CMPO

Centre for Market and Public Organisation

Using schools' most important resources – Teachers

Simon Burgess

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

University of BRISTOL

Outline

- Background:
  - How much do teachers matter?
  - Are effective teachers born or made?
- Assignment of teachers:
  - Within-school allocation
  - Between-school allocation
- How to use effective teachers:
  - Evidence from Charter and KIPP schools
  - Communicating with parents
  - Use of feedback

Background

- How much do teachers matter?
- Are effective teachers born or made?

How much do teachers matter?

If we're going to make a big difference to children's lives – its got to be based on teachers.

Teacher effectiveness matters

- The difference between having an effective* teacher and an ineffective* one is almost half a GCSE grade, or 0.25sd.
- For each student in the class.

- * 75th percentile of the distribution versus 25th

Other metrics …

- In one academic year, students with effective teachers can acquire 1.5 years of learning, and with others just 0.5 years.
- Replacing the bottom 5-8% of teachers in the US with average teachers has a PV of $100 trillion.

- **Swapping 8 ineffective teachers for 8 effective teachers for only the GCSE years eliminates half of the poverty (FSM) difference in scores.**

What is teacher effectiveness?

- Impact of a teacher on student progress, controlling for the innate characteristics of the child
- Motivating student effort counts as part of teacher effectiveness
- No reason why this should be homogenous across students

Why is it hard to quantify?

- Are teachers randomly assigned to pupils?
- If not, are we measuring the impact of teacher effectiveness or pupil characteristics?
- We controlled for prior ability and used point-in-time fixed effects to isolate teachers' input, completely accounting for student characteristics, observed and unobserved.

How do our estimates compare?

- Prior estimates:
  - Rockoff (2004)
    - 1 sd T. Q. => 0.11 sd test results
  - Rivkin *et al* (2005)
    - 1 sd T. Q. => 0.095 sd test results
  - Aaronson *et al* (2007)
    - 1 sd T. Q. => 0.15 sd test results
  - Slater *et al* (2009)
    - 1 sd T. Q. => 0.19 sd test results

Are effective teachers born or made?

- Teacher effectiveness is not correlated with:
  - The teacher's own academic record
  - Whether has s/he has a Masters or not
  - Teaching experience beyond 3 years
- Where does teacher effectiveness come from?
  - Is it an innate unteachable skill?
  - Is it a craft that can be learnt?
  - Different focus for research and policy

Assignment of teachers

- Within-school allocation
- Between-school allocation

Assignment of teachers

- Within schools:
  - (Assuming a HT knows her effective teachers)
  - Do you assign most effective teachers to:
    - Highest ability kids?
    - Lowest?
    - C/D border kids (not from now on!)
    - As they want to be assigned?
  - We're starting a project to find out, crossing accountability regimes

Assignment of teachers

- Between schools:
  - Want to know where the most effective teachers are – might be bi-modal
  - In England we can't – our estimation method takes out mean school effectiveness
- Speculate:
  - Clustering of effective teachers (in effective schools) if
    - Chosen by the same HT
    - Same preferences
    - If effectiveness is contagious

