

# Effectiveness of Tuscan primary schools: what role for school factors?

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**AIEL**

XXVIII National Conference of Labour Economics

Libera Università Internazionale degli Studi Sociali "Guido Carli" Roma, 27-28 September 2013

## Effectiveness of Tuscan primary schools: what role for school factors?

- **Objective:** to provide the policy maker with a tool to compare schools' effectiveness
- **Methodology:** multilevel regression model
- **Data sources:** Invalsi data on pupils' achievements merged with administrative databases
- **Main feature:** sub provincial detail
- **Basic outputs:** schools' rankings



## Methodological approach

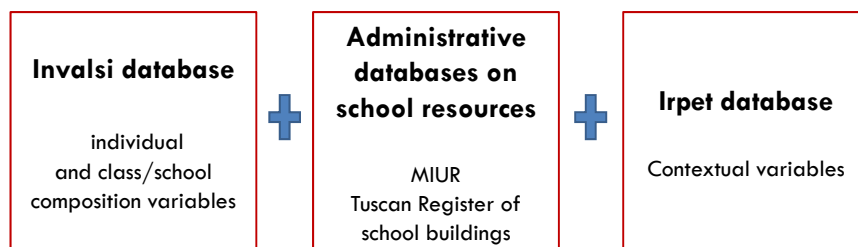
- **Methodology:** multilevel regression model
- **Use of multilevel model's results:**
  - Analysis of the relationship between the outcome and the explanatory variables
  - prediction of the outcome for a given student in a given school
  - ranking of schools according to their effectiveness
- **Specification:**

$$Y_{ij} = \alpha + \mathbf{b}'\mathbf{X}_{ij} + \mathbf{g}'\mathbf{W}_i + (u_i) + e_{ij}$$



## Construction of database

**Three initial databases were merged by Invalsi**

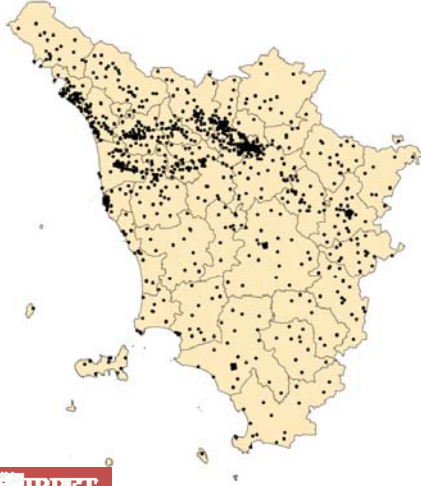


**After a cleaning process we have a database made up of  
22,005 pupils nested in 772 schools**

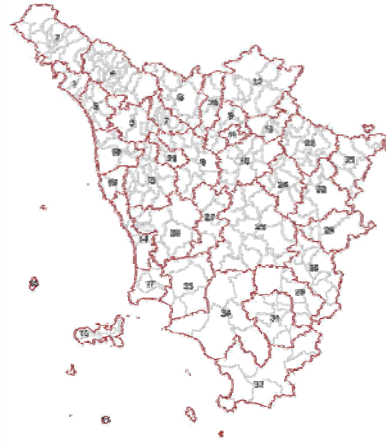


## Sub regional detail

Location of primary schools



Zonal conferences



## The model: covariates

Individual-level	Class-level	School-level	Spatial-level
Male	Class size	Average ESCS	Zonal Conferences dummies
ESCS	Disabled per class	School building's status	Remote areas dummies
Foreign	Repeating per class	Fixed-term teachers	
Repeating		Teachers over 55	
		Financial resources per pupil	



