



CPB Netherlands Bureau for Economic  
Policy Analysis

Are good researchers also  
good teachers? The  
relationship between  
research quality and  
teaching quality.

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# Research question

Are good researchers also good teachers?

Close relation between research and teaching in Dutch universities

- Accepted as a strong element in Dutch education (Wetenschapsvisie, OCW Strategische Agenda)
- However empirical evidence is scarce and mixed.

This study:

- Empirical analysis on individual level using experimental design



# Potential Mechanisms (1)

- Literature offers 2 main competing mechanisms
  - 1) Skill transfer (Feldman, 1987; Becker and Kennedy, 2005):
    - interaction with students -> improves research
    - increased proficiency due to research -> especially for special topic courses.
    - (+) association between research and teaching



## Potential Mechanisms (2)

2) Time and effort allocation (Walstad and Allgood, 2005; Cretchley et al., 2014) or difference in skill requirements

- More time for teaching -> less time for research
- Different skills are required for teaching and research
- (-) association between research and teaching

Hence: empirical question



# Research idea: exploiting random assignment of students to teachers

- School of business and economics (SBE) of Maastricht University (MU)
- Students follow lectures taught by a 'course coordinator'
- In addition, students participate in tutorials, taught by other teachers
- Max 16 students in tutorial, so courses have more tutorial groups taught by different teachers
- Random assignment of students to teachers (tutorial groups)
- Students take the same exam



# Research idea: exploiting random assignment of students to teachers

- Investigate impact of research quality of the teacher (measured by publication records) on teaching quality, measured by
  - student grades
  - evaluation scores



# The dataset

- Data from the School of Business and Economics at Maastricht University (MU)
- Student data (2011-2013); Publication data (2008-2011)
- Randomization of the students
  - Students choose the course, the computer assigns them into groups (max 16 students).
  - The same computer program then assigns tutors to each group and publishes the results.
  - Students, teachers, course coordinators cannot affect the assignment.
  - Students assigned to different tutors take the same exam at the end.



# The dataset

## Maastricht University (MU) data:

- Student level information: gender, nationality, age, grade, tutorial group, year of study (bachelor, master)
- Tutor level information: gender, nationality, age, position, contract type, publication records (A,B,C level), tutorial group
- Course level information: course, year and department





# The dataset

- We will proceed with 2 types of estimations: student level (grades), and tutorial level (course evaluations).
- Evaluation score is accessible only for the tutor, not on student level.



# The dataset – data creation steps

1. Initial student information: 80 000 observations  
(student-course-teacher level)
2. Those who fill in evaluation forms: 28 000 observations  
(If not filled then cannot be matched with the tutors)
3. Publication records are available for tutors who worked at MU for the entire period of 2008-2011: 5 934 observations



# The dataset

In total:

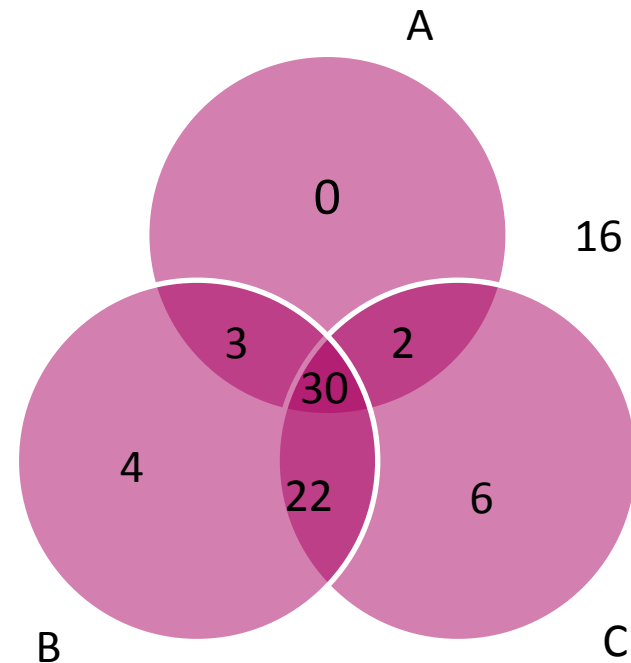
- 83 teachers
- 3369 students
- 408 course-years (69 having multiple tutors)
- 1127 tutorial groups
- 5934 observations