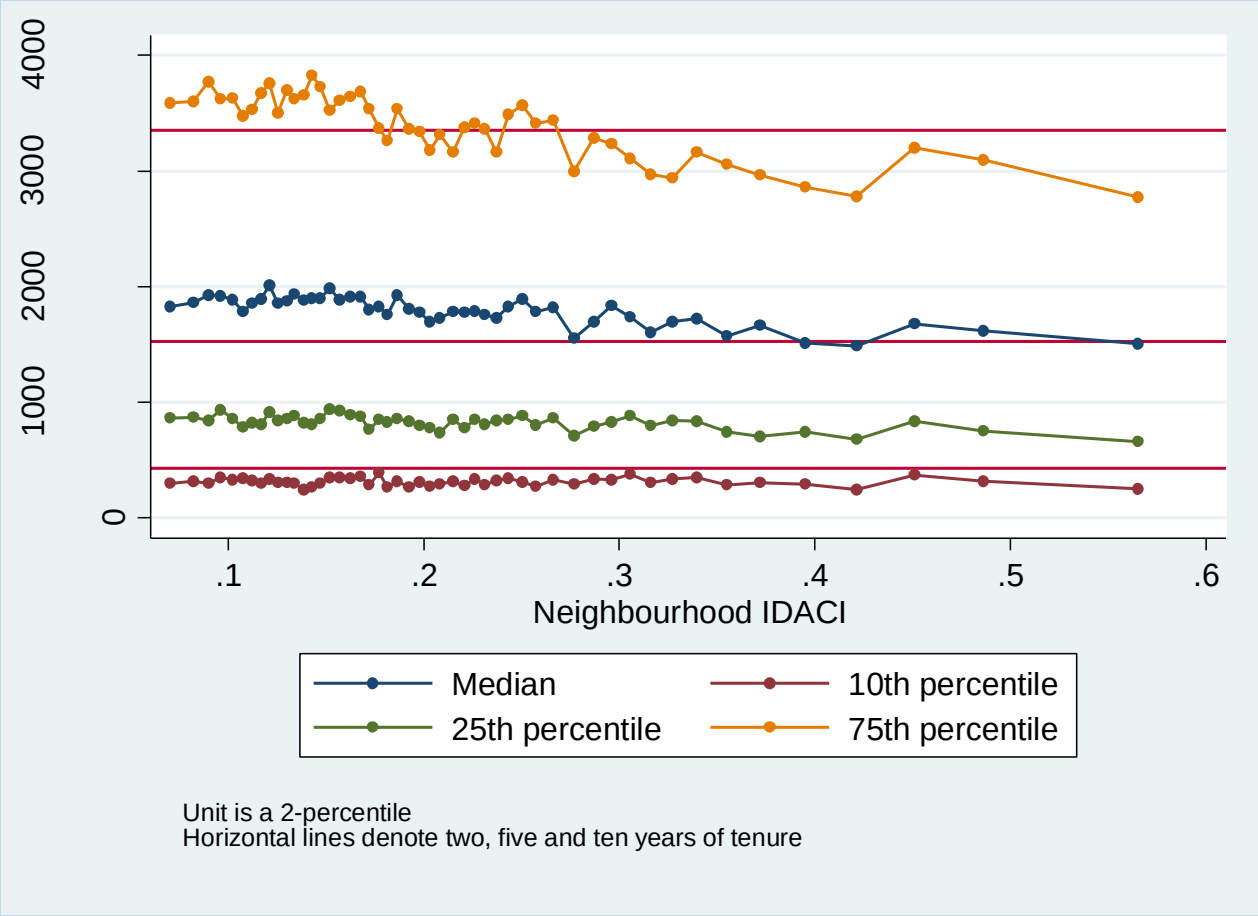
Analysis of teacher turnover

- The flip side of understanding how to attract teachers to disadvantaged schools is modelling the separation rate of teachers from those same schools.
- Part of our wider programme to model the teacher labour market – selection, training, recruitment, turnover, retention, promotion, ...
- Is teacher turnover a major problem for disadvantaged urban schools?

Tenure distribution of teachers

	All teachers	Male	Female	Prim'y	Sec'y
Recently hired					
Hired last year (%)	7.0	7.3	7.0	6.9	7.2
Hired this year (%)	7.5	7.9	7.4	7.7	7.3
Tenure distribution (%)					
0-2 years	19.4	20.4	19.2	19.5	19.4
2-5 years	36.8	37.0	36.7	36.6	37.0
5-10 years	24.8	23.5	25.2	24.8	24.8
10 years or more	18.9	19.1	18.9	19.1	18.8
N (k)	**343.5**	**80.7**	**262.8**	**172.1**	**171.4**

Elapsed tenure by neighbourhood disadvantage



Results

- Positive raw association between the level of disadvantage in the neighbourhood that a school serves and the turnover rate of its teachers, although this is not large.
- This association diminishes as we control for school, pupil and local teacher labour market characteristics, but is not eliminated.
- The remaining association is largely accounted for by teacher characteristics, with the schools in poorer neighbourhoods hiring much younger teachers on average.

California test case on teacher job security

- “A California superior court overturned state teacher tenure rules, saying they violated California’s constitution by depriving disadvantaged, mostly minority, students of an education equal to that afforded schools with higher-income students.” June 2014
- Removing job-protections may change teacher pay and the teacher market generally.
- Students better off or worse off?

