POLITECNICO DI MILANO

The heterogeneity of "private school effect" in Italy

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Agenda

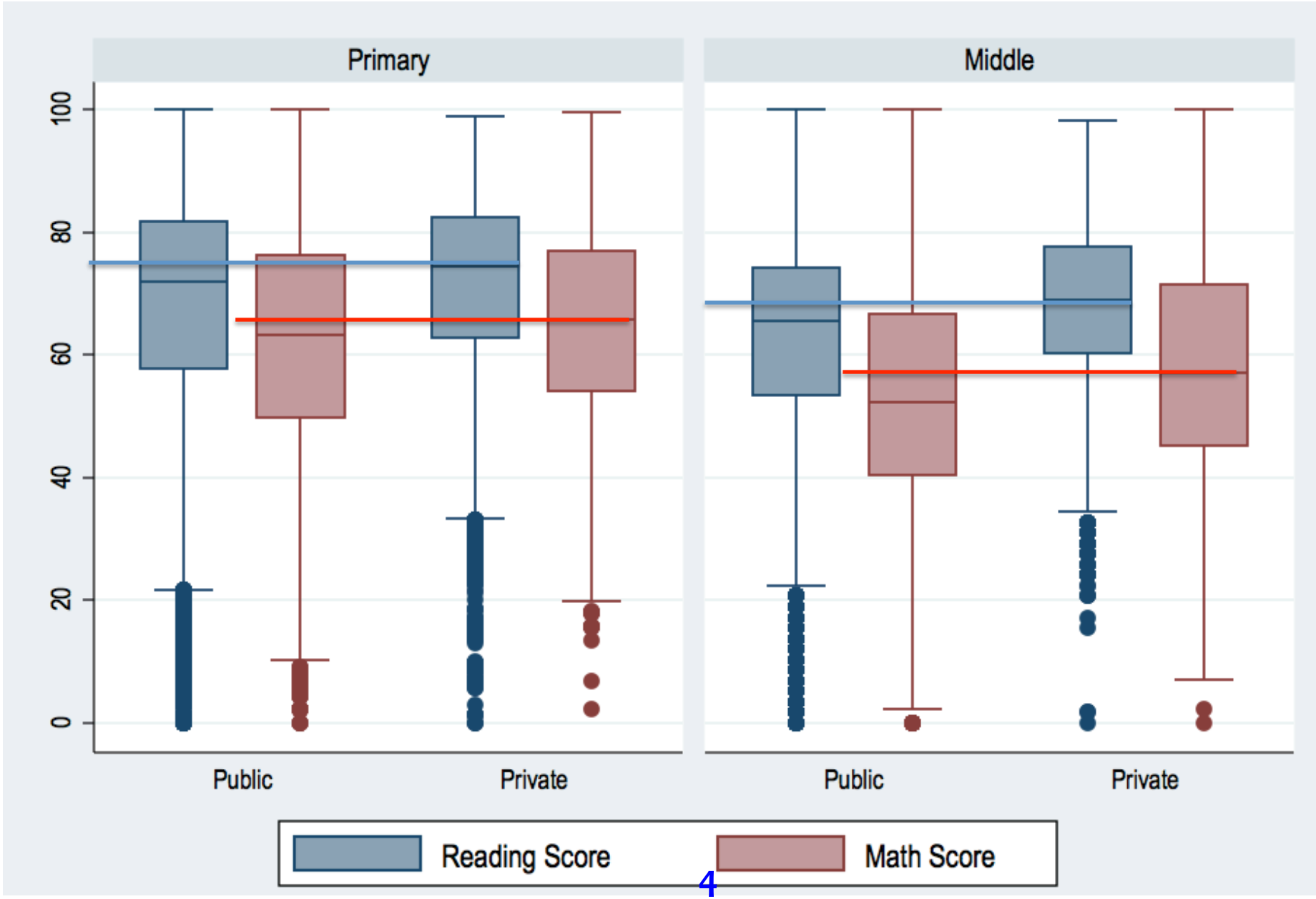
- The institutional (and academic) debate
- Research questions
- Background and previous literature
- Data and methodology
  - Propensity Score Matching and IV approach
  - Choosing the instrument
- Results
- Discussion and policy implications

The institutional (and academic) debate

Private schools

- More autonomy than their public counterparts
- A major critic: students' selection
  - Students from better socioeconomic background can be educated with lower costs; and their results are (on average) higher more because their background than for the "school effect"
- However, previous studies suggest that, net of socioeconomic conditions, private schools have lower performances than public ones (in Italy).
- Focus on a single Region (Lombardy)
  - The richest region (20% of national GDP, 9 millions inhabitants)
  - Policies towards more choice and competition (vouchers)