# The dataset

Number of tutors with corresponding publications

	A	B	C
0	48	24	23
1	15	16	17
2	8	8	8
3	6	13	5
4	3	11	8
5	2	2	3
6		3	5
7	1	3	4
8		2	2
9			4
10		1	1
11			2
12			1
<b>Total:</b>	83	83	83
<b>At least 1</b>	35	59	60





# Methodology

The following equations are estimated

- Student level estimation

$$G_{ictg} = \beta_0 + \beta_1 P_{ctg} + \beta_3 T_{ctg} + \beta_2 S_{it} + \beta_4 C_{ct} + u_{ict}$$

- Tutorial level estimation (course evaluations)

$$G_{ctg} = \beta_0 + \beta_1 P_{ctg} + \beta_3 T_{ctg} + \beta_2 S_{cgt} + \beta_4 C_{ct} + u_{ct}$$

Since students are randomly assigned to each tutorial (teacher) group, we can interpret the coefficients for the publication record ( $P$ ) as causal conditional on the course fixed effect ( $C$ ).



# Results

Table 11: Student grades estimations.

Student level  
Grades

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
Student: female	0.070 (0.042)	-0.067 (0.136)	0.042 (0.072)	0.121* (0.057)
Student: Dutch	-0.425*** (0.059)	-0.070 (0.182)	-0.519*** (0.118)	-0.496*** (0.068)
Student: other nationality	-0.699*** (0.063)	-0.843*** (0.200)	-0.721*** (0.135)	-0.662*** (0.071)
Student: age	-0.082*** (0.012)	-0.106* (0.049)	-0.140*** (0.028)	-0.062*** (0.012)
Tutor: female	0.111 (0.108)	0.246 (0.199)	0.178 (0.250)	-0.102 (0.099)
Tutor: Dutch	-0.053 (0.103)	-0.134 (0.258)	0.242 (0.148)	-0.183 (0.152)
Tutor: age	-0.012 (0.007)	0.001 (0.020)	-0.032 (0.018)	-0.002 (0.010)
Any publications	0.072 (0.103)	0.164 (0.546)	0.110 (0.232)	0.105 (0.115)
Constant	9.628*** (0.480)	9.766*** (1.585)	10.868*** (1.024)	8.656*** (1.081)
Course/year fixed effects	Yes	Yes	Yes	Yes
Program fixed effects	Yes	Yes	Yes	Yes
<i>N</i>	5787	784	1970	3033

Robust standard errors clustered on course-year level are in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



# Results

Table 12: Alternative publication indicators.

Student level

Grades:

Alternative  
publication  
variables:

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
1. Total number of publications	0.014 (0.020)	-0.020 (0.055)	0.011 (0.034)	0.031 (0.037)
2. At least an A publication	0.146 (0.165)	0.154 (0.503)	0.023 (0.491)	0.381** (0.138)
3. At least a B publication	0.111 (0.109)	0.164 (0.546)	0.064 (0.222)	0.185 (0.123)
4. Number of A publications	0.099 (0.052)	0.067 (0.077)	0.200 (0.276)	0.197** (0.056)
<i>N</i>	5787	784	1970	3033

Only the coefficient estimates of the publication record variables are presented.

Other results remain very similar to the estimates presented in Table 11.

Robust standard errors clustered on course-year level are in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



# Results

Tutorial level  
Teacher scores

Table 14: Teacher level estimations: evaluation scores.

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
Tutor: female	-0.479 (0.456)	-0.242 (0.723)	-0.396 (0.569)	-0.653 (0.839)
Tutor: Dutch	0.329 (0.287)	0.824 (0.507)	-0.206 (0.416)	0.475 (0.580)
Tutor: age	-0.038 (0.025)	0.082** (0.028)	-0.091 (0.061)	-0.048 (0.027)
Share(Dutch)	0.123 (0.250)	0.365 (0.574)	-0.410 (0.331)	0.691 (0.391)
Share(Other nationality)	0.243 (0.225)	-0.145 (0.575)	0.025 (0.311)	0.610 (0.335)
Average(age)	0.063 (0.053)	0.158 (0.189)	-0.013 (0.081)	0.102 (0.075)
Share(female)	-0.303 (0.224)	-0.639 (0.490)	-0.511 (0.300)	0.151 (0.395)
Any publications	-0.264 (0.261)	1.908 (1.096)	-0.428 (0.486)	-0.150 (0.307)
Constant	7.790*** (1.790)	-2.800 (4.236)	12.700*** (2.955)	7.360** (2.359)
Course/year fixed effects	Yes	Yes	Yes	Yes
<i>N</i>	1127	172	459	496

Robust standard errors clustered on course-year level are in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$





# Results

Tutorial level Table 15: Teacher level estimations: Alternative publication variables: evaluation scores.

