TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI

VICTORIA
UNIVERSITY OF WELLINGTON

Students are Almost as Effective as Professors in Tutorial Teaching

Jan Feld

Victoria University of Wellington and IZA

Nicolas Salamanca

Melbourne Institute of Applied and Social Research and IZA

Ulf Zölitz

briq, IZA and Maastricht University

Motivation

- Student instructors are currently enrolled bachelor and master's students (not PhD students)

- In many universities, a large share of education is delivered by students instructors in tutorials/exercises/lab sessions.

- Often senior instructors (professors, lecturers, etc.) teach tutorials in the same course.

- **…Yet, we know very little about their effects on students!**

Research Question

What is the effect of student instructors (versus more senior instructors) on students' grades, course evaluations and labour market outcomes?

Policy Implications

- Student instructors are a low cost resource that universities can use to lower their cost or to lower the teaching burden for researchers.

- To decide how many student instructors to hire, universities need to know how effective they are.

Student Instructors vs Senior Instructors

- Our prior was that student instructors would perform significantly worse, because they
  - Know the course content less
  - Know related material less
  - Have less teaching experience

- However, student instructors might be more intrinsically motivated and better able to related to students.

Literature

- Lusher, Campbell and Carrell (NBER 2015): Students' grades increase with same-race TAs

- Borjas (AER P&P 2000): Students' grades decrease with foreign-born TAs

- Fleisher, Hishimoto and Weinberg (J Econ Edu, 2002): Foreign-born TAs can be as effective as native Tas

- Bettinger et al. (EER 2016): Graduate students acting as full instructors affect major choice

Institutional Background

- Data from Maastricht University's School of Business and Economics (SBE)
- Maastricht is located in the Netherlands close to German border
- 51% of students are German, 29% are Dutch; 39% are female
- Language of instruction is English

Teaching at the SBE

- Maastricht has 6 teaching blocks per year (4 regular blocks and 2 "Skills" mini-blocks). Each regular block is roughly 6 weeks long, and students typically take 2 courses per block

- The bulk of the teaching at the SBE is done in tutorials (2 tutorials a week per course, plus 3 lectures per course)

- The tutorials are given in tutorial groups of up to 16 students

Problem-Based Learning

- Students are expected to solve problems before class, and discuss their findings each session

- The instructor works as a guide, helping students when they are stuck

- Instructors also take attendance and grade some tasks

Key Features of Setting

1. Students are (conditionally) <u>randomly</u> assigned to tutorial groups within a course

   - We don't have to worry about endogenous matching of instructors and students.

2. We have many courses which are taught student and non-student instructors

   - Gives us plenty of within course variation to identify causal effects—even small ones

Our Data

- We have administrative data from 2009-2014
- We only analyze courses with at least one student instructor and at least one non-student instructor
  - 176 different courses
  - 434 instructors (217 student instructors)
  - 2,534 tutorial groups
  - 6,649 students
  - 28,203 course grades

Empirical Strategy

$$y_{ic} = \beta_1 student_{ic} + \beta_2 PhD_{ic} + \gamma' X_{ic} + \delta_c + \varepsilon_{ic},$$

- y_{ic} is the standardized (Std. Dev.=1) final grade of student *i* in course *c*
- Student$_{ic}$, PhD$_{ic}$: Dummies for student and Ph.D. student instructors (base group: senior staff)
- X_{ic}: Course-year dummies, teacher gender & nationality, time and day of the session dummies, and student gender, nationality, and GPA
- δ_c: course-invariant unobserved heterogeneity
- ε_{ic}: idiosyncratic error term
- Standard errors are clustered at the instructor level

Results – Effect on Current Grades

Dep. Variable: Std. Final Grade	(1)	(2)	(3)
Student Instructor	-0.018	-0.018	-0.023*
	(0.014)	(0.014)	(0.013)
Std. GPA			0.593***
			(0.010)
Student Characteristics:		✓	✓
Fixed Effects:	✓	✓	✓
R-Squared	0.18	0.21	0.51
Observations	28,203	28,203	28,203
Instructors	434	434	434

This table reports OLS coefficients of regressing standardized (Std.Dev.=1) final course grades on a student instructor and a Ph.D. instructor (unreported) dummy variable (the base group is senior instructor) and student GPA before taking the course. Student characteristics include student gender and nationality, and a cubic polynomial for student age. All regressions condition on time-of-day and day-of-week fixed effects, and course & other course combination fixed effects. Robust standard errors clustered at the instructor level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Effect Size

- - 0.023 Std.
  - a reduction of 0.04 grade points on the 1 to 10 points grade scale.
  - Less than average performance gap between median and 51st percentile student in terms of student ability

- Effect of having a TA of own ethnicity: 0.023 Std. for Asian students, 0.037 Std. for non-Asian students (Lusher et al., 2016)

- Effect of being graded by instructor with same nationality 0.17 Std. (Feld et al., 2016, in same setting)

Effect on Subsequent Grades?