Figure B.3. Test scores' distribution, by grade and type (public/private), through boxplots



Achievement scores (standardized: [0;100])

	Reading (public schools)	Reading (private schools)	Math (public schools)	Math (private schools)
Grade 5	68.51 (17.03)	70.80 (16.25)	62.63 (17.28)	65.07 (16.10)
Grade 6	62.88 (15.03)	67.67 (12.92)	54.03 (18.08)	58.21 (17.19)

Research question

Private schools (on average) seem to perform slightly better than public ones… but there is also evidence of a better (on average) socioeconomic background of their students…

Do private schools have just a better school intake (in terms of pupils quality and motivation) *or do they really outperform public schools?*

Background

Italian educational system

- (public) schools have no power over recruiting, pay-roll and dismissing of teachers
- Teachers' salaries are determined and paid by the government (apart from short-term contracts). Schools just manage facilities, integrative projects and the possibility to collect money by private or local public institutions.
- No different school types (i.e. tracking) until grade 9.
- Families can choose among public schools
- Ministry's Expenditure per student:
  - Around 6,000€ for students in public schools;
  - Around 500€ for students in private schools.

Table 1. Public and private schools in Italy and in the Lombardy Region, 2009

	Public schools		Private schools		Students attending public schools		Students attending private schools	
	#	%	#	%	#	%	#	%
Lombardy	4,581	86.4%	722	13.6%	981,220	90.9%	98,189	9.1%
Italy[a]	33,644	90.1%	3,713	9.9%	6,871,889	94.3%	418,386	5.7%

Notes: [a] It also embodies schools directly managed by *Valle d'Aosta* and *Trentino Alto Adige* but accredited by the Ministry of Education. These regions have more autonomy than other regions.
Source: MIUR (http://oc4jesedati.pubblica.istruzione.it/Sgcnss/index.jsp).

Previous literature

International comparisons

- Vandenberghe & Robin (2004)
- Dronkers & Robert (2008)
- Coulson (2009)

Country-specific studies

Evidence about Italy

- Bertola & Checchi (2004), Brunello & Checchi (2005), Di Pietro & Cutillo (2006), Bertola et al. (2007).
- Thesis: *private schooling in Italy has a "remedial" function*

Previous literature

Coulson's (2009) results

- Across time, countries, and outcome measures, private provision of education outshines public provision according to the overwhelming majority of econometric studies.
- Findings of a statistically significant advantage for private schooling outnumber findings of a significant advantage for public schooling by a ratio of roughly 8 to 1;
- the statistically significant advantage for private schools outnumbers by a ratio of more than 3 to 1 the statistically insignificant findings.

Data

Data come from INVALSI, which runs standardized tests within the country since 2007 (Reading and Math)

- 74,265 students and 1,050 schools (grade 5)
- 74,538 students and 900 schools (grade 6)