Sensitivities

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
1.Total number of publications	-0.074 (0.039)	0.136 (0.111)	-0.120*** (0.030)	-0.064 (0.099)
2.At least an A publications	-0.249 (0.445)	0.431 (1.236)	-1.071** (0.385)	0.230 (0.671)
3.At least an B publications	-0.130 (0.270)	1.730 (0.982)	-0.493 (0.477)	0.184 (0.348)
4.Number of A publications	-0.052 (0.151)	0.216 (0.284)	-0.782*** (0.104)	0.286 (0.241)
<i>N</i>	1127	172	459	496

Only the coefficient estimates of the publication record variables are presented. Other results remain the same.

Robust standard errors clustered on course-year level are in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



## Conclusions (1)

- 1) Having any publications at all or total number of publications does not have a significant effect on student grades.
  
- 2) However, if the publication is of high quality, i.e. publication occurs at a highly ranked journal, for master students, the students grades increase.
  - quality rather than quantity matters
  - difference between bachelor and masters: bachelor courses are generally introductory courses, master courses are more specialized



## Conclusions (2)

3) Master students do not give higher scores to teachers with higher quality of publications. Bachelor students do give lower scores.

- two measures capture different things

***We find that excellent research performance contributes to a higher teaching quality, measured by student grades, in the master programs.***



# APPENDICES



## Sample selection (step 1)

Table 8: The effect of student characteristics on survey response rate.

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
Female	0.067*** (0.004)	0.080*** (0.006)	0.040*** (0.005)	0.093*** (0.008)
Grade	0.032*** (0.002)	0.025*** (0.003)	0.038*** (0.002)	0.029*** (0.003)
Age	-0.002 (0.001)	-0.008** (0.003)	-0.008*** (0.002)	0.008*** (0.002)
Dutch	-0.051*** (0.005)	-0.080*** (0.008)	-0.054*** (0.006)	-0.012 (0.010)
Other N.	0.029*** (0.005)	0.019** (0.006)	-0.015 (0.008)	0.088*** (0.010)
Constant	0.330*** (0.062)	0.166* (0.074)	0.257** (0.078)	-0.198 (0.159)
Course FE	Yes	Yes	Yes	Yes
Program FE	Yes	Yes	Yes	Yes
<i>N</i>	74351	23277	32654	18420

Robust standard errors clustered on course-year level are in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



## Sample selection (step 2)

Table 9: The effect of student characteristics on sample selection due to teacher information.

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
Female	0.001 (0.004)	0.006 (0.005)	0.003 (0.007)	-0.004 (0.008)
Grade	0.002 (0.001)	0.002 (0.001)	0.002 (0.002)	0.000 (0.004)
Age	0.000 (0.001)	-0.001 (0.002)	0.002 (0.002)	-0.000 (0.001)
Dutch	-0.005 (0.004)	-0.003 (0.006)	-0.004 (0.007)	-0.008 (0.009)
Other N.	-0.010* (0.005)	0.000 (0.005)	-0.017 (0.009)	-0.014 (0.010)
Constant	0.090* (0.040)	0.048 (0.063)	0.034 (0.087)	0.052 (0.093)
Course FE	Yes	Yes	Yes	Yes
Program FE	Yes	Yes	Yes	Yes
<i>N</i>	27700	8861	10239	8600

Robust standard errors clustered on course-year level are in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



# Descriptive statistics

	BA1					BA23					MA				
Student characteristics:	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Mi n	Max	Obs	Mean	Std. Dev.	Min	Max
Grade	784	6.61	1.86	0.5	10	1,972	7.19	1.56	0.5	10	3,033	7.29	1.37	0	10
Female	810	0.42	0.49	0	1	2,028	0.41	0.49	0	1	3,094	0.48	0.50	0	1
Dutch	810	0.26	0.44	0	1	2,028	0.22	0.41	0	1	3,094	0.28	0.45	0	1
Other	810	0.27	0.44	0	1	2,028	0.33	0.47	0	1	3,094	0.36	0.48	0	1
German	810	0.47	0.50	0	1	2,028	0.45	0.50	0	1	3,094	0.36	0.48	0	1
Age	810	19	2	16	31	2,028	21	2	17	37	3,094	23	2	20	44