How to use effective teachers

- Evidence from Charter and KIPP schools
- Communicating with parents
- Use of feedback

Evidence from KIPP and Charters

- Teachers provide:
  - More hours per day
  - More days per year
  - More availability to students

Communicating with parents

- We have a study in progress funded by EEF on parental engagement with teachers
  - Test alerts
  - Absence information
  - Conversation prompts
- Teachers initiating direct and early communications with parents

Use of feedback

- Feedback on how lessons go
- Triangulation of teacher effectiveness
  - MET project in NYC combined classroom observations, student surveys, and student achievement gains
- Gradual move away from a “closed door” profession
- Feedback is one of Dobbie and Fryer’s “5 practices of effective charter schools”
- Our in-progress project funded by EEF on teacher peer observation

Final thoughts on teachers

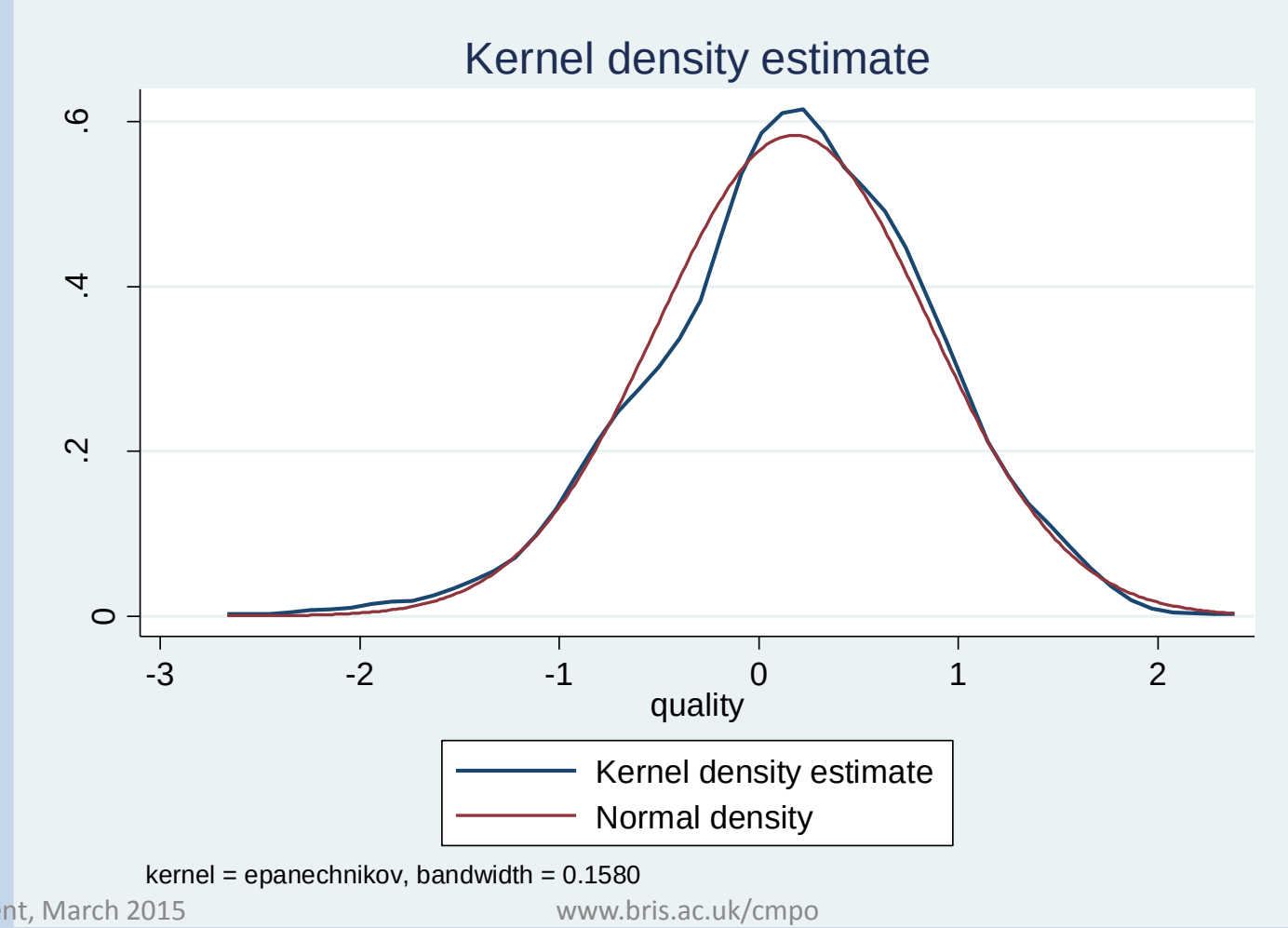
- The most important single asset a school has is its effective teachers - more than money, IT, small classes

- Research frontier:
  - How to improve average effectiveness?
  - How to ensure that disadvantaged as well as advantaged pupils work with effective teachers?