Student-level and school-level variables

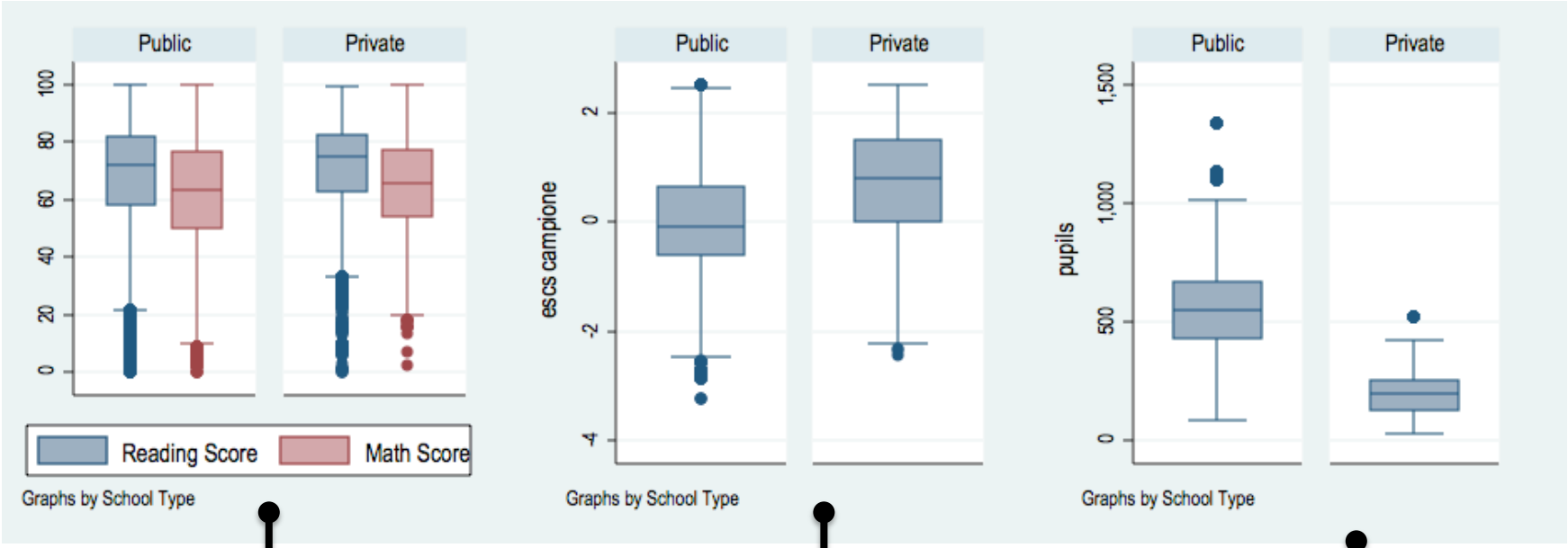
- We use a wide array of indicators to control the students' performance and isolate the "private-school effect"

Data

Controls:

- Personal information
  - ESCS (an indicator for socio-economic status)
  - Gender
  - Immigrant status
  - Grade repetition
  - Pre-schooling attendance
- School-level information
  - #pupils, pupils per class/school, teachers:students ratio,
  - %foreign, %disabled, avg_ESCS of the schools

Descriptive statistics (1/2)

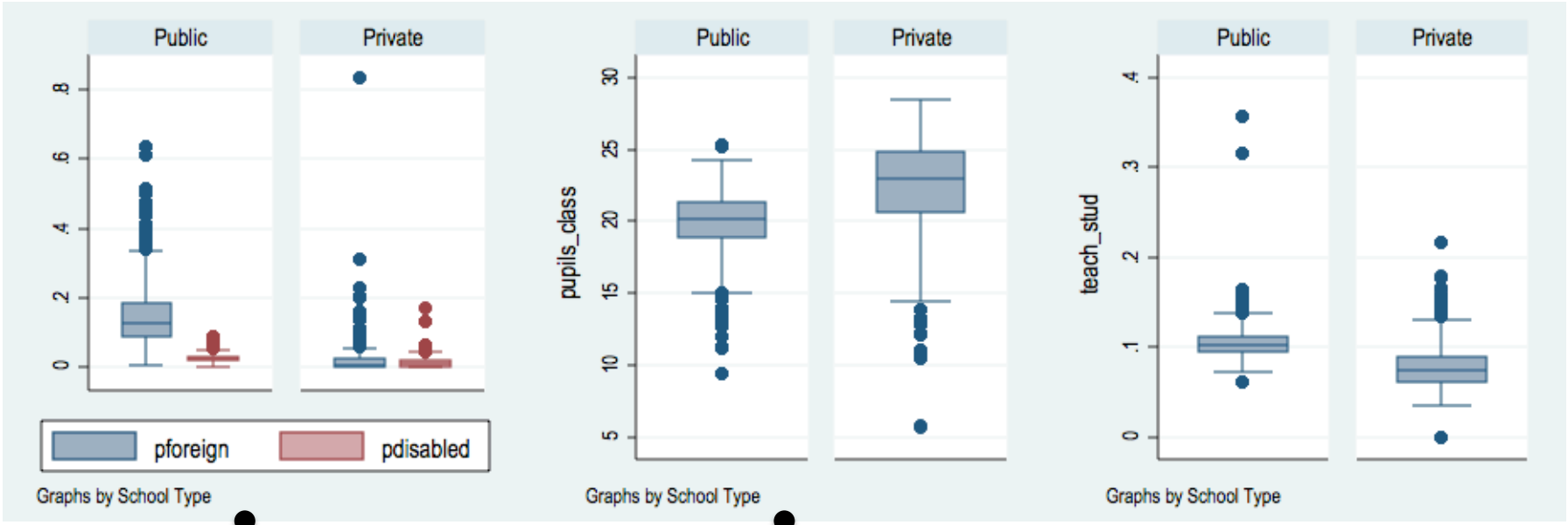


Test scores

Socioeconomic indicator (ESCS)

pupils

Descriptive statistics (2/2)



