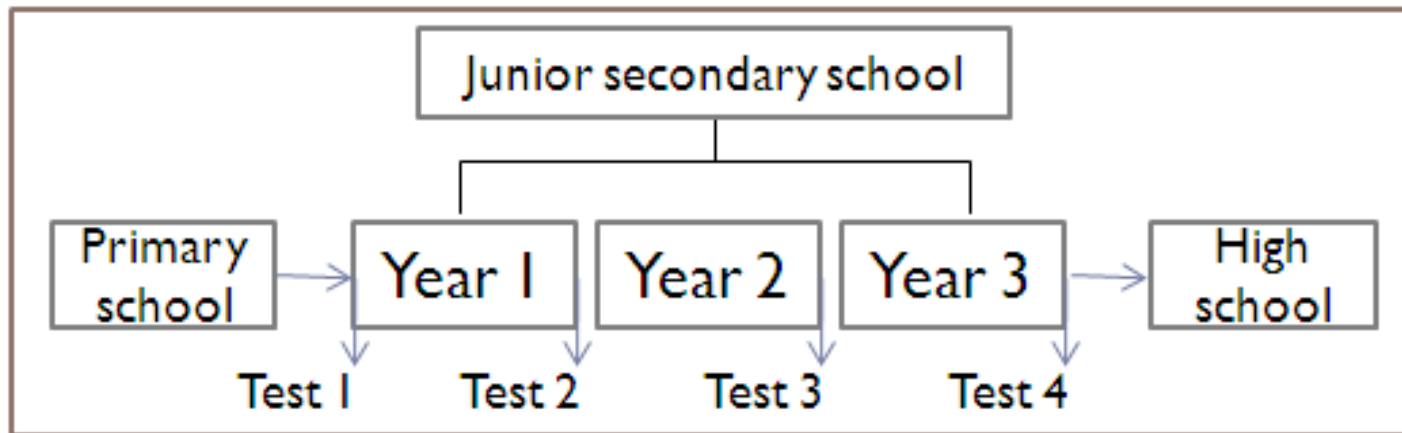
Two types of stability of school effects

- One of the most important issues in school effectiveness research (*Scheerens & Bosker, 1997*)
- **Year-to-year & Cohort-to-cohort**



Methodology

- Single-cohort longitudinal design



- Tests:
 - curriculum-based (Chinese, Maths, English)
 - Achievement: total score, standardized
 - Reliability (*Cronbach's alpha*=0.72-0.92)
 - Externally designed and graded
- All 2012 cohort of students in all 25 junior secondary schools in one LEA

LEA: Local Education Authority

Methods

- Matrix of models

	Prior attainment Only	Type-A	Type-B
Linear Regression Model (1)	1PO	1A	
Fixed-effect Model (2)	2PO	2A	
Random-effect Model (3)	3PO	3A	3B