"What we want are rigorously evaluated, replicable, systematic educational practices that will change the odds"

Extras

Distribution of teacher effects



Results 4: Residual variation after controlling for school and teacher characteristics

Residual teacher effects:	
Standard deviation	0.455
	(0.063)
Interquartile range (P75 – P25)	0.547
	(0.081)
Extreme range (P95 – P5)	1.490
	(0.218)
Relative variation:	
Std dev of teacher effects relative to std dev of residuals from 1st stage regression	0.943
	(0.131)
Std dev of teacher effects relative to std dev of pupil effects from 1st stage regression	0.342
	(0.041)
Within- and between-school variation in residuals	
Within school std dev	0.327
	(0.017)
Between school std dev	0.310
	(0.083)

Notes:

1) Units: GCSE points (1, ..., 8),

2) bootstrapped s.e. in parentheses

Results 5: Second stage regression: Teacher level variables

Dep. Var. Residual teacher fixed effects	
Teacher female	0.010
	(0.041)
Age of teacher	0.004
	(0.006)
Age of teacher squared	-0.000
	(0.000)
First year of teaching	-0.109
	(0.086)
Second year of teaching	-0.040
	(0.061)
5-10 years experience	-0.017
	(0.097)
10-15 years experience	0.050
	(0.052)
First class degree	0.193
	(0.082)
Second class degree	0.017
	(0.049)
Science degree	0.012
	(0.042)
Salary	0.000
	(0.000)
Observations	740
R-Squared	0.43

Notes:

1) Units: GCSE points (1, ..., 8),
2) bootstrapped s.e. in parentheses

Other estimates (still no more for England)

Study	Location	Test subject	
		reading	math
Rockoff (2004)	New Jersey	0.10	0.11
Nye, Konstantopoulos, and Hedges (2004)	Tennessee	0.26	0.36
Rivkin, Hanushek, and Kain (2005)	Texas	0.15	0.11
Aaronson, Barrow, and Sander (2007)	Chicago		0.13
Kane, Rockoff, and Staiger (2008)	New York City	0.08	0.11
Jacob and Lefgren (2008)	Undisclosed city	0.12	0.26
Kane and Staiger (2008)	Los Angeles	0.18	0.22
Koedel and Betts (2009)	San Diego		0.23
Rothstein (2010)	North Carolina	0.11	0.15
Hanushek and Rivkin (2010a)	Undisclosed city		0.11
AVERAGE		**0.13**	**0.17**

Note: All estimates indicate the standard deviation of teacher effectiveness in terms of student achievement standardized to mean zero and variance one. All variances are corrected for test measurement error and except Kane and Staiger (2008) are estimated within school-by-year or within school-by-grade-by-year. Corrected reading estimates included for Rivkin, Hanushek, and Kain (2005).