- Maybe student instructors teach to the test at the expense of a deeper understanding of the course material.

- Having a student instructor might negatively impact grades in subsequent courses.

Effect on Subsequent Grades – Setup

Compulsory 1st year courses

Treatment: Having a student instructor in 1st year courses

Compulsory 2nd & 3rd year courses, and Elective Courses

Outcome: Average grade in 2nd and 3rd year courses

Effect on Subsequent grades

| Dep. Variable: Std. GPA (after 2nd year)	(1)	(2)	(3)
Student Instructor (first year)	-0.005	-0.003	-0.006
	(0.018)	(0.018)	(0.016)
Std. GPA (first year)			0.415***
			(0.008)
Student Characteristics:		✓	✓
Fixed Effects:	✓	✓	✓
R-Squared	0.04	0.09	0.44
Observations	7,075	7,075	7,075
Instructors	196	196	196

This table reports OLS coefficients of regressing standardized (Std. Dev.=1) student GPA after second year on a student instructor and a Ph.D. instructor (unreported) dummy variable (the base group is senior instructor) and student GPA. All independent variables refer to first-year courses. Student characteristics include student gender and nationality, and a cubic polynomial for student age. All regressions condition on time-of-day and day-of-week fixed effects, and course & other course combination fixed effects. Robust standard errors clustered at the instructor level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

No evidence for effect on subsequent grades.
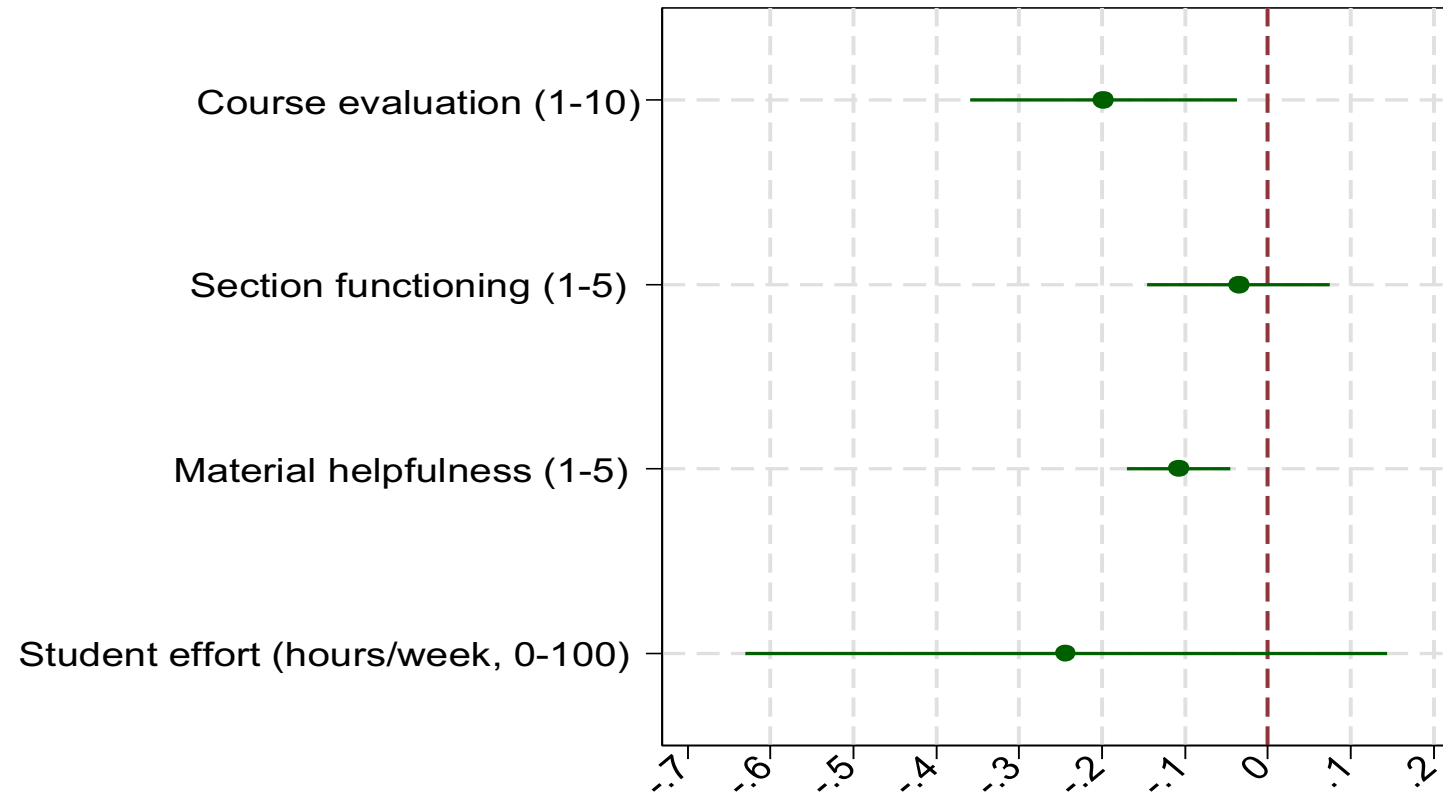
Course Evaluation Outcomes

