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# EMPOWERING SCHOOLS

## EVIDENCE - INFORMED POLICIES FOR QUALITY EDUCATION

*EENEE and NESET II Conference - Brussels, 23 November 2017*



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## EMPOWERING SCHOOLS

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# THE SCHOOL OF OPPORTUNITY

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### Definition :

**School of *opportunity*** =

1. *efficiency* : School whose students perform beyond national-rank expectation
2. *equity* : School with upward mobility of students

### Methodology

- Measuring efficiency & equity at school level
- Finding Correlates



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## DATA PISA 2012

- Focus on Mathematics
- 32 OECD countries
- 4179 schools
  - Exclusion 10% most segregated schools (based on Dissimilarity index)
- 113 000 students



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## Rank to rank analysis (within country)

- For each student  $i$  within the same country
- test score in math  $\Rightarrow$  (national) test rank  $y_i$  (in decile)
- Socio-eco PISA index  $\Rightarrow$  (national) social rank  $x_i$  (in decile)
- Ranking by decile  $\Rightarrow$  ranking less sensitive to sample selection
- Ordinal outcome  $\Rightarrow$  less sensitive to standardisation and measurement errors





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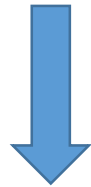
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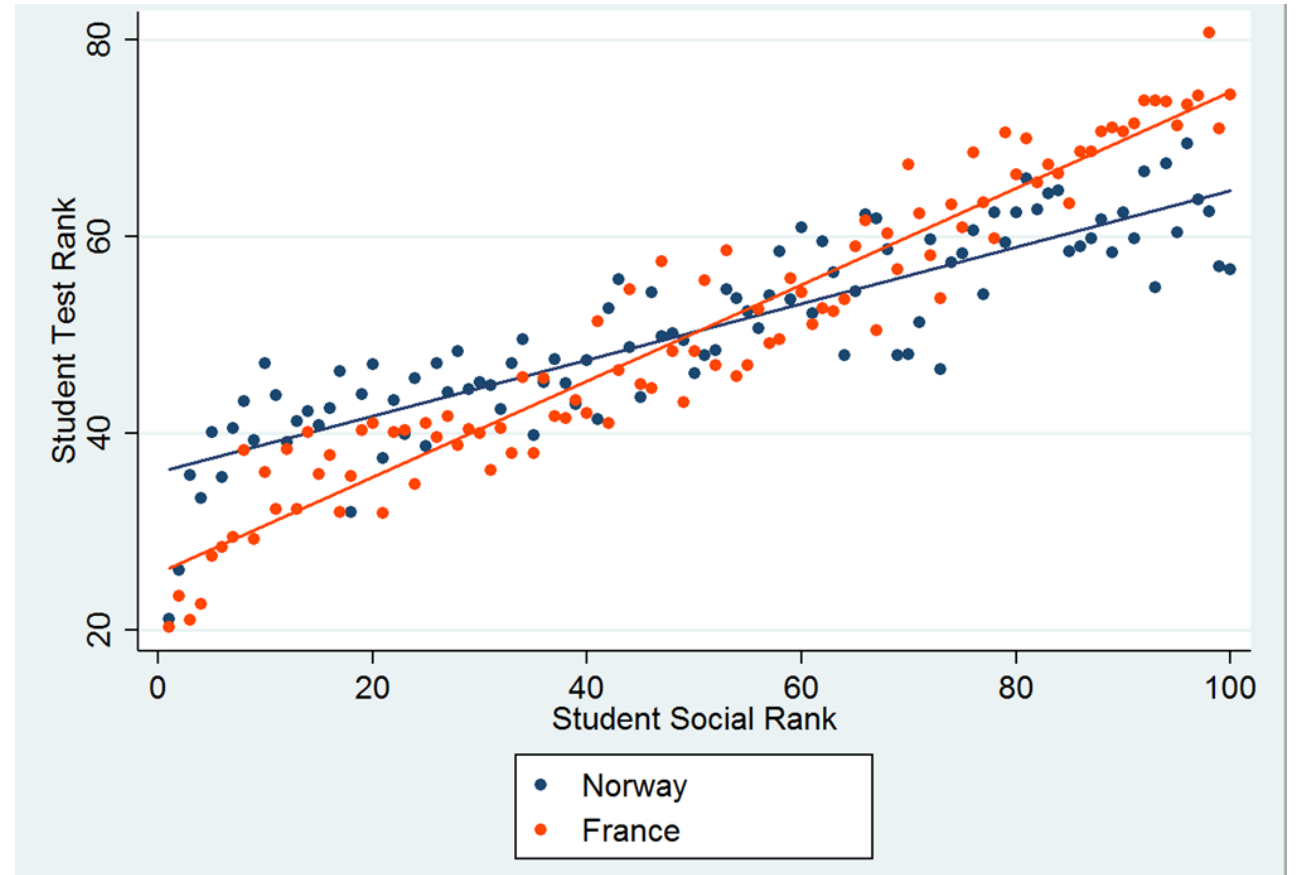


## Efficiency frontier: RANK to RANK line

Different school systems



Different efficiency  
frontiers



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- School **efficiency index** is:

$$Efficiency_s = \frac{1}{n_s} \sum_{i \in S} (y_{ic} - \hat{y}_{ic})$$

- $\hat{y}_{ic}$  is the estimated test rank of the student  $i$  in country  $c$
- $y_{ic}$  is the observed test rank of the student  $i$  in country  $c$
- $n_s$  is the number of student in the school  $s$
- In the US, the most efficient school (top efficiency decile) are 37% above the expectation. Less efficient schools (bottom efficiency decile) are 42% below expectation.