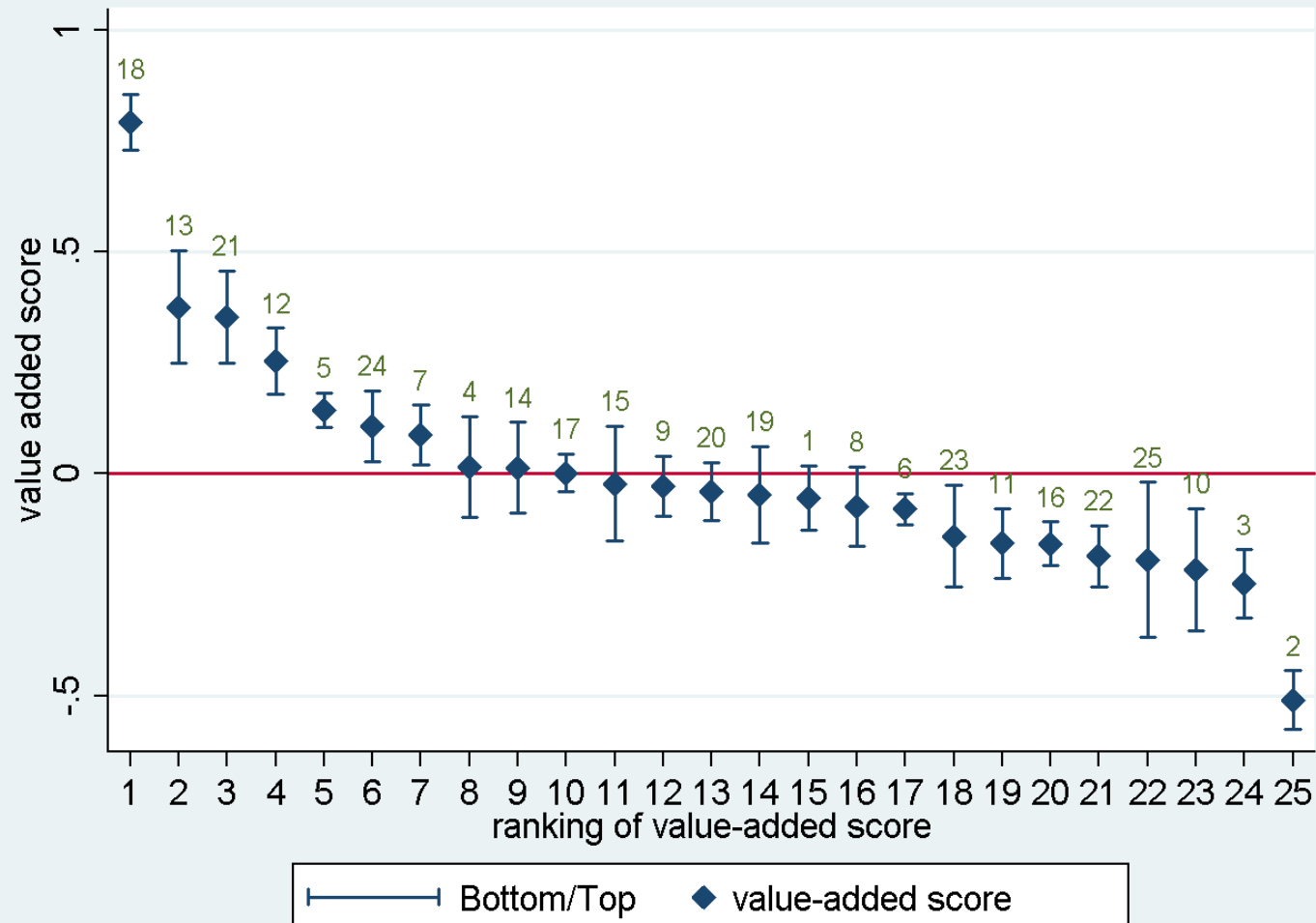


Table 4: Parameter Estimates of Seven Value-added Models for Each Year

		Prior score	Boy	Age in month	SES	Mean prior score	Mean SES
1PO	year1	0.93(0.01)***					
	year2	0.93(0.01)***					
	year3	0.93(0.01)***					
2PO	year1	0.96(0.01)***					
	year2	0.92(0.01)***					
	year3	0.90(0.01)***					
3PO	year1	0.96(0.01)***					
	year2	0.92(0.01)***					
	year3	0.90(0.01)***					
1A	year1	0.91(0.01)***	-0.02(0.01)	-0.00(0.00)*	0.03(0.01)***		
	year2	0.91(0.01)***	-0.07(0.01)***	-0.00(0.00)	0.01(0.01)		
	year3	0.90(0.01)***	-0.01(0.01)	-0.00(0.00)***	0.03(0.01)***		
2A	year1	0.94(0.01)***	-0.01(0.01)	-0.00(0.00)*	0.01(0.01)		
	year2	0.92(0.01)***	-0.07(0.01)***	-0.00(0.00)	0.02(0.01)*		
	year3	0.90(0.01)***	-0.01(0.01)	-0.00(0.00)***	0.01(0.01)		
3A	year1	0.94(0.01)***	-0.01(0.01)	-0.00(0.00)*	0.01(0.01)		
	year2	0.92(0.01)***	-0.07(0.01)***	-0.00(0.00)	0.02(0.01)		
	year3	0.90(0.01)***	-0.01(0.01)	-0.00(0.00)***	0.01(0.01)		
3B	year1	0.94(0.01)***	-0.01(0.01)	-0.00(0.00)*	0.01(0.01)	-0.37(0.12)***	0.28(0.10)**
	year2	0.92(0.01)***	-0.07(0.01)***	-0.00(0.00)	0.02(0.01)*	0.07(0.10)	-0.06(0.07)
	year3	0.90(0.01)***	-0.01(0.01)	-0.00(0.00)***	0.01(0.01)	-0.04(0.09)	0.06(0.07)

Note: Standard errors in parentheses.