- Student instructors could affect students in other ways (i.e., demanding more student effort, worsening class environment and decreasing student satisfaction, etc…)

- The SBE's extensive course evaluation data allow us to "look inside the black box" of sections!

Other Instructor Outcomes – Results
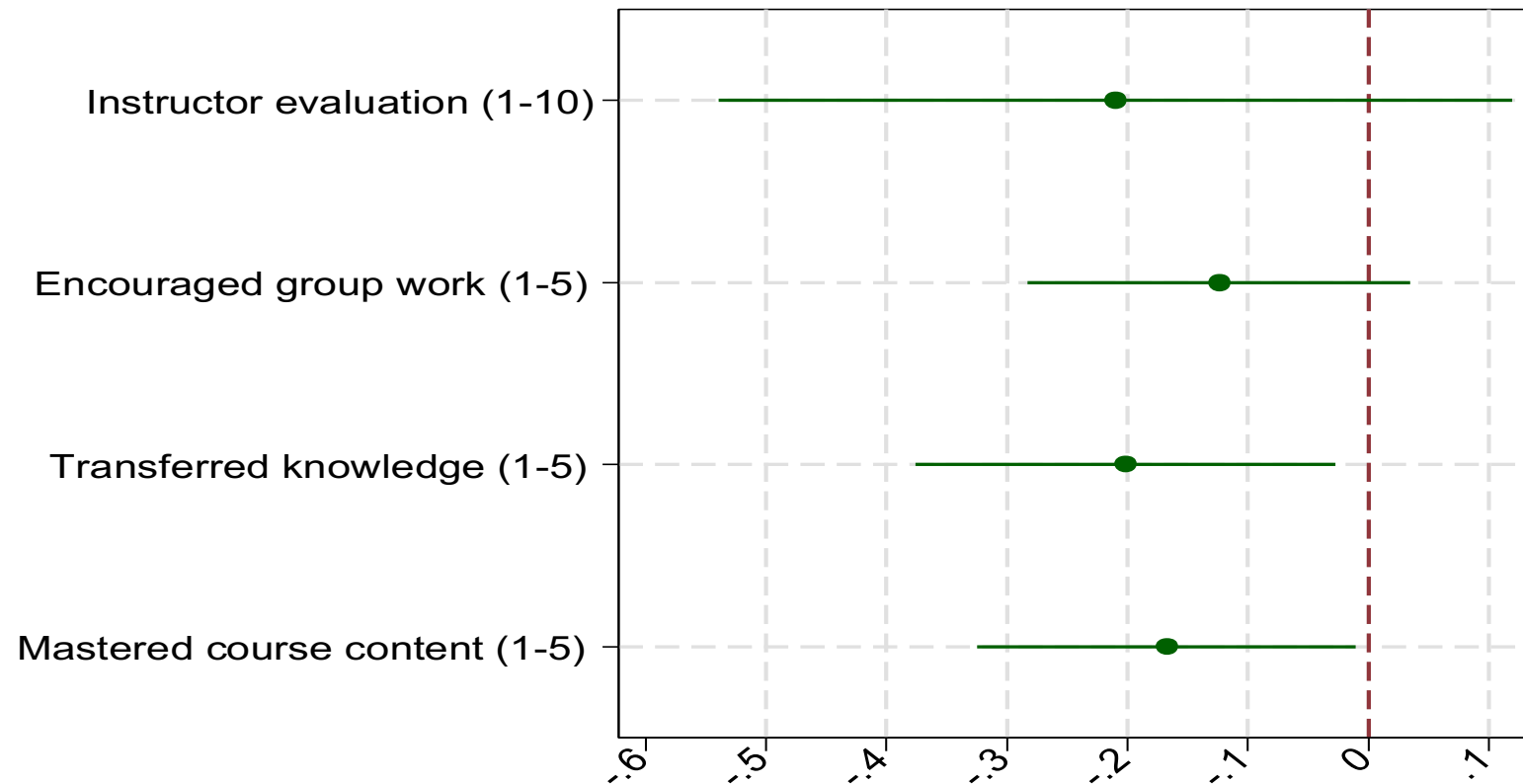
Student instructors get significantly worse evaluation on
"transfer of knowledge to other contexts" and "mastery of course content".