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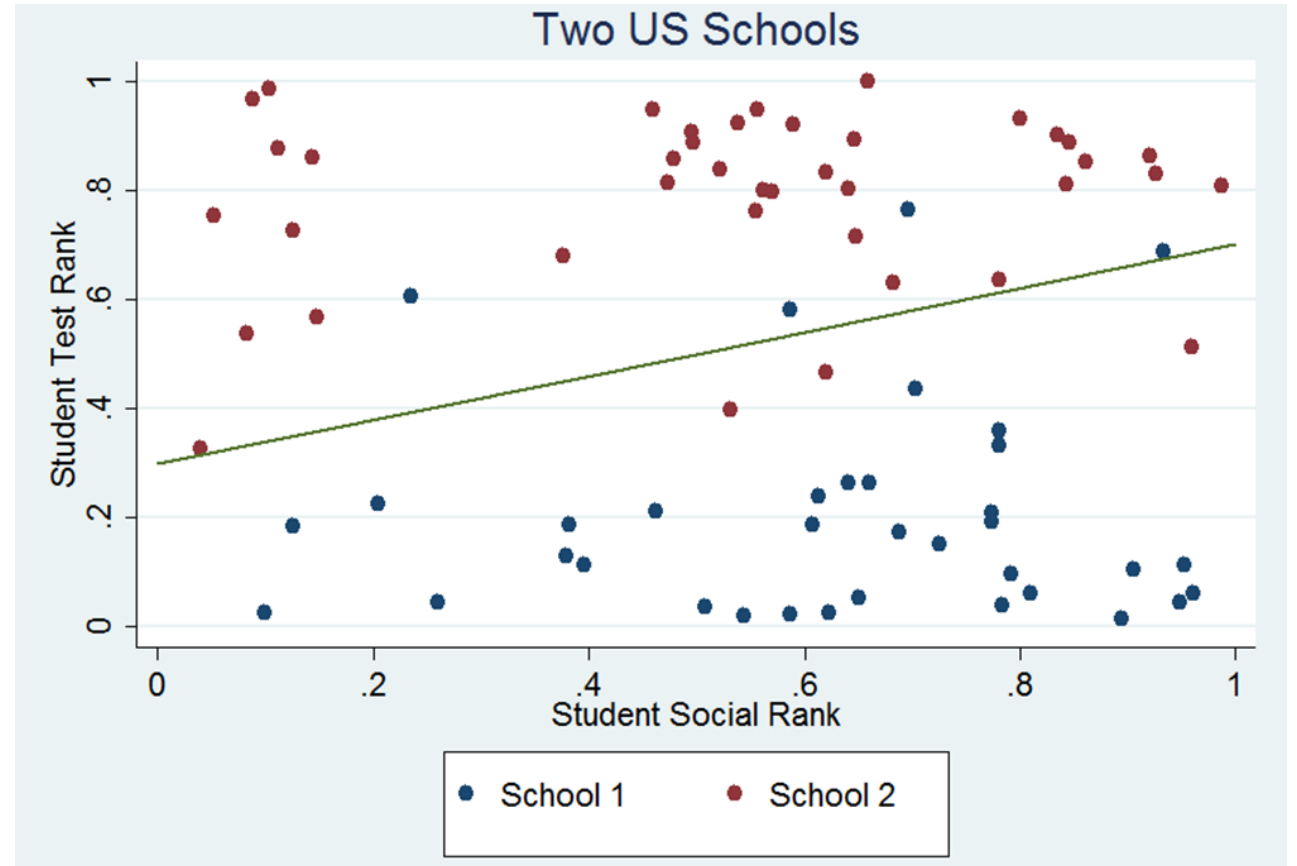
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## Distribution of students in two US schools

School 1 (blue) low  
efficiency

School 2 (red) high  
efficiency





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The school *equity index* is :

