The laboratory of an education economist. Testing cures for disadvantaged students.

Kristof De Witte (Leuven Economics of Education Research – KU Leuven;
Top Institute for Evidence Based Education Research – Maastricht University)

www.feb.kuleuven.be/kristof.dewitte

DAMSS – Data Analysis Methods for Software Systems

November 30, 2018 (Druskininkai, Lithuania)

This talk

Overviews my research agenda on socio-economic segregation in education

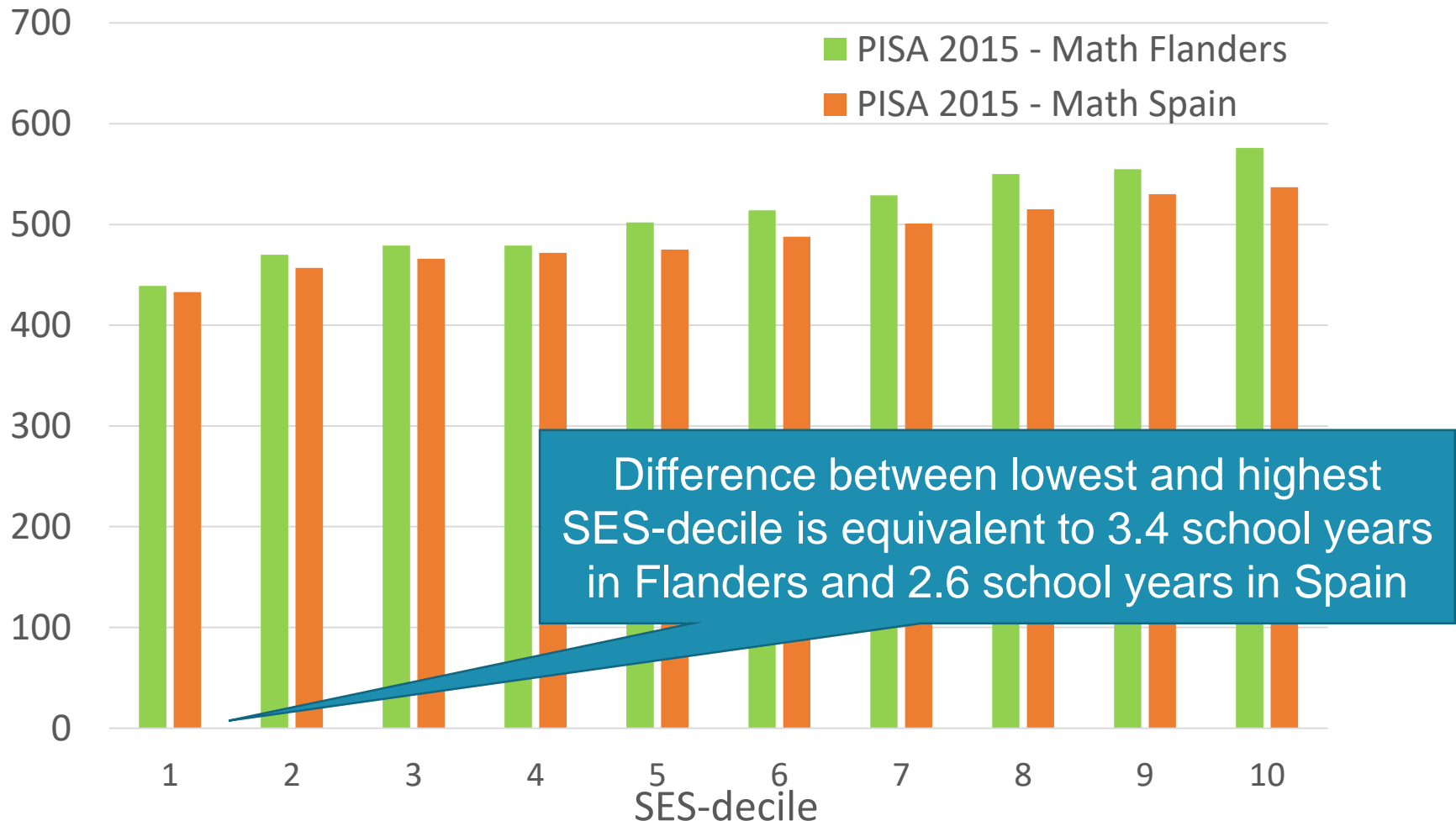→ Shows how education economists try to do research.

