School & Teacher Preferences: Evidence from a Multi-stage Internal Labor Market

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Research questions

How much do teachers value school characteristics?

How much do schools value teacher characteristics?

Implications for policy?

Approach

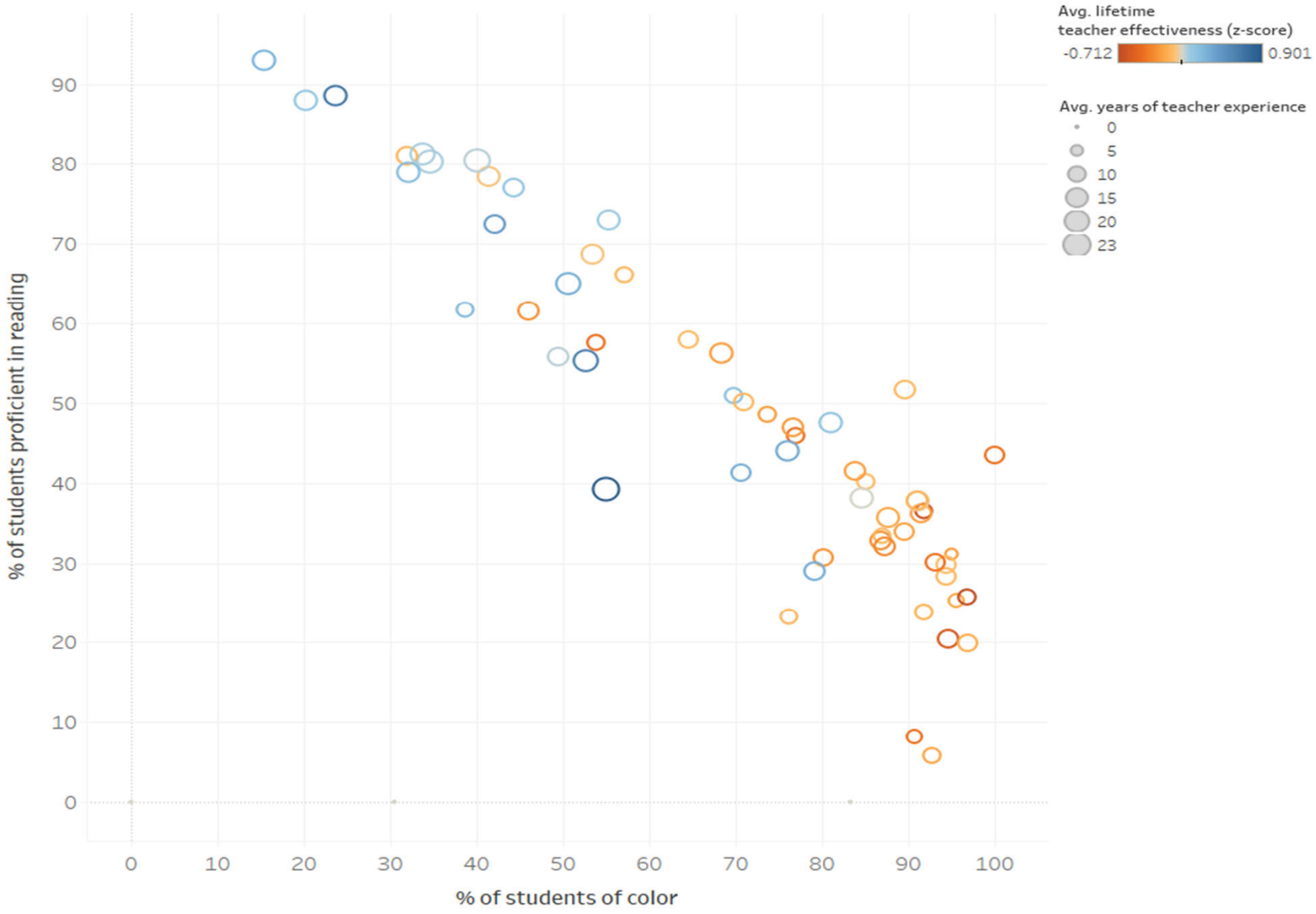
Analyze choices made in district internal labor market, ~2M teacher & ~12K school decisions.

Findings

Pay premium to make teachers indifferent is modest.

Evidence of dmgr discrimination by schools.