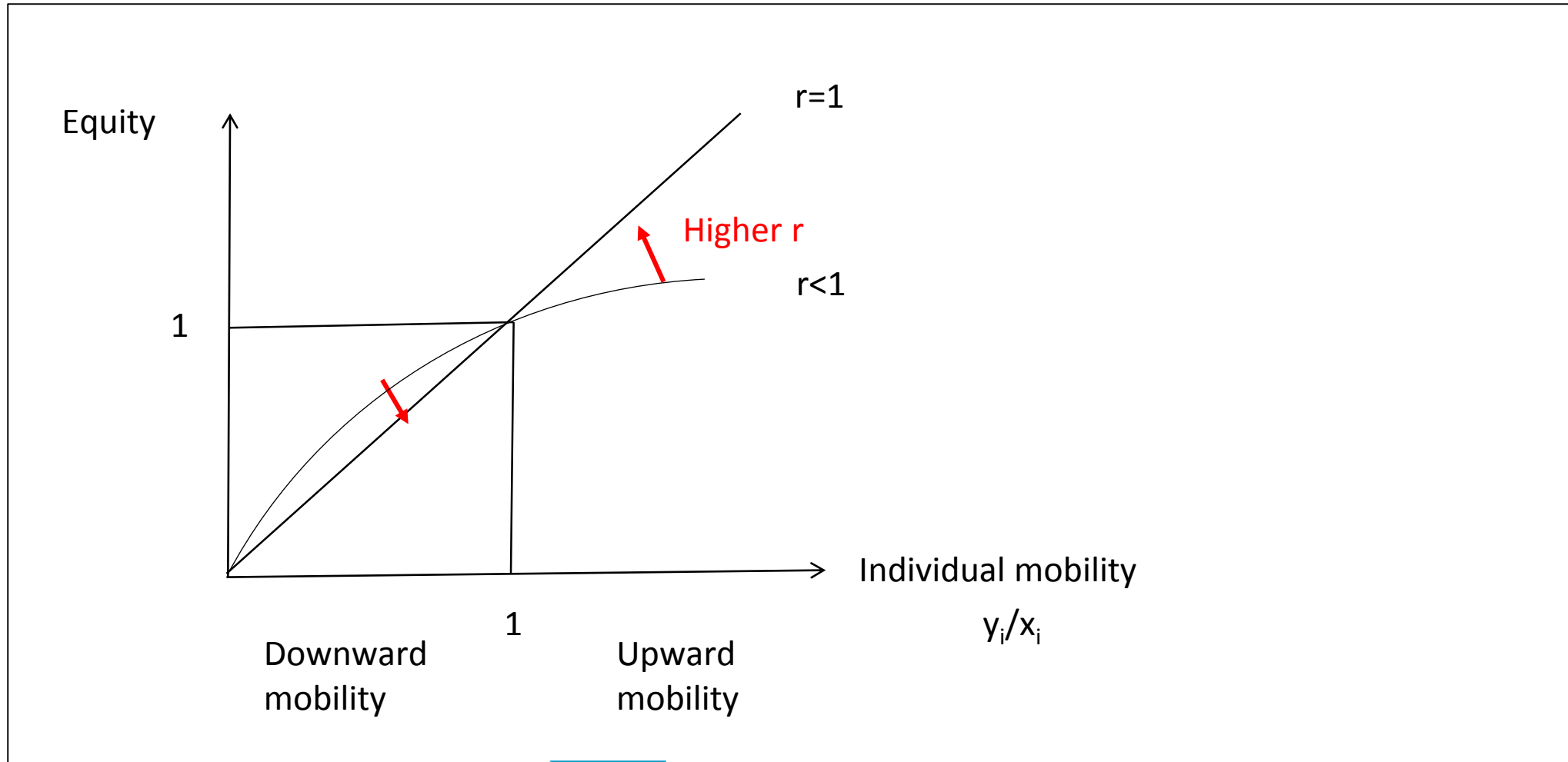
$$Equity_s(r) = \frac{1}{n_s} \sum_{i \in s} \left( \frac{y_i}{x_i} \right)^r$$

- $y_i / x_i$  is the individual mobility ratio : test rank /social rank (>1 upward mobility)
- $n_s$  is the number of student in school  $s$
- $r$  is a relative mobility parameter (with  $0 \leq r \leq 1$ ):
  - Higher  $r$  put more weight on mobility at the bottom
  - Higher  $r$  put more weight on the size of the jump