→ Discussion of various quasi-experimental evaluations of interventions to change the odds for disadvantaged students.

Step 1: Equal educational opportunities. The issue
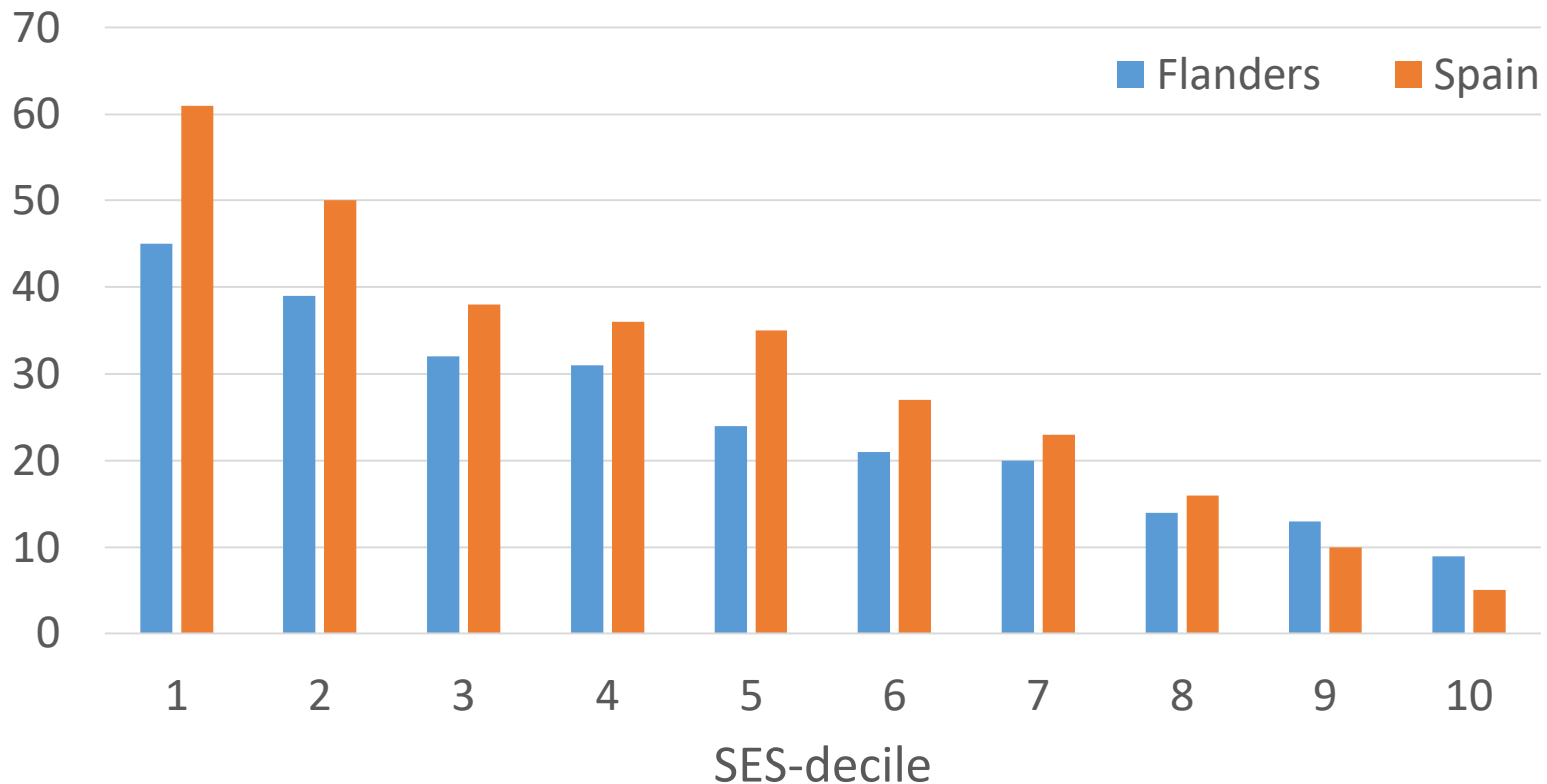
Joint work with Jean Hindriks (UCL)