%immigrants
%disabled

Students per class

Teachers/ students

Methodology

Instrumental Variables (IV) approach

- OLS estimates are likely to be biased
  - a non- random selection process in students' distribution between private and public schools might "confound" the private schooling effect).
- Our model is composed by two equations:
  - (i) an "attendance equation" estimated through probit (to describe the probability of attending a private school, given the observable characteristics);
  - (ii) an "achievement equation" estimated through OLS.
- The inclusion of an instrument in the first equation acts as a source of randomness in the "treatment"

Choosing the instrument

We rely upon a specific characteristic of the voucher plan launched in Lombardy

- Lombardy launched a voucher scheme in the year 2000/01
- Vouchers eligibility
  - to be enrolled in a private school
  - to be subjected to a "means test". Threshold (46,500€/equivalent) – 70% of families with students attending a private school
- Voucher's functioning
  - Families send (online) an application to the regional government
  - if eligible, the chosen school receive a voucher covering 25% of the up-front fee (a maximum limit was set at 1,050€/per student).

Choosing the instrument

What is relevant for our strategy

- attending a private school is a prerequisite for obtaining the voucher
  - all other factors equal, the availability of vouchers for those attending private schools does stimulate families to evaluate this opportunity; and, *at the margin*, some families can decide for going private.
  - *The income threshold introduces randomness in the distribution of vouchers – potential recipients near the threshold do not know if they are below the threshold in advance.*
- There is not any particular reason for which this higher probability to attend a private school should be related to higher achievement scores.

Choosing the instrument

For being a credible instrument, the incentive to attend private schools should be heterogeneous across Region's subunits (Provinces)

- While the voucher plan is uniform, the geographical distribution of private schools is not; ➔ this source of variation is related to the probability of attending a private school but not to students' achievement.
- The threshold acts as a source of randomness – income is not homogeneously distributed across Provinces ➔ moreover, the formula for calculating eligibility is quite difficult to understand

Instrument: **Expenditure_inhabitants** (time-lag: 1 year)

Choosing the instrument

Good correlations among:

- the **instrument** (expenditures for vouchers/#inhabitants),
- the **density of private schools** (#private schools /1,000 students)
- the **share of students enrolled in private schools**

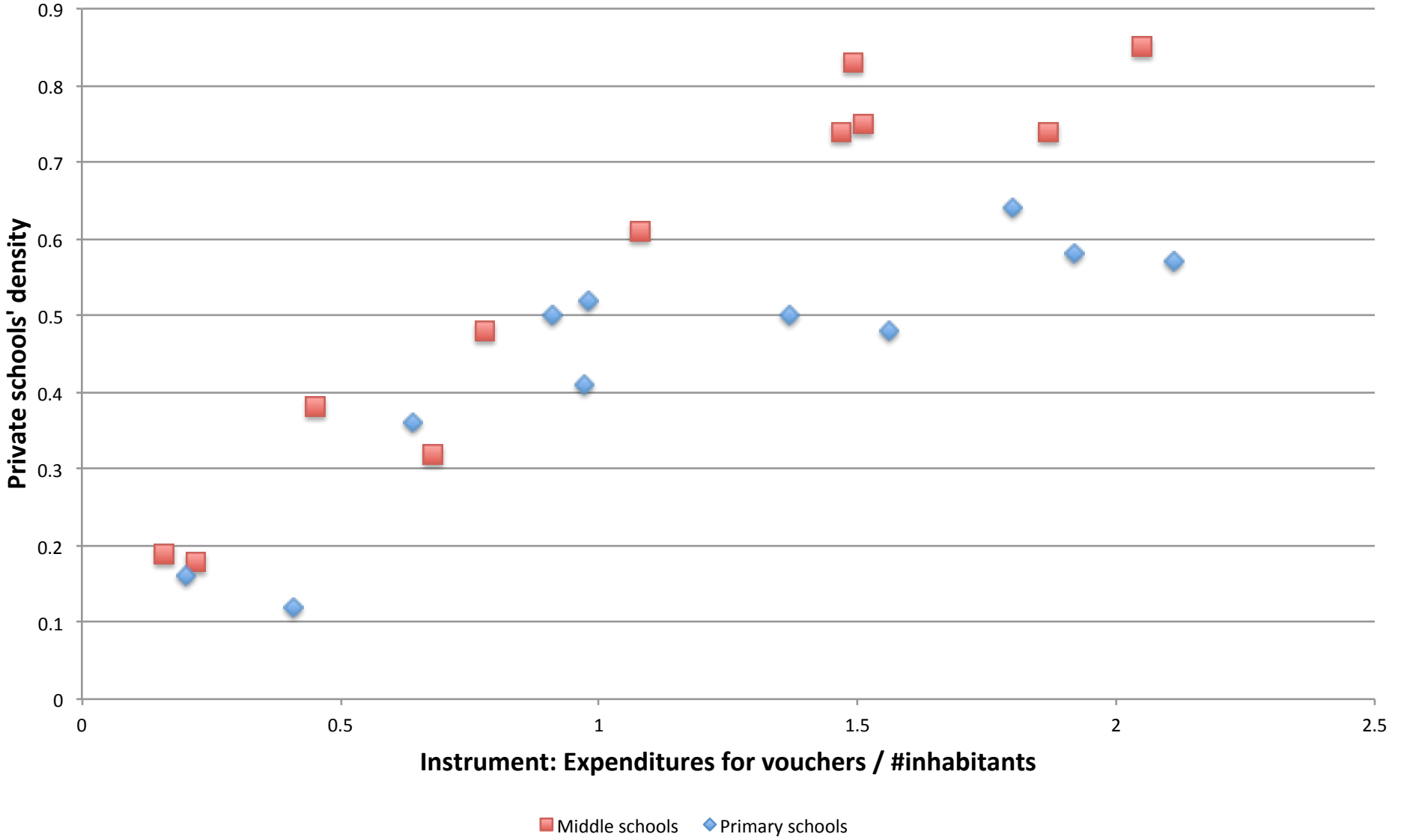
  - We also tested a different version of our instrument, namely the expenditures for voucher divided by the number of students (by Province), but its explanatory power is not statistically significant in first-stage equations (more specifically, $z<10$ see Staiger & Stock, 1997).