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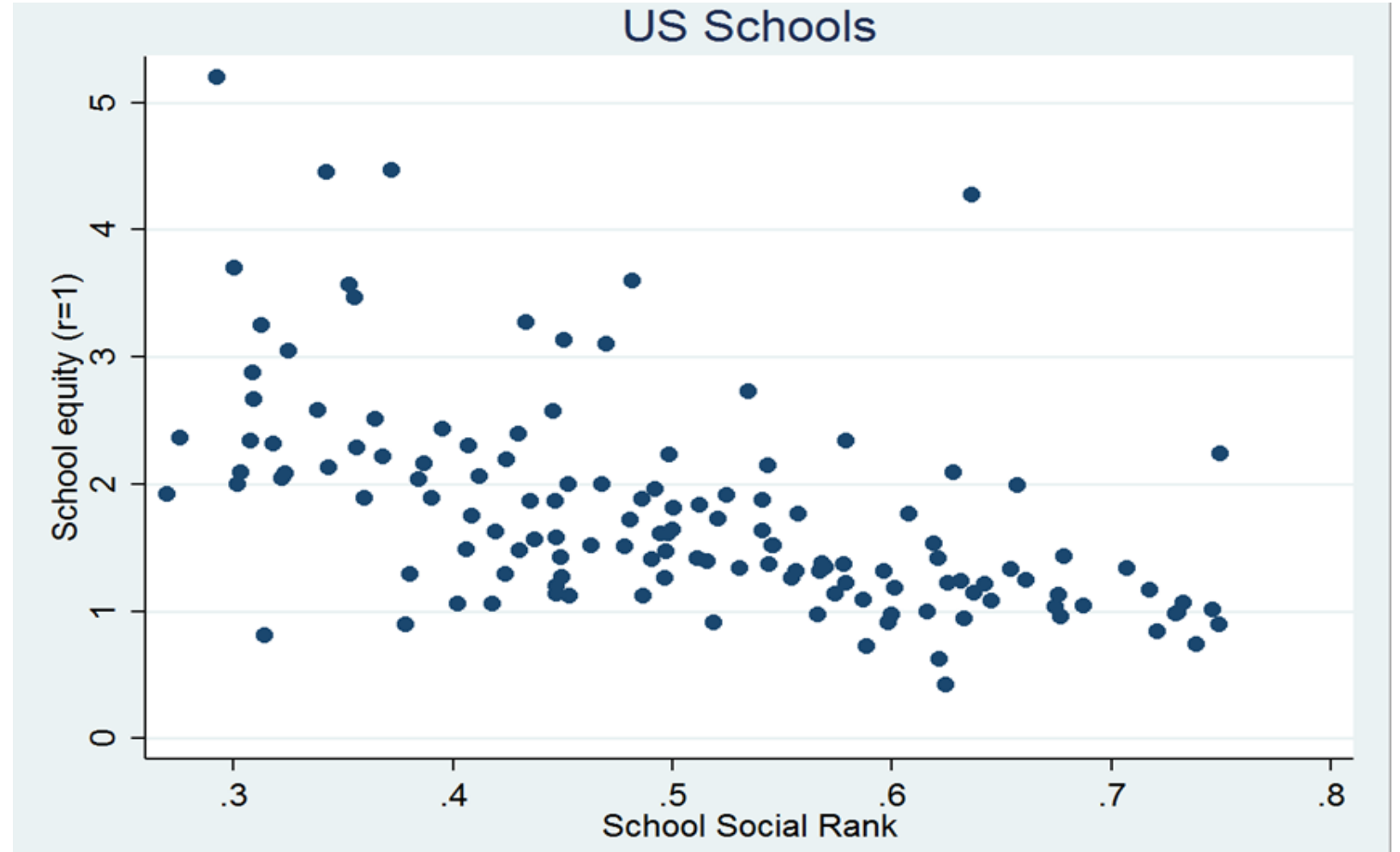
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# School Equity ( $r=1$ )



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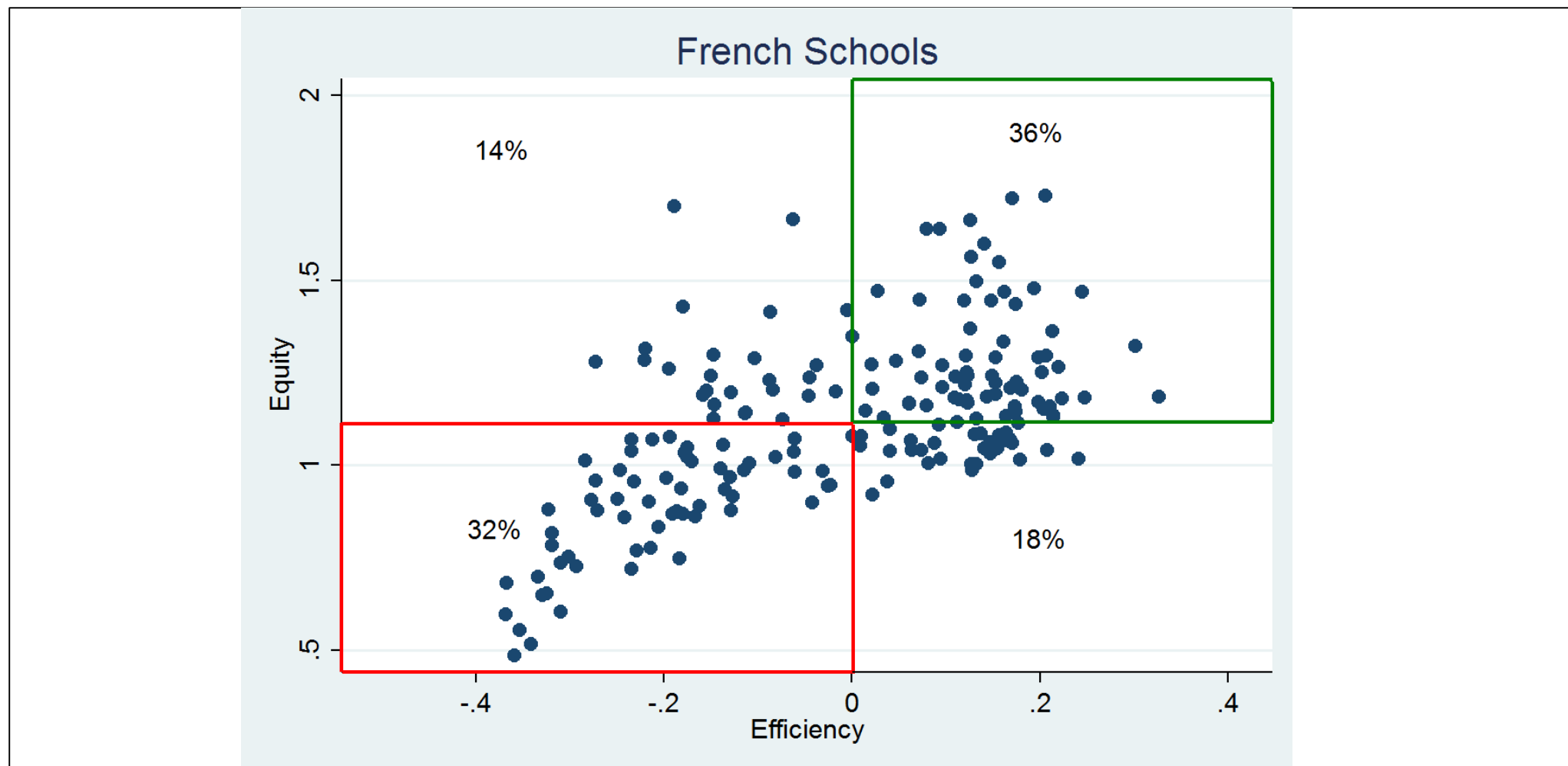