Unequal educational opportunities

Average math test scores per SES-decile (Pisa 2015)

Difference between lowest and highest SES-decile is equivalent to 3.4 school years in Flanders and 2.6 school years in Spain

Unequal educational opportunities

Probability for grade retention per SES-decile (Pisa 2015)

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Literature

Equal educational opportunities:
> "… the school's task is – besides increasing the opportunity for all, through what it imparts - to reduce the unequalising impact of adult life of differential environments." (Coleman, 1975).

→ How can we 'cure' the disadvantaged students?

Many programs and policies aim to reduce the impact of SES on educational achievement

- Voucher programs (Angrist et al., 2006; Hoxby, 2003; Nechyba, 2000)
- Duration of programs (Aakvik et al., 2010; Oosterbeek & Webbink, 2007; Oreopoulos, 2007)
- Class size reductions
- Additional funding (few causal evidence by Leuven et al., 2007; Henrey et al., 2010).

Step 2: The impact of additional resources at school level on cognitive and non-cognitive outcomes

Joint work with Mike Smet and Ruben Van Assche (LEER, KU Leuven)

The laboratory…

We exploit an exogenous cutoff which provides additional funding for schools with more than 25% disadvantaged students

→ Unique and detailed panel data of 12 years at student and school level (+3 million observations)

→ A clear definition of disadvantaged students avoids endogeneity issues due to systematic noise