## Results: test scores' determinants (1)

### Math

	A Empty	B + pupil variables	C + school variables	D + Zonal Conferences dummies	E + remote areas dummies
Constant	69.3***	68.1***	63.1***	65.7***	62.9***
Male		2.17***	2.17***	2.17***	2.17***
Escs		3.93***	3.87***	3.88***	3.87***
Foreigner		-2.93***	-2.9***	-2.90***	-2.90***
Repeating		-3.48***	-3.26***	-3.24***	-3.26***
Full time		0.28	0.09	0.09	0.10
Disabled pupils per class			0.51***	0.50***	0.52***
Repeating pupils per class			-0.45***	-0.42***	-0.45***
Class size: 10-25 pupils			2.53*	1.89	2.61*
Class size: more than 25 pupils			4.19***	3.47**	4.26***
Average school escs			2.34***	2.13**	2.35***
School building status			0.73	0.54	0.74
% of fixed-term teachers: medium			-0.38	-1.43	-0.37
% of fixed-term teachers: high			-2.39***	-4.13***	-2.41***
% of teachers older than 55			-0.03	-0.05	-0.03
Financial resources per pupil			0.00	0.00	0.00
Territorial dummies	no	no	no	yes	yes
<b>Random effects</b>					
Between variance	64.72	59.88	57.07	52.00	57.05
Within variance	219.98	203.23	203.03	203.06	203.03
Total variance	284.70	263.12	260.10	255.06	260.08
% between over total (ICC)	22.7%	22.8%	21.9%	20.4%	21.9%
% change in within variance		-7.6%	-0.1%	0.0%	0.0%
% change in between variance		-7.5%	-4.7%	-8.9%	0.0%
LR test vs. linear regression: chibar2(01)	3262.96	3280.39	3037.18	2723.97	3036.87



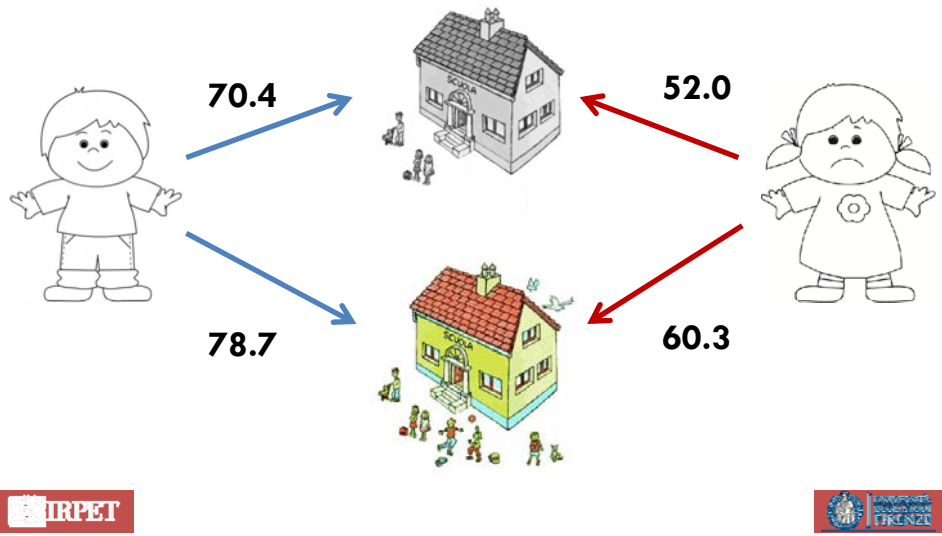
## Results: test scores' determinants (2)

### Reading

	A Empty	B Pupil Variables	C + school variables	D + Zonal Conferences dummies	E + remote areas dummies
Constant	74.1***	75.3***	76.0***	76.8***	76.3***
Male		-0.33**	-0.33*	-0.33**	-0.33*
Escs		3.38***	3.35***	3.35***	3.35***
Foreigner		-5.09***	-5.08***	-5.07***	-5.07***
Repeating		-5.46***	-5.38***	-5.38***	-5.38***
Full time		-1.27***	-1.39***	-1.30***	-1.40***
Disabled pupils per class			0.65***	0.63***	0.64***
Repeating pupils per class			-0.19*	-0.18	-0.19*
Class size: 10-25 pupils			0.62	0.38	0.42
Class size: more than 25 pupils			0.90	0.60	0.69
Average school ESCS			0.95	0.98	0.89
School building status			-0.23	-0.46	-0.25
% of fixed-term teachers: medium			-0.86	-1.14	-0.86
% of fixed-term teachers: high			-2.95***	-3.55***	-2.91***
% of teachers older than 55			0.02	0.00	0.02
Financial resources per pupil			0.00	0.00	0.00
Territorial dummies	no	no	no	yes	yes
<b>Random effects</b>					
Between variance	40.04	35.62	33.58	31.11	33.53
Within variance	163.40	146.08	145.94	145.87	145.93
Total variance	203.44	181.70	179.52	176.98	179.47
% between over total (ICC)	19.7%	19.6%	18.7%	17.6%	18.7%
% change in within variance		-10.6%	-0.1%	0.0%	0.0%
% change in between variance		-11.0%	-5.7%	-7.4%	-0.1%
LR test vs. linear regression: chibar2(01)	2713.34	2678.07	2433.71	2267.61	2428.15