*p < 0.05, **p < 0.01, ***p < 0.001

Consistency of value-added across models

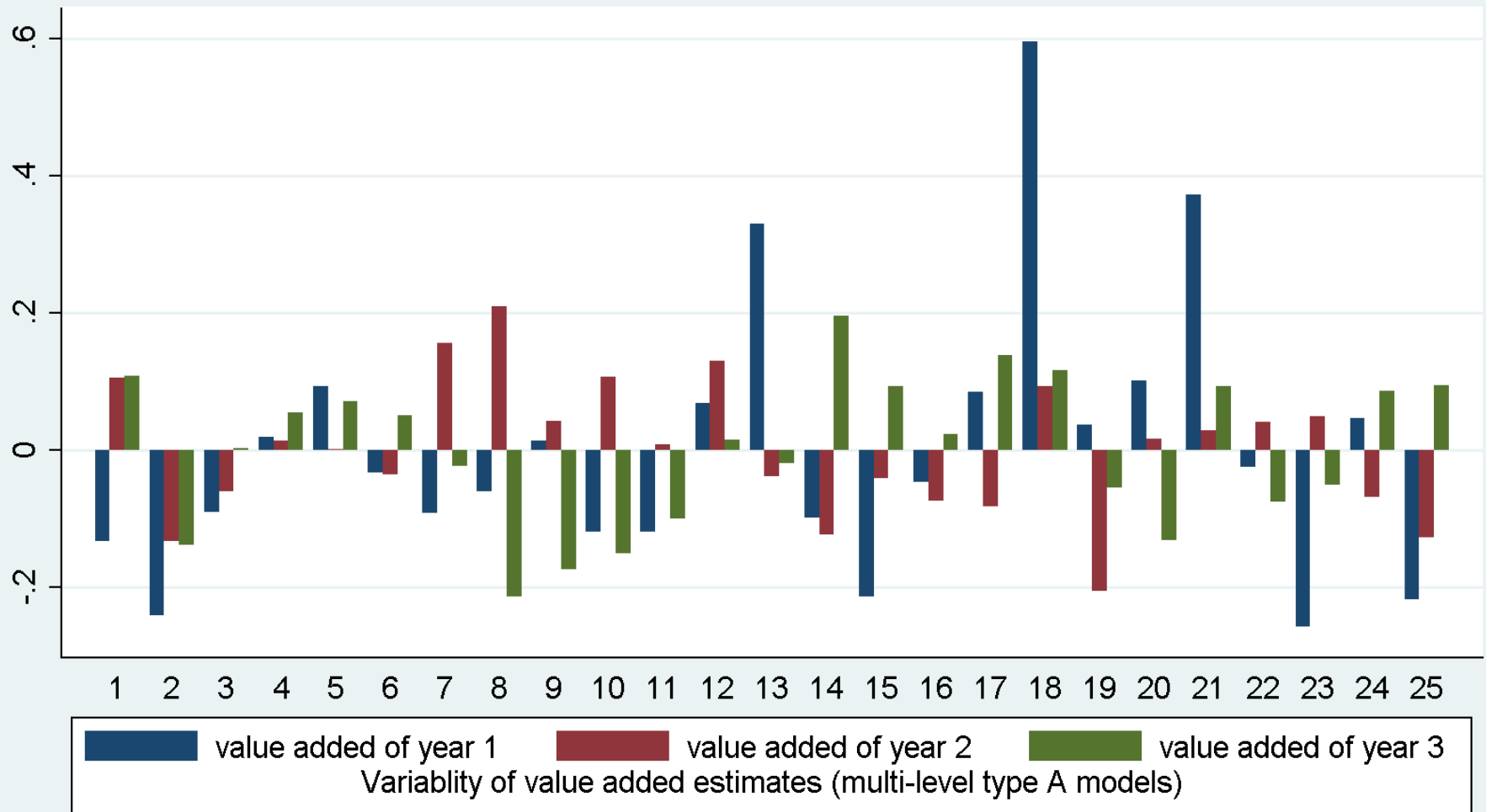
Table 5: Correlations of school's value-added across models

		1PO	2PO	3PO	1A	2A	3A	3B
Year 1	1PO							
	2PO	1.00						
	3PO	1.00	1.00					
	1A	0.99	0.99	0.99				
	2A	1.00	1.00	1.00	1.00			
	3A	1.00	1.00	1.00	1.00	1.00		
	3B	0.85	0.84	0.83	0.88	0.86	0.85	
Year 2	1PO							
	2PO	1.00						
	3PO	0.99	0.99					
	1A	0.99	0.99	0.99				
	2A	0.99	0.99	0.98	1.00			
	3A	0.98	0.98	0.99	0.99	0.99		
	3B	0.97	0.97	0.98	0.98	0.98	0.99	
Year 3	1PO							
	2PO	1.00						
	3PO	0.99	0.99					
	1A	0.98	0.98	0.98				
	2A	0.99	0.99	0.98	0.99			
	3A	0.98	0.98	0.99	0.99	1.00		
	3B	0.95	0.95	0.96	0.99	0.98	0.98	

Stability across years

Table 6: Correlations of Value-added Score Across 3 year

	year1-year2	year2-year3	year1-year3
1PO	0.18	-0.35	0.15
2PO	0.18	-0.33	0.15
3PO	0.18	-0.27	0.19
1A	0.13	-0.39	0.20
2A	0.13	-0.39	0.20
3A	0.13	-0.35	0.23
3B	0.12	-0.38	0.19



Conclusions and discussions

- Schools' value-added is highly consistent across different models.
 - The simpler, the better?
 - Transparency (Confidence interval; super population)
 - Local affair/no national assessment
 - Time-consuming to collect student background information
- Annual value-added of schools is not stable across years.
 - not proper for high-stake accountability
 - useful for school self-evaluation/improvement
 - Dilemma (timely feedback VS. accurate estimate)



Thank you very much!
Vielen Dank!
谢谢！

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