→ Fuzzy regression discontinuity as there is also a second eligibility condition (i.e., 25% disadvantaged students AND minimum of 6 teaching hours generated)
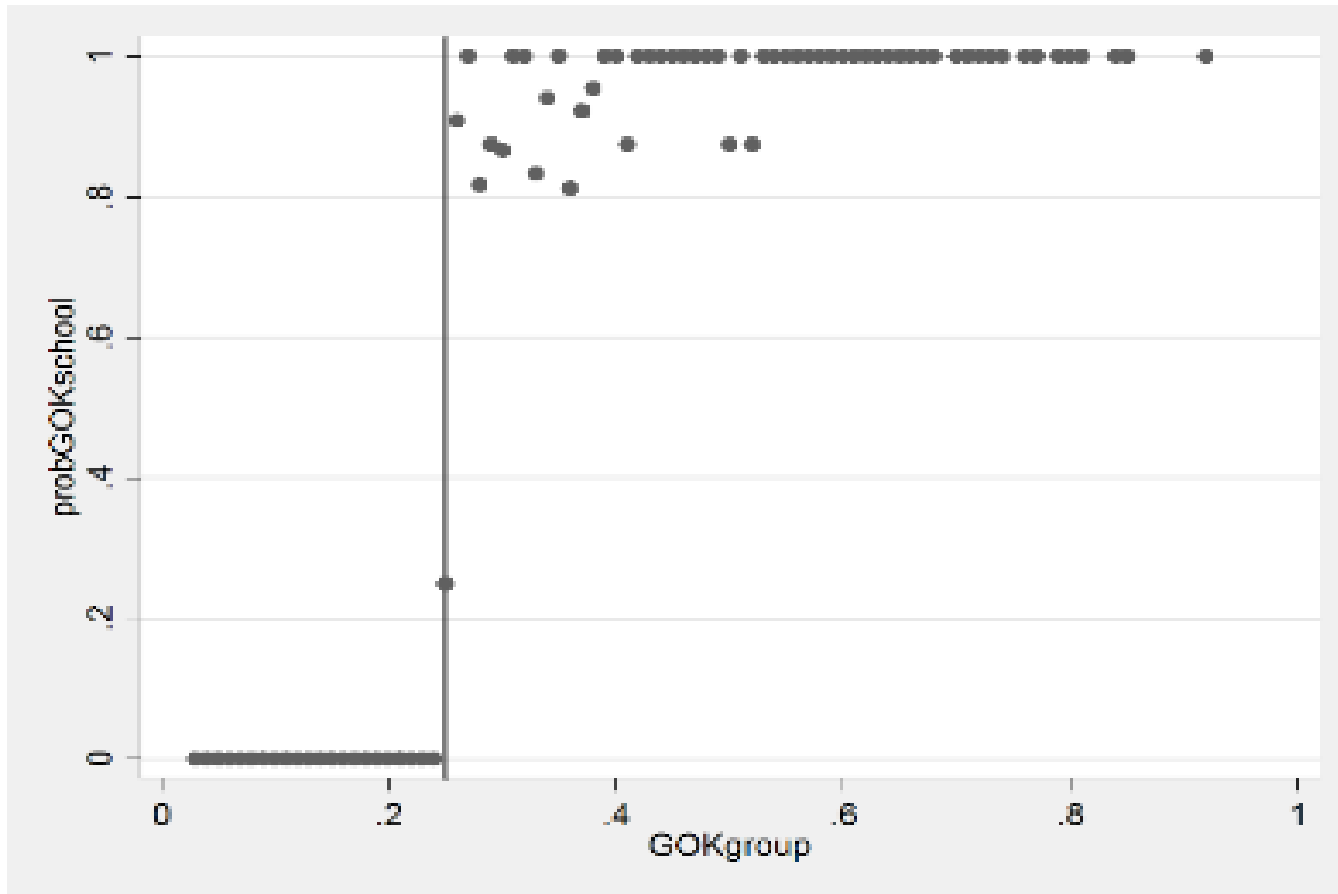
The laboratory…

In administrative data of all Flemish students, we have a clear indicator for disadvantaged student:

- the student receives an educational grant
- the mother has not completed secondary school
- the child does not live with his or her parents
- the student is part of the travelling population
- at home the child speaks a language other than Dutch

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The laboratory…

Probability of treatment in the second and third stage of secondary education, where 25% disadvantaged students serves as the cutoff. Data for 2011.

Results

We do not find a significant effect of additional funding on grade retention, absenteeism, start in professional bachelor, start in academic bachelor, graduation in professional or academic bachelor.

→ **Conclusion**:
1. Providing funds at a low cut-off does not result in improved outcomes.
2. We need to dig deeper.

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Step 3: The impact of additional resources on efficiency

Joint work with Giovanna D'Inverno (LEER, KU Leuven)

The laboratory…

Again, we exploit the exogenous cutoff of 25% disadvantaged students that makes schools eligible for additional resources.

Here, we estimate the implications on **efficiency** of the policy. Interestingly, we provide a framework to estimate causal efficiency scores

Research question:
1. How to assess the causal impact within the efficiency framework?
2. Do more resources promote better school performance?