	BA1					BA23					MA				
Tutor characteristics:	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
tutor_female	810	0.11	0.31	0	1	2,028	0.08	0.28	0	1	3,094	0.17	0.37	0	1
tutor_dutch	810	0.48	0.50	0	1	2,028	0.57	0.49	0	1	3,094	0.59	0.49	0	1
tutor_age	810	45.62	7.15	26	59	2,028	46.44	8.62	26	64	3,094	43.65	9.80	26	64
Professor 1	810	0.00	0.00	0	0	2,028	0.05	0.21	0	1	3,094	0.16	0.44	0	2
Professor 2	810	0.01	0.07	0	1	2,028	0.09	0.29	0	1	3,094	0.06	0.24	0	1
Assistant Prof.	810	0.11	0.31	0	1	2,028	0.19	0.39	0	1	3,094	0.35	0.49	0	2
Associate Prof.	810	0.13	0.34	0	1	2,028	0.20	0.43	0	2	3,094	0.22	0.47	0	2
Lecturer	810	0.76	0.43	0	1	2,028	0.53	0.59	0	2	3,094	0.27	0.44	0	1



# Randomization test

- Randomization of the students
  - Regression of publication variables on student characteristics and course fixed effects.

Table 10: Regression of publication variables on student characteristics.

	(1)	(2)	(3)	(4)
	Any publications	Any A publications	Any B publication	Any C publication
Female	0.004 (0.006)	0.004 (0.011)	0.023 (0.014)	0.024 (0.017)
Dutch	0.001 (0.008)	-0.008 (0.009)	-0.001 (0.023)	0.005 (0.014)
Other N.	-0.005 (0.009)	0.005 (0.014)	-0.014 (0.021)	-0.030 (0.022)
Age	-0.001 (0.002)	-0.000 (0.002)	0.005 (0.003)	0.002 (0.003)
Constant	1.021*** (0.028)	-0.001 (0.029)	-0.058 (0.058)	6.998*** (0.065)
<i>N</i>	5934	5934	5934	5934

Robust standard errors clustered on course-year level are in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$





# Results

Table 13: Sensitivities: student grade estimations.

	(1)	(2)	(3)	(4)
	All students	Bachelor 1	Bachelor 2 & 3	Master
1. At least an A publication	0.155 (0.164)	0.147 (0.503)	0.023 (0.491)	0.407** (0.141)
Tutor Female - Student Male	-0.077 (0.141)	-0.032 (0.301)	0.096 (0.280)	-0.335* (0.142)
Tutor Male - Student Female	0.019 (0.045)	-0.128 (0.136)	0.034 (0.082)	0.049 (0.057)
Tutor Female - Student Female	0.326** (0.118)	0.356 (0.249)	0.219 (0.248)	0.165 (0.116)
2. At least an A publication	0.168 (0.165)	0.468 (0.512)	0.029 (0.536)	0.374** (0.141)
Peer age	0.012 (0.026)	-0.058 (0.089)	0.026 (0.047)	0.002 (0.031)
Peer female	0.144 (0.123)	0.556 (0.328)	0.237 (0.197)	-0.133 (0.188)
3. At least an A publication	-0.068 (0.228)	-0.041 (0.409)	-0.036 (0.547)	0.255 (0.262)
Professor 1	0.250 (0.162)	-	0.842 (0.431)	0.080 (0.189)
Professor 2	0.009 (0.219)	-1.313*** (0.361)	-0.083 (0.393)	0.163 (0.195)
Associate Prof.	-0.019 (0.128)	-0.098 (0.143)	0.073 (0.296)	-0.081 (0.126)
Assistant Prof.	0.210 (0.190)	0.988* (0.415)	0.308 (0.312)	-0.098 (0.166)
<i>N</i>	5787	784	1970	3033

Only the coefficient estimates of the publication record variables are presented.

Other results remain very similar to the estimates presented in Table 11.

Robust standard errors clustered on course-year level are in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$