Table 5. Figures about the instrument, the density of private schools and the share of students enrolled in private schools

	Primary schools			Middle schools		
Province	% enrolled in private schools	Instrument	Private schools' density	% enrolled in private schools	Instrument	Private schools' density
	(1)	(2)	(3)	(4)	(5)	(6)
BG	0.10	1.92	0.58	0.12	1.87	0.74
BS	0.07	0.97	0.41	0.08	1.08	0.61
CO	0.07	1.56	0.48	0.10	1.47	0.74
CR	0.08	0.98	0.52	0.05	0.68	0.32
LC	0.10	2.11	0.57	0.14	2.05	0.85
LO	0.09	0.91	0.50	0.05	0.78	0.48
MI	0.11	1.80	0.64	0.11	1.49	0.83
MN	0.01	0.20	0.16	0.01	0.16	0.19
PV	0.05	0.64	0.36	0.04	0.45	0.38
SO	0.01	0.41	0.12	0.01	0.22	0.18
VA	0.08	1.37	0.50	0.12	1.51	0.75

Correlations	(1)	(2)	(3)	(4)	(5)	(6)
(1)	1.000					
(2)	**0.882**	1.000				
(3)	**0.986**	**0.866**	1.000			
(4)	0.845	0.955	0.828	1.000		
(5)	0.840	0.975	0.814	**0.986**	1.000	
(6)	0.846	0.933	0.828	**0.977**	**0.958**	1.000

Figure 5. The relationship between
the instrument (expenditures per vouchers / #inhabitants) and the density of private schools, by Province



Results

Results are articulated in two subsections

- Overall results
- Heterogeneity

- We also performed robustness checks (not shown here)

Overall results

Table 6. The impact of attending a private school: Primary schools (grade 5)

Panel A: student-level characteristics				
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1288***	-0.2857***	-.0945***	-0.2595***
t	-10.33	-	-7.58	-
z	-	-3.39	-	-3.07
Panel B: student and school-level characteristics				
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1945***	-0.2043	-0.1036***	-0.2526
t	-4.74	-	-2.85	-
z	-	-1.47	-	-1.59

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Overall results

Table 7. The impact of attending a private school: Middle schools (grade 6)

		Reading		Math
Panel A: student-level characteristics				
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0276**	0.0631	-0.0495***	0.1830**
t	-2.51	-	-4.06	-
z	-	0.99	-	2.54
Panel B: student and school-level characteristics				
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1649***	-0.0978	-0.1679***	0.0648
t	-5.99	-	-4.79	-
z	-	-0.87	-	0.54