Methodology

To provide a causal interpretation of the findings, we decompose the overall school efficiency by using:
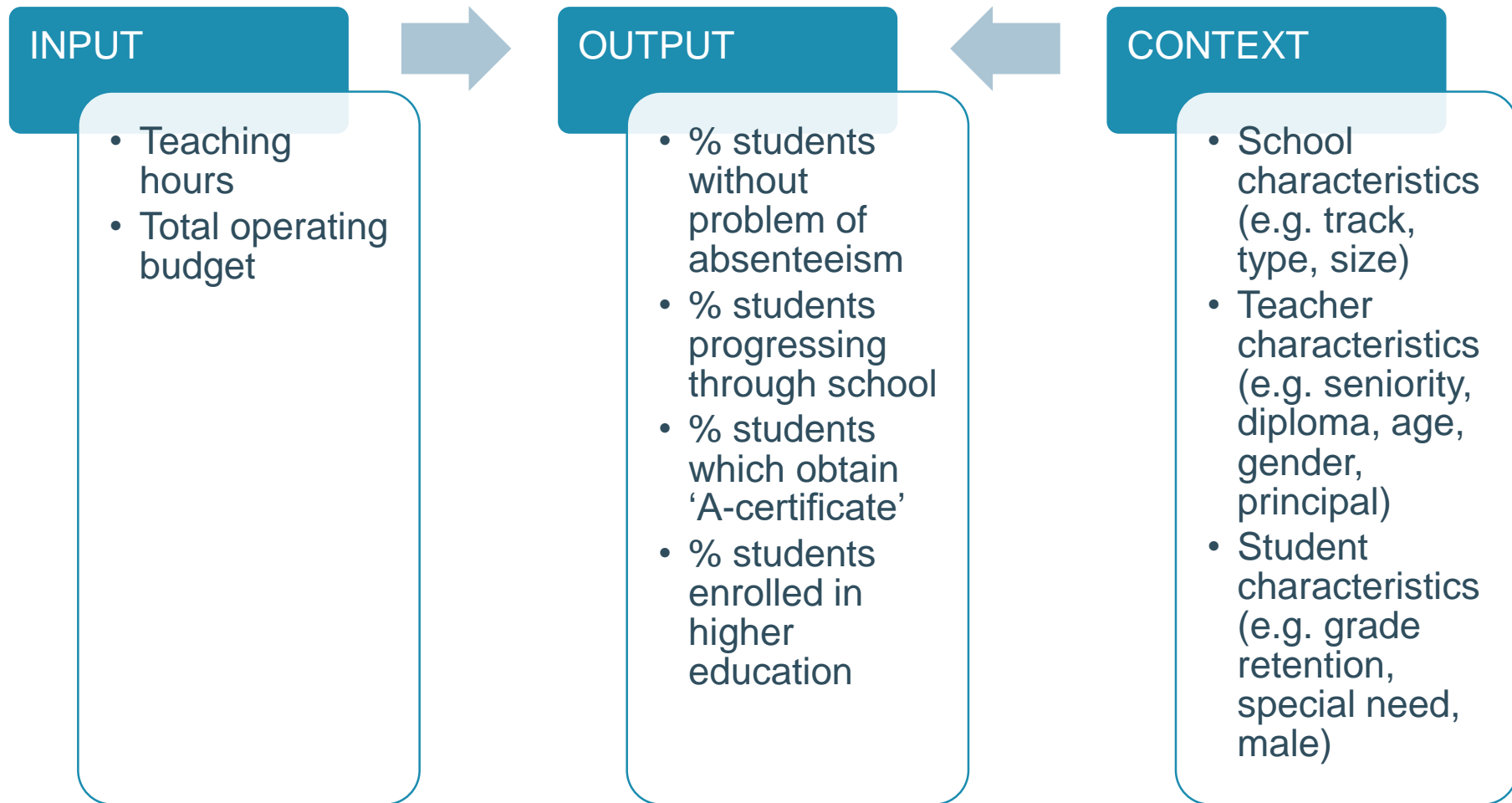
A fully non-parametric conditional efficiency model

- Avoids imposing any functional form
- Multiple inputs and outputs
- Mitigates influence of atypical observations
- Captures heterogeneity at school level

Concept of metafrontier approach is adapted for program evaluation

- Overall school efficiency = 'school-specific efficiency' x 'program efficiency'

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Methodology

INPUT

- Teaching hours
- Total operating budget

OUTPUT

- % students without problem of absenteeism
- % students progressing through school
- % students which obtain 'A-certificate'
- % students enrolled in higher education

CONTEXT

- School characteristics (e.g. track, type, size)
- Teacher characteristics (e.g. seniority, diploma, age, gender, principal)
- Student characteristics (e.g. grade retention, special need, male)

Results

Overall efficiency

➕ Treated schools are only more efficient when accounting for the environment

Program efficiency

🟥 Treated schools around the threshold do not successfully convert more resources into outputs

→ **Conclusion:**

The threshold for eligibility is too low?
Intensity of the treatment is too low?