		Efficiency	UMR	Equity		
				r=1/4	r=1/2	r=1
Efficiency		1				
	UMR (r=0)	0.7028	1			
Equity	r=1/4	0.5787	0.8238	1		
	r=1/2	0.4187	0.7323	0.9327	1	
	r=1	0.1675	0.4853	0.7289	0.8011	1

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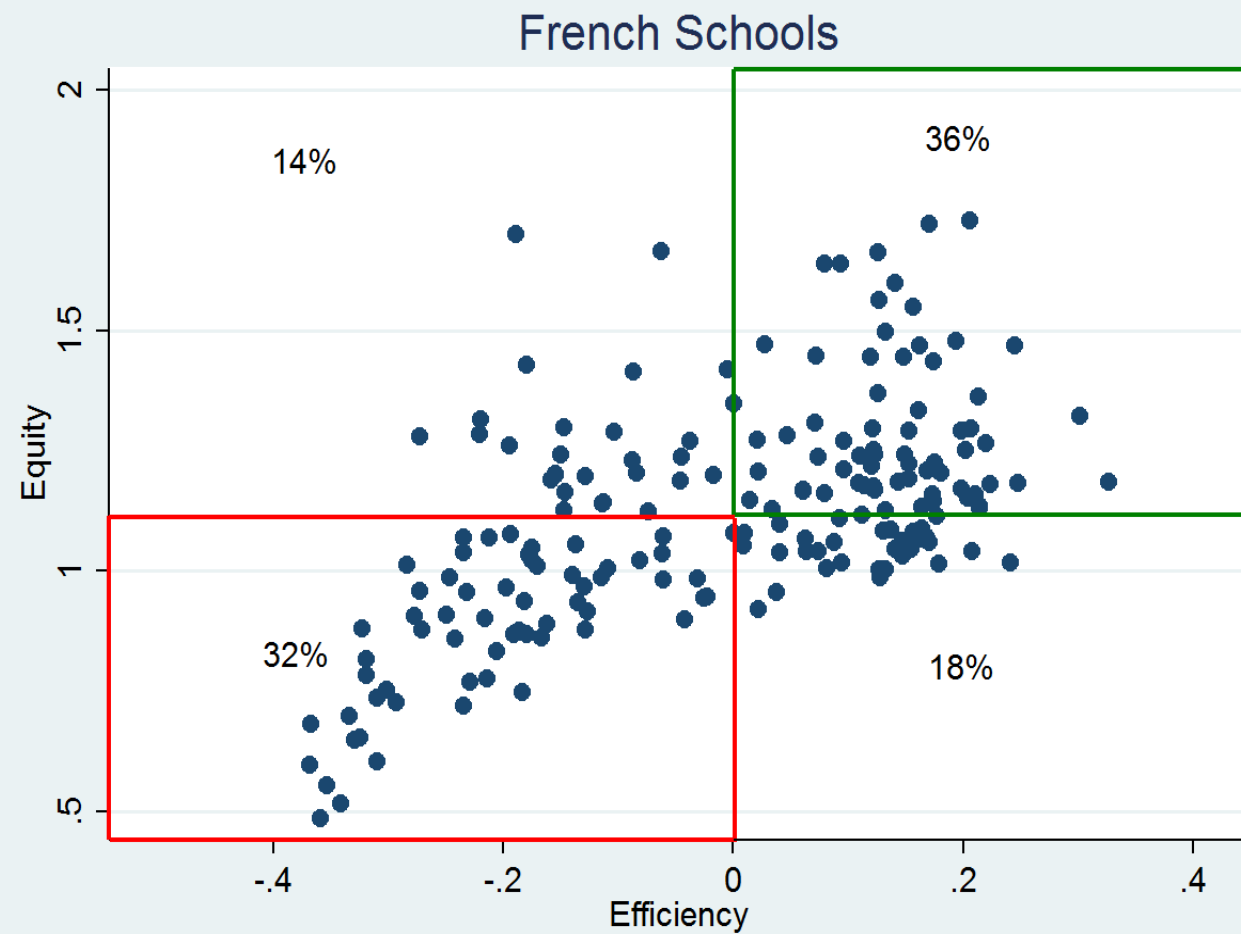
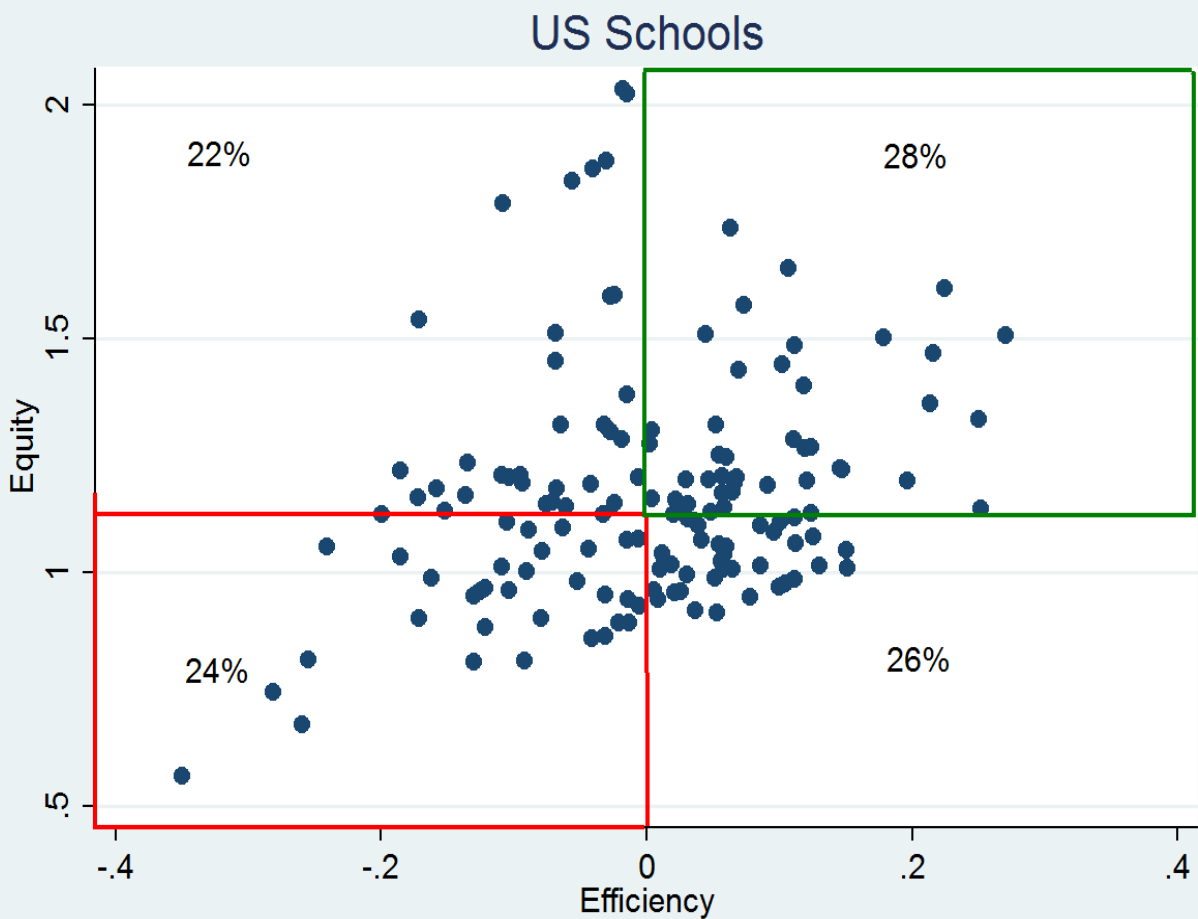
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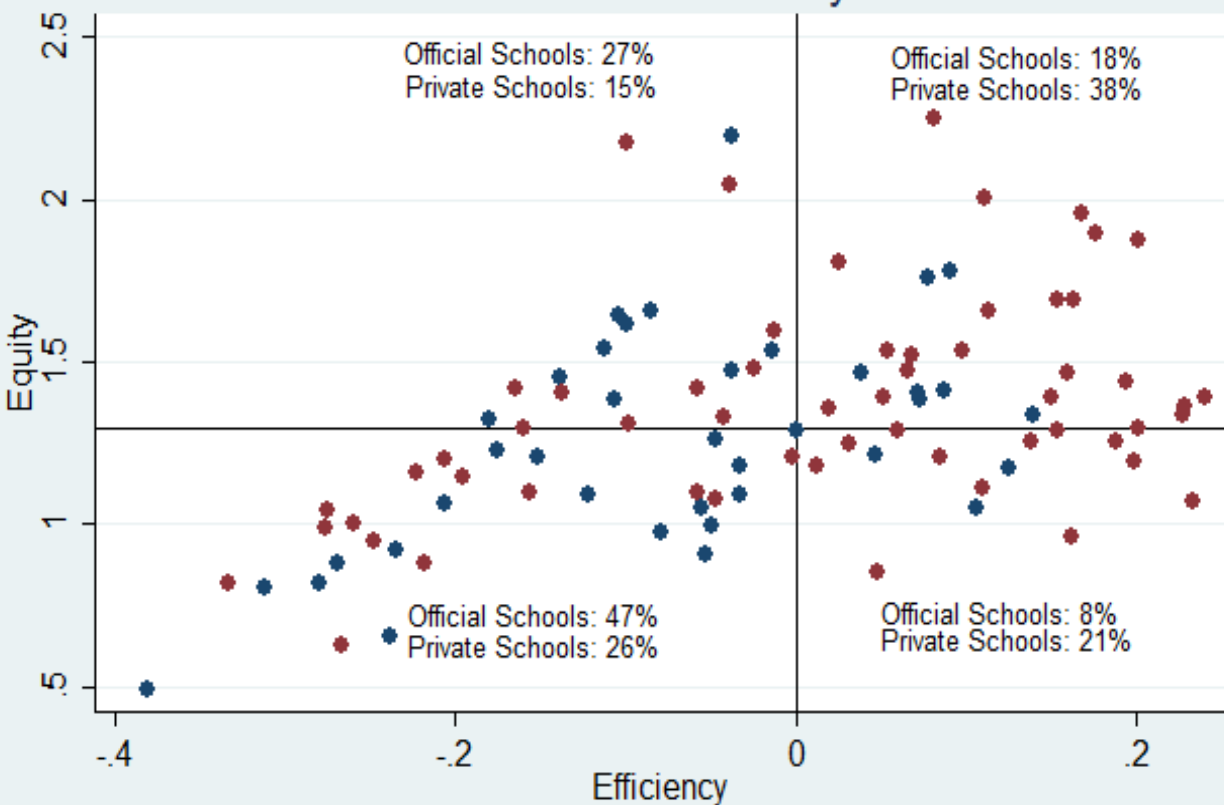