Other Course Outcomes – Results

Student instructors get significantly worse evaluation on "overall course evaluation" and "material helpfulness".

Effect on Labour Market Outcomes

- Student instructor might be less to provide their students with the skill, knowledge or referrals necessary for a successful career start after graduation.

- Use data from SBE graduate survey conducted in 2016.

Results - Labour Market Outcomes

Dep. Variable:	Unemp. after graduation:		Log earnings:		Satisfaction with:	
	None	Months	First	Current	Studies	Job
	(1)	(2)	(3)	(4)	(5)	(6)
Student Instructor	0.025	-0.013	-0.017	-0.019	0.002	-0.075
	(0.024)	(0.037)	(0.026)	(0.030)	(0.011)	(0.062)
Std. GPA	0.165***	0.118***	0.080***	0.010	0.054***	-0.234***
	(0.013)	(0.019)	(0.013)	(0.014)	(0.005)	(0.035)
Other covariates:	✓	✓	✓	✓	✓	✓
Fixed Effects:	✓	✓	✓	✓	✓	✓
R-Squared	0.10	0.09	0.14	0.14	0.13	0.08
Observations	11,539	8,358	7,868	9,518	11,539	8,793
Instructors	413	412	411	411	413	411

This table reports OLS coefficients of regressing students' labor market outcomes from a post-graduation survey on a student instructor and a Ph.D. instructor (unreported) dummy variable (the base group is senior instructor) and student GPA before taking the course. Unemployment after graduation is measured as a dummy demarking having a job lined up before graduating (Column 1), and the median number of months of unemployment from a 6-category measure capped at 12 months (Column 2). Column 2 excludes those who have a job lined up after graduation, and includes a dummy for "I did not (yet) start working after graduation". Earnings are measured in annualized thousands of Euros. Satisfaction variables are measured from 1 to 10 and increasing in satisfaction. Other covariates include student gender and nationality, a cubic polynomial for student age, and a dummy for whether the survey was conducted by phone (vs online). All regressions condition on time-of-day and day-of-week fixed effects, and course & other course combination fixed effects. Robust standard errors clustered at the instructor level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Summary - Labour Market Outcomes

- No significant effects.
- We can rule out modest negative effects on job search and study satisfaction.
- Effects on earnings and job satisfaction are too imprecisely estimated.

We also checked

Is it grading bias?	No. No effect on first year courses which are centrally graded.
Effects on grades across grade distribution?	Not sig. , but more negative estimates at lower grades
Cumulative effect?	Not sig.
Does student instructor GPA predict teaching performance?	Not sig.
Multiple testing?	After correcting for multiple testing, only significant effect that remains is on perceived usefulness of teaching material.

Summary Results

Student instructors have

- tiny negative effect on student grades.

- no measurable effect on future grades.

- Small negative effect on course evaluations

- No measurable effect on labour market outcomes.

Conclusions

- Our results suggest that universities can hire more student instructors to reduce cost / lower teaching burden with little negative effect on students.

- Caution #1: We've said nothing about changing the role of student instructors.
- Caution #2: Hiring more student instructors might result in lower quality student instructors
  - However, we show that grades, the main hiring criteria, are not sig. related to student instructors' effectiveness

- More broadly: we have shown an example of where formal qualification and experience are hardly related to objective job performance.