Hanushek, 2010, NBER WP 16606

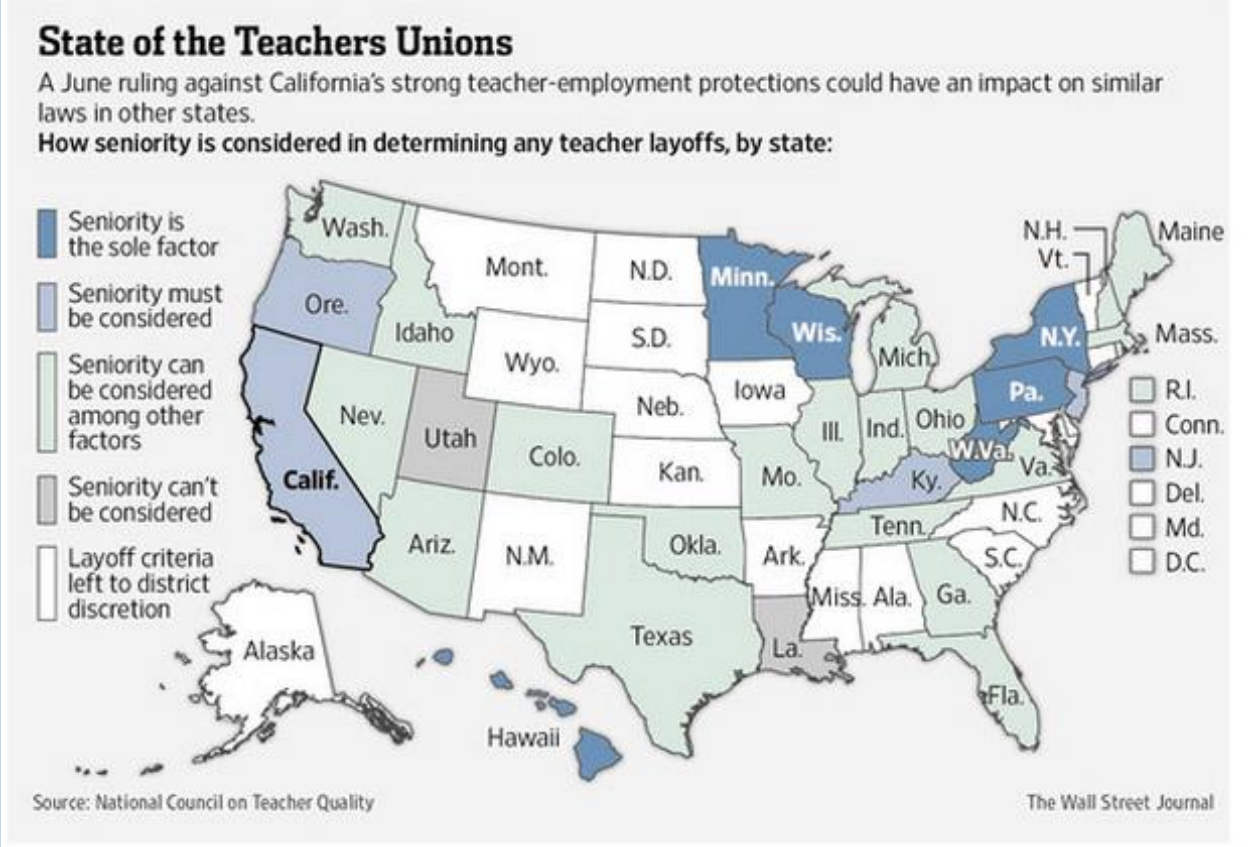
Table 2. Baseline Marginal Annual Economic Value Based on Student Lifetime Incomes

$(\sigma_T = 0.2\,;\phi = 0.13\,;\theta = 0.3\,)$

	Teacher effectiveness as s.d. from mean (percentile)					
class size	0.25 (60th)	0.5 (69th)	0.75 ((77th)	1.0 (84th)	1.25 (89th)	1.5 (93rd)
5	$26,458	$53,036	$79,735	$106,556	$133,500	$160,566
10	$52,915	$106,071	$159,470	$213,113	$267,000	$321,132
15	$79,373	$159,107	$239,205	$319,669	$400,499	$481,698
20	$105,830	$212,143	$318,941	$426,225	$533,999	$642,264
25	$132,288	$265,179	$398,676	$532,781	$667,499	$802,831
30	$158,745	$318,214	$478,411	$639,338	$800,999	$963,397

Teacher 0.5SDs above the mean, teaching a class of 20, produces PV of $212k more than a mean teacher per year

Hanushek, 2010, NBER WP 16606


State of the Teachers Unions
A June ruling against California's strong teacher-employment protections could have an impact on similar laws in other states.
How seniority is considered in determining any teacher layoffs, by state:
Seniority is the sole factor
Seniority must be considered
Seniority can be considered among other factors
Seniority can't be considered
Layoff criteria left to district discretion
Wash.
Ore.
Calif.
Idaho
Nev.
Mont.
Wyo.
Utah
Ariz.
Colo.
N.M.
N.D.
S.D.
Neb.
Kan.
Okla.
Texas
Minn.
Iowa
Mo.
Ark.
La.
Wis.
Ill.
Mich.
Ind.
Ohio
Ky.
Tenn.
Miss.
Ala.
Ga.
Fla.
S.C.
N.C.
Va.
W.Va.
Pa.
N.Y.
N.H.
Vt.
Maine
Mass.
R.I.
Conn.
N.J.
Del.
Md.
D.C.
Alaska
Hawaii
Source: National Council on Teacher Quality
The Wall Street Journal

Improving teacher effectiveness

- Measuring teacher effectiveness
- MET study:
- http://www.metproject.org/index.php
- Looked at:
  - Classroom observation instruments
  - Student perception surveys
  - Student achievement gains
- Weighting of these measures