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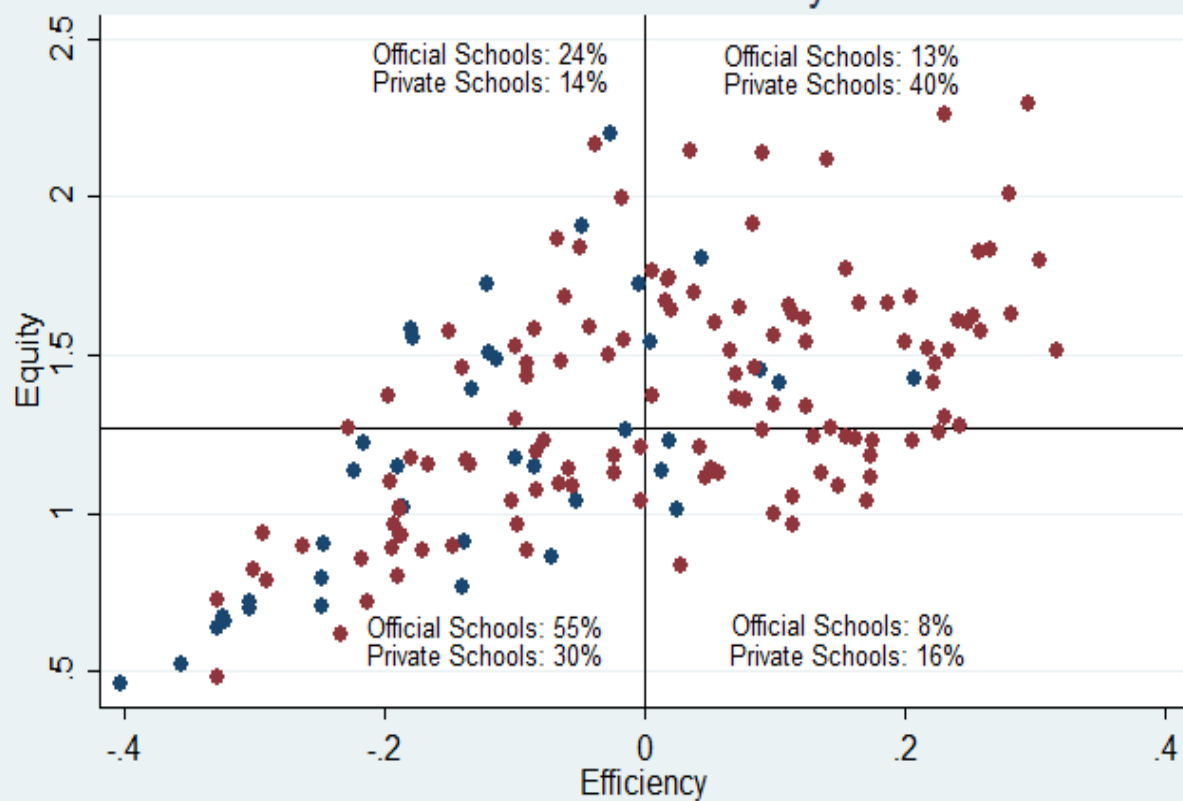
# SCHOOL OF OPPORTUNITY IN BE

## French Community



● Official Schools ● Private Schools

## Flemish Community



● Official Schools ● Private Schools

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## Correlates of school opportunity