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Heterogeneity

Table 16. The impact of attending a private school:
A synthesis of the results

ATT (Average Treatment on Treated) - Private schooling	Grade 5		Grade 6	
	Reading	Math	Reading	Math
Overall effect	no	no	no	no
Heterogeneity (1)				
Urban schools	no	no	no	no
Rural schools	no	no	no	+
Italian students	no	no	no	no
Immigrant students	-	-	no	no
Students with ESCS<0	+	no	no	no
Students with ESCS>0	no	no	no	+
Heterogeneity (2)				
1st generation immigrants	-	-	+	no
2nd generation immigrants	no	no	no	no
Mostly advantaged students (ESCS>90th percentile)	no	no	no	no
Advantaged students (75th - 90th percentile)	no	no	+	+
Average students (50th - 75th percentile)	+	no	no	+
Average students (25th - 50th percentile)	n.v.	n.v.	+	+
Disadvantaged students (10th - 25th percentile)	n.v.	n.v.	n.v.	n.v.
Mostly disadvantaged students (ESCS<10th percentile)	n.v.	n.v.	n.v.	n.v.

Heterogeneity

b. Immigrant students

Panel A: student-level characteristics

	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	0.0755	-0.5375	0.0719	-0.9445**
t	1.06	-	1.14	-
z	-	-1.28	-	-2.11

Panel B: student and school-level characteristics

	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0237	-0.9184*	0.0491	-1.1745**
t	-0.20	-	0.64	-
z	-	-1.65	-	-2.14

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Immigrant students, grade 5

Heterogeneity

Table 10. The impact of attending a private school:
Primary schools (grade 5)

a. Students with ESCS<0

Panel A: student-level characteristics				
		Reading		Math
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0822***	0.5607***	0.0046	0.1187
t	-3.26		0.19	-
z	-	2.29	-	0.43
Panel B: student and school-level characteristics				
		Reading		Math
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1807***	0.7074*	-0.0179	0.0626
t	-3.35	-	-0.38	-
z	-	1.81	-	0.16

Heterogeneity

B. Non-urban Schools

Panel A: student-level characteristics

	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0232*	0.2989***	-0.0513***	0.6081***
t	-1.65	-	-3.30	-
z	-	3.34	-	6.94

Panel B: student and school-level characteristics

	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1170***	0.1037	-0.1512***	0.4216***
t	-3.56	-	-4.02	-
z	-	0.74	-	2.66

Notes: *** ** and * indicate $p < 0.01$ $p < 0.05$ $p < 0.10$ respectively. In columns 1 and 3 estimates are

Non-urban schools, grade 6

Heterogeneity

b. Students with ESCS>0

Panel A: student characteristics

	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0597***	0.2891***	-0.0820***	0.4076***
t	-4.78	-	-5.84	-
z	-	3.32	-	4.03

Panel B: student and school characteristics

	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1759***	0.2116	-0.1970***	0.3778**
t	-6.14	-	-5.04	-
z	-	1.46	-	2.04

Notes: *** ** and * indicate p < 0.01 p < 0.05 p < 0.10 respectively In columns 1 and 3 estimates are

Better-off students, grade 6

Heterogeneity

Table 14. The impact of attending a private school:
First-generation and second-generation immigrant students

	Reading	Math
	IV	IV
Primary schools (grade 5)		
1st generation immigrant students	-2.2089*	-2.0506*
	(-1.70)	(-1.79)
2nd generation immigrant students	-0.3655	-0.6469
	(-0.70)	(-1.26)
Middle schools (grade 6)		
1st generation immigrant students	-1.2238	-0.8773
	(-1.17)	(-1.07)
2nd generation immigrant students	0.9050*	0.3035
	(1.79)	(0.57)

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. Estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

A focus on immigrant students

Summary of results

The "private school effect"?

- The (negative) effects especially hold for foreign students, when considering grade 5, while there is a positive effect for less advantaged students (ESCS<0)
- the positive effects at grade 6 are for (relatively) better- off students and those attending a non urban-school

The main finding:

- the so-called "private school effect" does not exist as a whole, but it is likely to be heterogeneous depending on students, classes and schools' characteristics.