Step 4: Does the intensity of the treatment matter?

Joint work with Benny Geys (Oslo) and Catharina Solondz (TU Dresden)

Research question

Are resource-driven policies effective in increasing educational quality and student performance?

Results of studies analyzing whether resource-driven policies increase schooling quality and student performance are, at best, ambiguous

→ Reason:

- Different objective functions of teachers, schools or public authorities

- Exam systems differ widely

→ Without standarized tests, a change in education spending may therefore have a different *observed* impact

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The laboratory…

The intervention: In 2007, 83 postcode areas situated in 18 large and medium-sized Dutch cities received *earmarked* funds to improve their social, physical and economic environment

→ The total subsidy amounted to 250 million euro annually: ranging from €1.2 million to €29.3 million across districts, or €333 to €3995 per inhabitant

→ Selection process obviously was non-random since the government aimed at selecting the worst-performing districts, BUT: a substantial number of similarly 'underperforming' districts outside the chosen sample
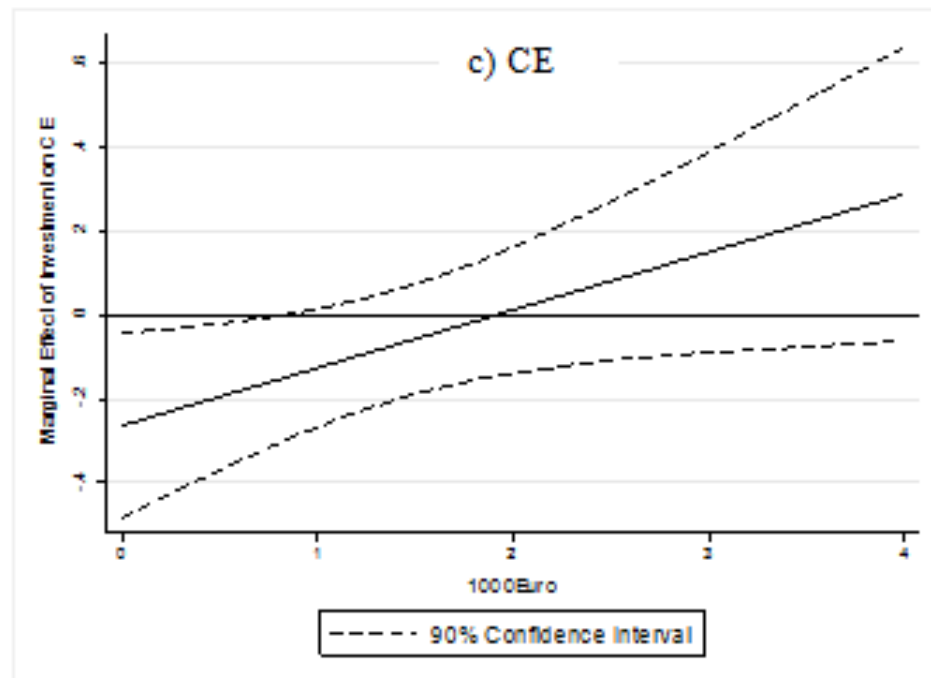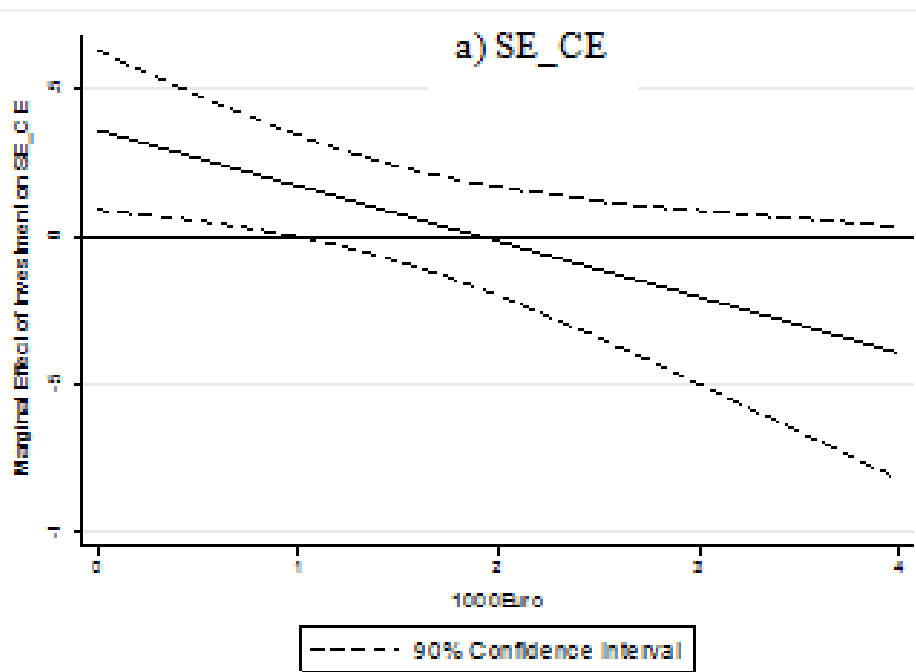
Methodology