- Regressing « school of opportunity » on school composition and policy
- Exploiting both cross-national and intra-national variation
- Same set of covariates from PISA 2012 at the school level
- Using Logit model with equity based either on UMR or Equity index, with FE





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ALL SAMPLE FE	MODEL 1	MODEL 2	MODEL 3
MEAN SES	-0.26	-0.70	-0.89**
SD SES	2.09***	2.14***	2.11***
REPEATERS (%)	-10.12***	-10.13***	-9.86***
URBANISATION	-0.22***	-0.23***	-0.28***
CLASSSKIP	-0.46***	-0.44***	-0.44***
BEHAVTRANSF	-0.42***	-0.42***	-0.42***
ACATRANSF	0.42***	0.40***	0.39***
ADMITTANCE RULE-PERFORM	0.27***	0.26***	0.24***
TEACHINGADEQUACY (ABILITY X PEDAGOGY)		0.10***	0.09***
CREATIVE ACTIVITY – INTRA MUROS		0.29***	0.27***
TEACHER ATTITUDE-SOCIO DEV		-0.14**	-0.13*
TEACHER ATTITUDE-ACADEMIC STANDARD		-0.23***	-0.23***
TEACH2TEST		0.33***	0.29***
TEACHER COMPETENCE- QUALMATH (%)			0.24*
CLASS SIZE			0.13***
CLASS SIZE^2			-0.002***
MATERIALSHORTAGE (INSTRUCTIONAL)			-0.13***
ICTRATE			0.05
AUTONOMY- BUDGFORMATION			-0.01
AUTONOMY- COURSECONTENT			0.10*
AUTONOMY-ASSESSMENTPOLICY			0.08
ACCOUNTABILITY- STUDENT ACHIEVTRACKING			0.13
MONITORING- EXTERNALEVALUATION			-0.01
N (NUMBER OF SCHOOLS)	2.866	2.866	2.866



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RANDOM SPLIT (50%)	MODEL 1	MODEL 2	MODEL 3
MEAN SES	0.16	-0.27	-0.61
SD SES	1.65***	1.66***	1.62***
REPEATERS (%)	-10.12***	-10.24***	-10.07***
URBANISATION	-0.27***	-0.29***	-0.36***
CLASSSKIP	-0.52***	-0.51***	-0.52***
BEHAVTRANSF	-0.38***	-0.39***	-0.40***
ACATRANSF	0.37***	0.35***	0.34**
ADMITTANCE RULE-PERFORM	0.28***	0.28***	0.26***
TEACHINGADEQUACY (ABILITY X PEDAGOGY)		0.11**	0.10*
CREATIVE ACTIVITY – INTRA MUROS		0.41***	0.39***
TEACHER ATTITUDE-SOCIO DEV		-0.20**	-0.19*
TEACHER ATTITUDE-ACADEMIC STANDARD		-0.21**	-0.22***
TEACH2TEST		0.27**	0.21*
TEACHER COMPETENCE- QUALMATH (%)			0.38***
CLASS SIZE			0.17***
CLASS SIZE^2			-0.002***
MATERIALSHORTAGE (INSTRUCTIONAL)			-0.11
ICTRATE			-0.11
AUTONOMY- BUDGFORMATION			-0.01
AUTONOMY- COURSECONTENT			0.25***
AUTONOMY-ASSESSMENTPOLICY			0.11
ACCOUNTABILITY- STUDENT ACHIEVTRACKING			0.08
MONITORING- EXTERNALEVALUATION			-0.11
<b>N (NUMBER OF SCHOOLS)</b>	<b>1.442</b>	<b>1.442</b>	<b>1.442</b>

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Marginal Effect	Significant variables (model 3, FE)  dy/dx
Mean SES	-0.121
SD SES	0.281***
Repeaters (%)	-1.318***
Urbanisation	-0.037***
ClassSkip	-0.059***
BehavTransf	-0.055***
AcaTransf	0.051***
Admittance Rule-Perform	0.034***
TeachingAdequacy (ability X pedagogy)	0.013**
Creative activity – intra muros	0.036**
Teacher attitude-Socio Dev	-0.017
Teacher attitude-Academic Standard adjustment	-0.031**
Teach2Test	0.039***
Teacher competence- QualMath (%)	0.032*
Class size	0.017***
Class size^2	-0.0002***
MaterialShortage (instructional)	-0.017**
N (number of schools)	2.866

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# Robustness of correlates

- Standard regressors robustly correlated to equity/efficiency
- Sample split model gives same regressors
- Logit and Probit with FE give same regressors
- Reading model (using test scores in reading) give same regressors



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# Endogeneity and sorting effect

- Substantial Variation in School efficiency and equity
- Two effects: school effect + student effect (sorting effect)
- Policy endogeneity : school policy is unlikely to be random but endogenously determined.
- Answer: looking for correlates (not identifying causality)
  - Our regressions control for the school composition
  - Outliers are removed (most segregated school).
  - Policy variables based on the perception of staff are mostly exogenous (see Hindriks et al,2015)
  - Equity/efficiency are country-specific using only ordinal variables





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# Thanks for your attention