Discussion

Overall: positive association between private schooling for grade 6 and negative for grade 5 (net of heterogeneous effects)

- Looking at the distribution of overall test scores
  - Grade 5: almost overlap
  - Grade 6: slightly shifted to the right

Figure B.1. Test scores' distribution (reading), by grade

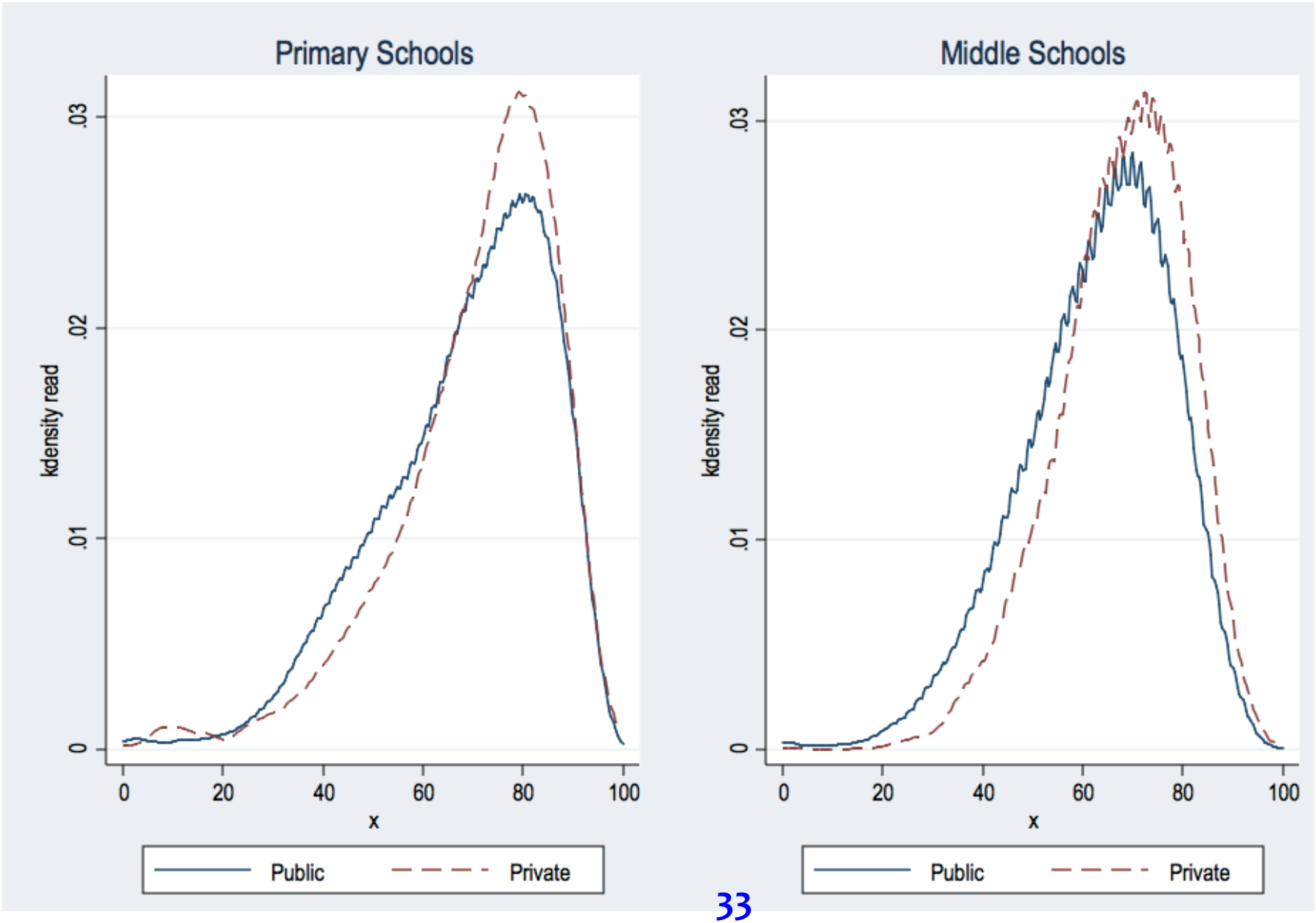
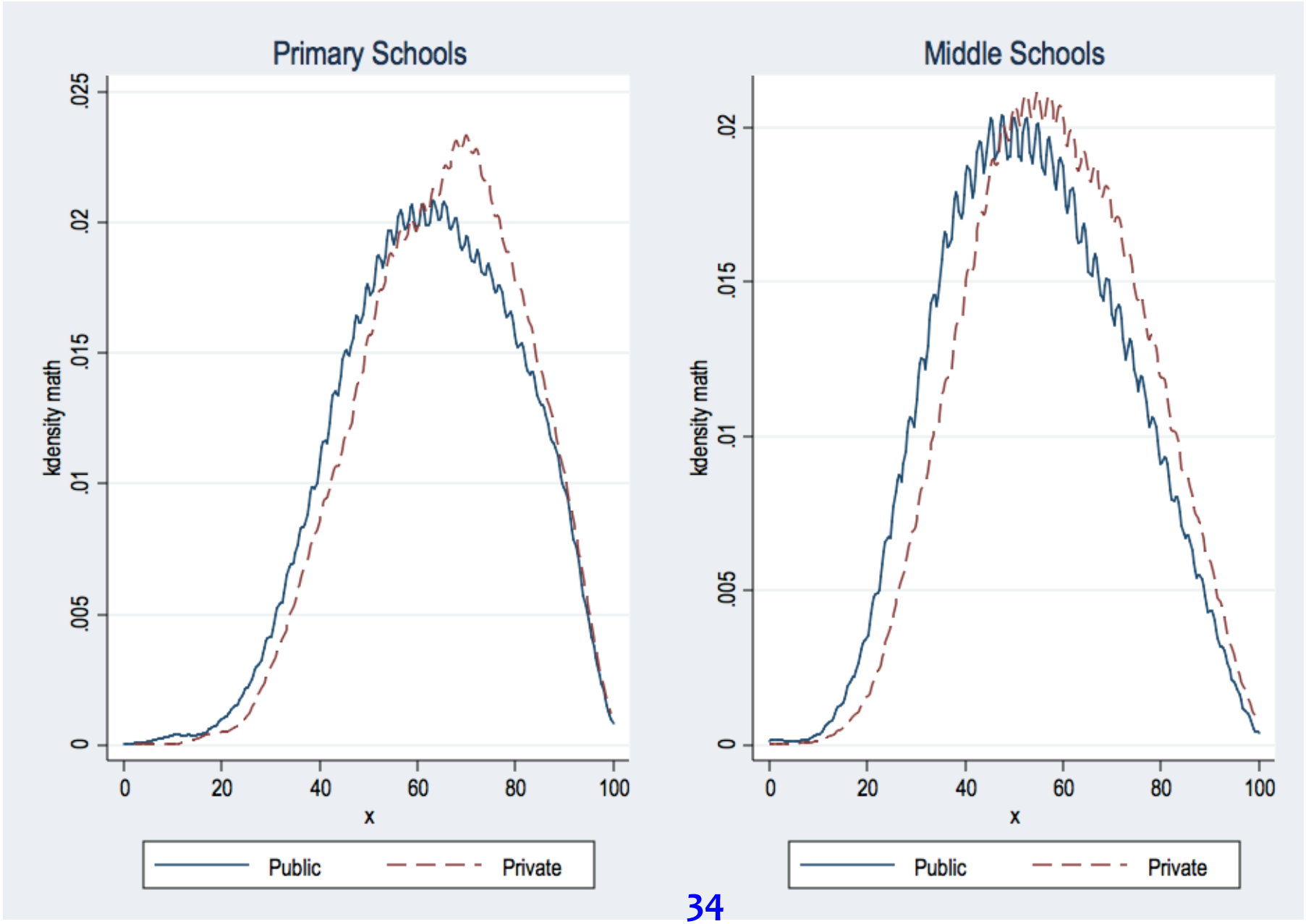


Figure B.2. Test scores' distribution (math), by grade



Discussion

A potential explanation for differences between grades?

- Grade 5. No "raw" differences in test score between private and public primary schools: as the former have better background, they are relatively worse than the latter (all other else equal)
- Grade 6. Private middle schools outperform their public counterparts – as the distribution shows: this effect is lower when the (confounding) compositional variables are equalized

  - (?) public schools' quality is higher at primary than at middle-level of education, so that the relative performance of private schools (which in this interpretation is similar in the two grades) results higher for middle and lower for primary-level education

Discussion

Policy implications

- Agencies that are in charge of evaluating schools should consider compositional variables and institution- level factors for "adjusting" their performances
  - Improving the quality of Ministry's evaluation procedures
- Information to parents: it is not clear whether the Italian families' perception of private schools is of better or worse quality institutions; in both cases, it is unlikely that such perceptions are based on solid and robust scientific evidence
  - Fostering market mechanisms in Italian education requires an investment towards better information

Discussion

Our main message:

"private school effect" is likely to be heterogeneous, and it requires broad information, numbers and statistics to be correctly evaluated across grades and different subgroups of students and schools