Exploits the variation in public investment across space and time due to the July 2007 policy intervention via a difference-in-differences (DiD) approach

Outcome variables:

- ✓ **School exam:** Fewer quality controls in its construction and evaluation as it is set up and corrected only by the school teacher

- ✓ **National exam**: A national standardized assessment constructed by the Central Institute for Assessments (CITO), Externally screened by professors, Prior test on a sample of students, Uniform correction model and second corrector

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Results

The policy intervention worked to halt falling central exam results in the selected districts when additional funds were sufficiently elevated, but induced grade inflation – by schools (teachers) failing to downgrade mean locally-assigned grades in spite of declining scores on national exams – when such funds were limited.

Conclusion

- Additional resources only have an effect when they are sufficiently substantial. Limited resources result, at best, in grade inflation.

- Can we improve the outcomes by providing more information on school quality to parents?

Step 5: If money is not effective, can we provide information to parents to improve equal educational opportunities?

Joint work with Fritz Schiltz (LEER, KU Leuven)

Literature provides conflicting answers

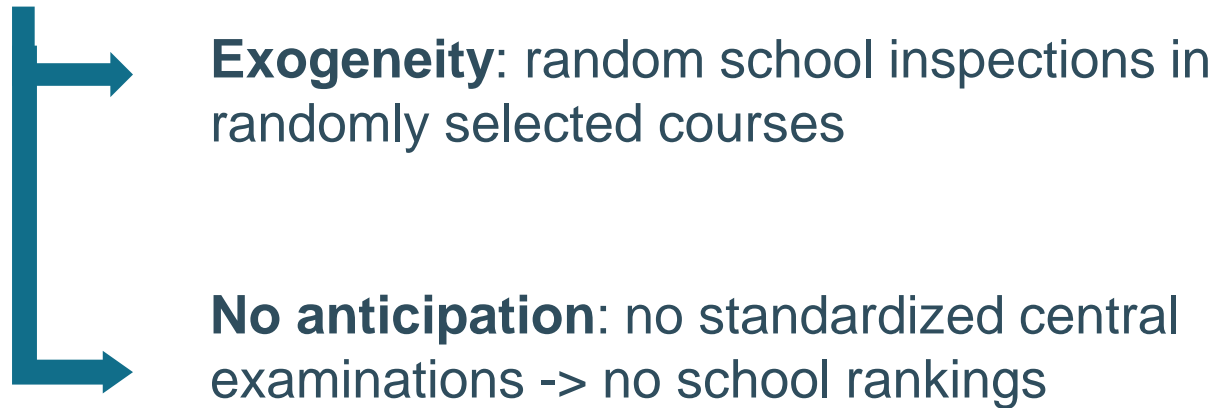1. Are schools affected by information shocks?