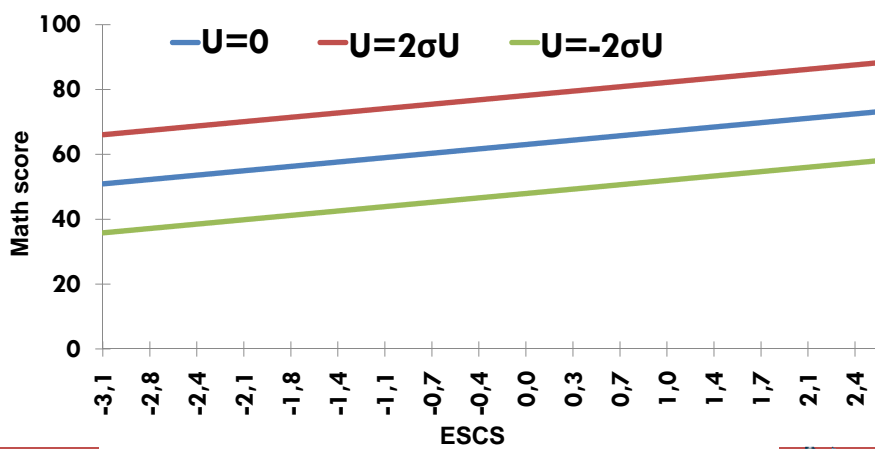


## Results: expected test scores for different profiles (1)



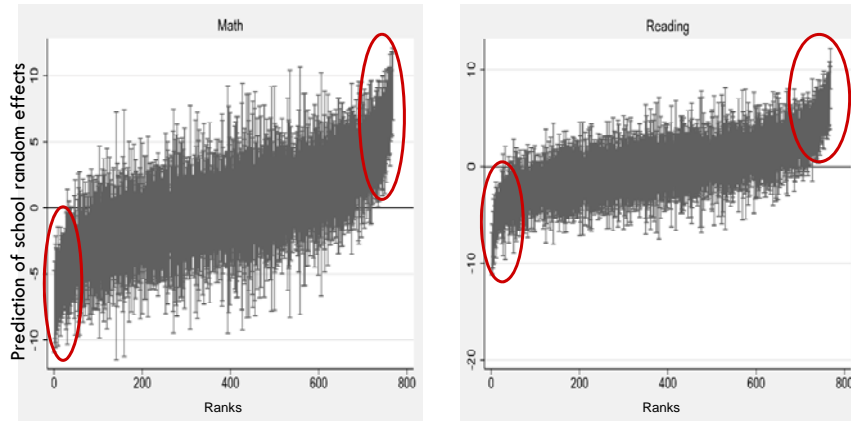
## Results: expected test scores for different profiles (2)

Expected math score for different individual ESCS and school effectiveness



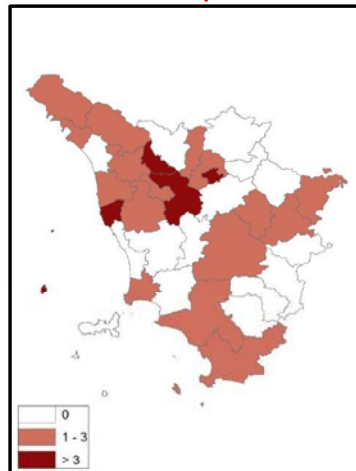
## Results: schools' rankings

### Ranking of Tuscan primary schools by level 2 residuals of the math and reading model

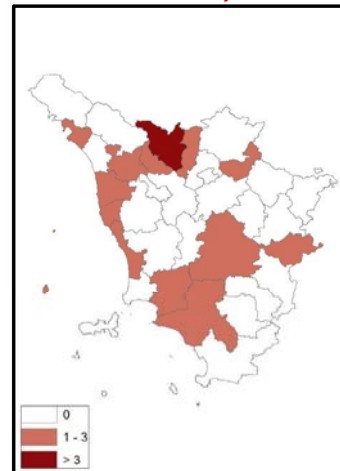


## Results: the best and worst schools

### N. of best schools by Zonal Conference



### N. of worst schools by Zonal Conference



## Conclusions

- Individual characteristics are the main determinants of pupils' achievements
- Since the first years of schooling, schools can make the difference
- Only a small amount of between-school variance is explained by observed factors
- Policy makers should use information on schools' effectiveness in order to identify good practices and to correct bad practices



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