   - YES: Hastings & Weinstein (2008), Koning & Van der Wiel (2013), Nunes et al. (2015)
   - NO: Mizala & Urquiola (2013)

2. Does school composition change following these shocks?
   - YES: Hastings & Weinstein (2008), Burgess et al. (2015)
   - NO: Koning & Van der Wiel (2013), Nunes et al. (2015)

The laboratory…

Information shocks in Flemish primary education:

Exogeneity: random school inspections in randomly selected courses

No anticipation: no standardized central examinations -> no school rankings

Report is drafted and published within 5 weeks

2001   2013   2015

2012   2014

1

2

3

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Methodology

- Difference-in-differences

- Generalized Synthetic control (Xu, 2017) with multiple treated units and variable treatment periods

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Results – <u>Rural</u> schools

Information shocks, and particularly positive evaluations, result in an increase in the school size.

No effect on school composition in rural schools

Rural	Schools size			SES composition		
Variables	(A)	(B)	(C)	(A)	(B)	(C)
D: School inspection in t	1.040*			-0.001		
	(0.626)			(0.009)		
D x Positive evaluation[#]		1.501**			-0.002	
		(0.742)			(0.012)	
D x Negative evaluation[#]			0.850			0.004
			(0.936)			(0.013)
Fixed effects: Year, School	YES	YES	YES	YES	YES	YES
School-specific time trends	YES	YES	YES	YES	YES	YES
Observations	4,207	3,422	2,925	4,207	3,422	2,925
Number of schools	333	274	240	333	274	240

Results – Urban schools

In urban schools:

→ No response in school size due to capacity constraints

→ Response in composition: 3% less disadvantaged students after an inspection, and 5% less disadvantaged students after a favorable inspection.

→ Suggests that high SES parents respond more

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Changing the school system

By modular education: the division of conventional courses into smaller components or modules. Each module enables the students to obtain a partial certificate that can be combined into a qualification.

→ Assumption: Modular education should increase intrinsic motivation by more flexibility and frequent experiences of success, and improve labour market outcomes by partial certification

→ Frequently used as a dropout prevention program in secondary and higher education

The laboratory…

Exogenous source of variation:

> Flemish decree of July 10, 2008 introduced modularisation in a specific list of around 20% of the vocational education programs in school years 2008, 2009 and 2010
>
> → 88.5% of the schools offered both linear and modular programs.

Methodology:

> Within schools that offer both linear and modular education, we use a difference-in-differences framework with time varying treatment date

Results

Modular education reduces school dropout rate by 2.5 percentage points (from a baseline dropout rate of 28 percent)

Heterogeneous effects: modular education decreases the school dropout rate by 2 percentage points for the native Belgian students and by 7.7 percentage points for the foreign origin students (from a baseline dropout rate of 42 percent for foreign origin students)

Modular education increases students' employment and earnings up to two years after leaving high school

Conclusion: Modular education could become an important tool enabling the foreign origin students to come at par with their native peers

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Conclusion

Testing cures for disadvantaged students

1. Many opportunities to find a laboratory for an education economist.

2. There are few effective cures for disadvantaged students.

3. Providing more money to schools does not work and, at best, results in grade inflation

4. High SES parents are more responsive to information shocks, reinforcing social segregation

5. Changes in the curriculum, as modular education, might be more effective

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Invitation

Dan Goldhaber,
Washington
University,
AE Economics of
Education Review

Dinand Webbink,
Erasmus University,
AE Economics of
Education Review

Anna Vignoles,
University of Cambridge,
AE Education Economics

See: www.feb.kuleuven.be/LEER

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