Educational Inequality

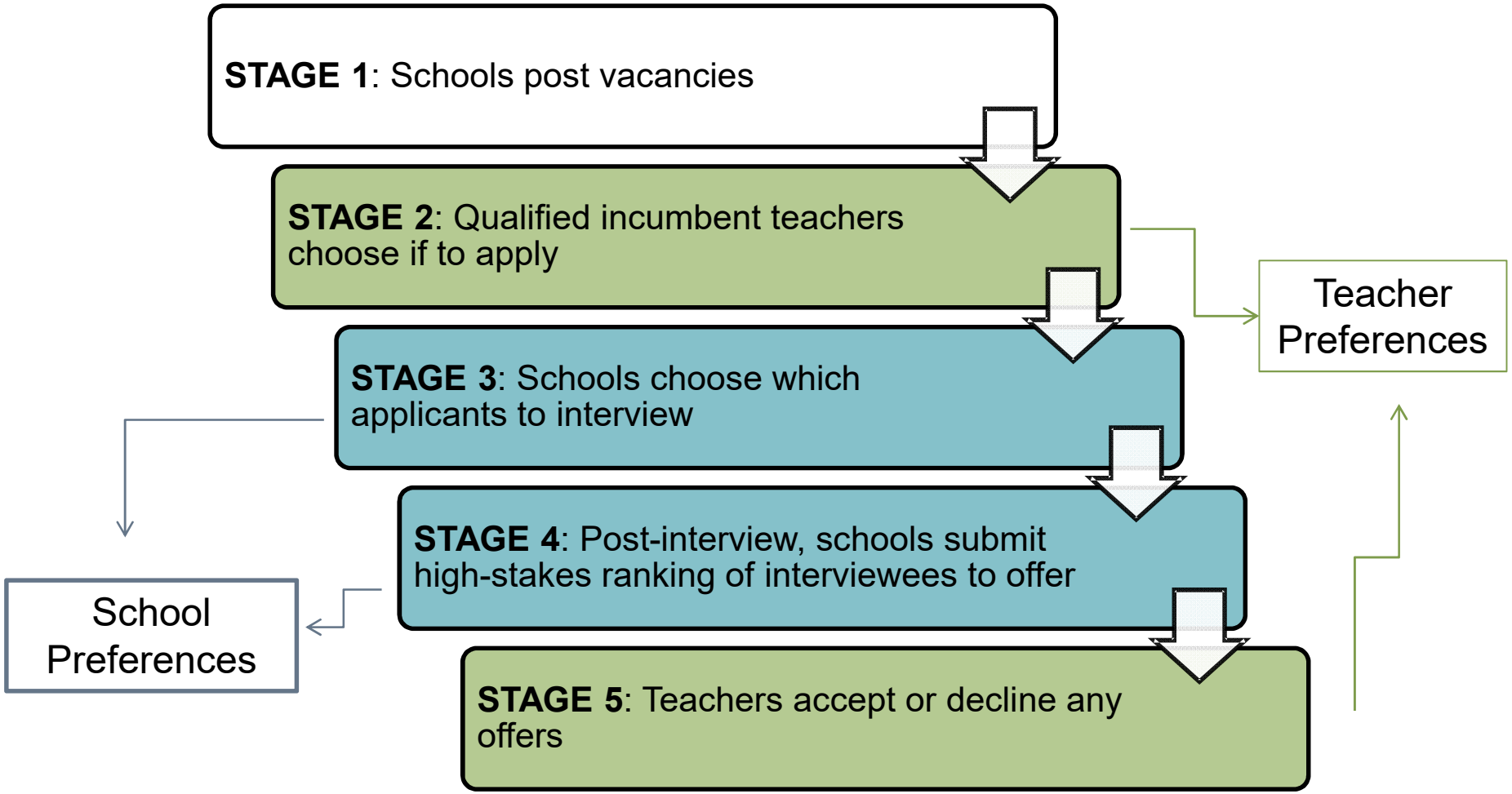


Motivation

This topic is economically relevant for four reasons:

1. School districts are giving schools more hiring autonomy and reducing the importance of seniority.
   - New York City (Boyd et al. 2011)
   - North Carolina (Ahn 2015)
   - Minneapolis (this study)
2. When given the opportunity, schools can actually identify and hire effective teachers (Boyd et al. 2011).
3. Effective teachers move away from hard-to-staff schools to schools with lower proportions of disadvantaged students and a higher level of achievement (Goldhaber et al. 2007).
4. There is evidence of better long-run outcomes for students taught by more effective teachers (Chetty et al. 2011; Hanushek's early works).

C1: Can see detailed choice process



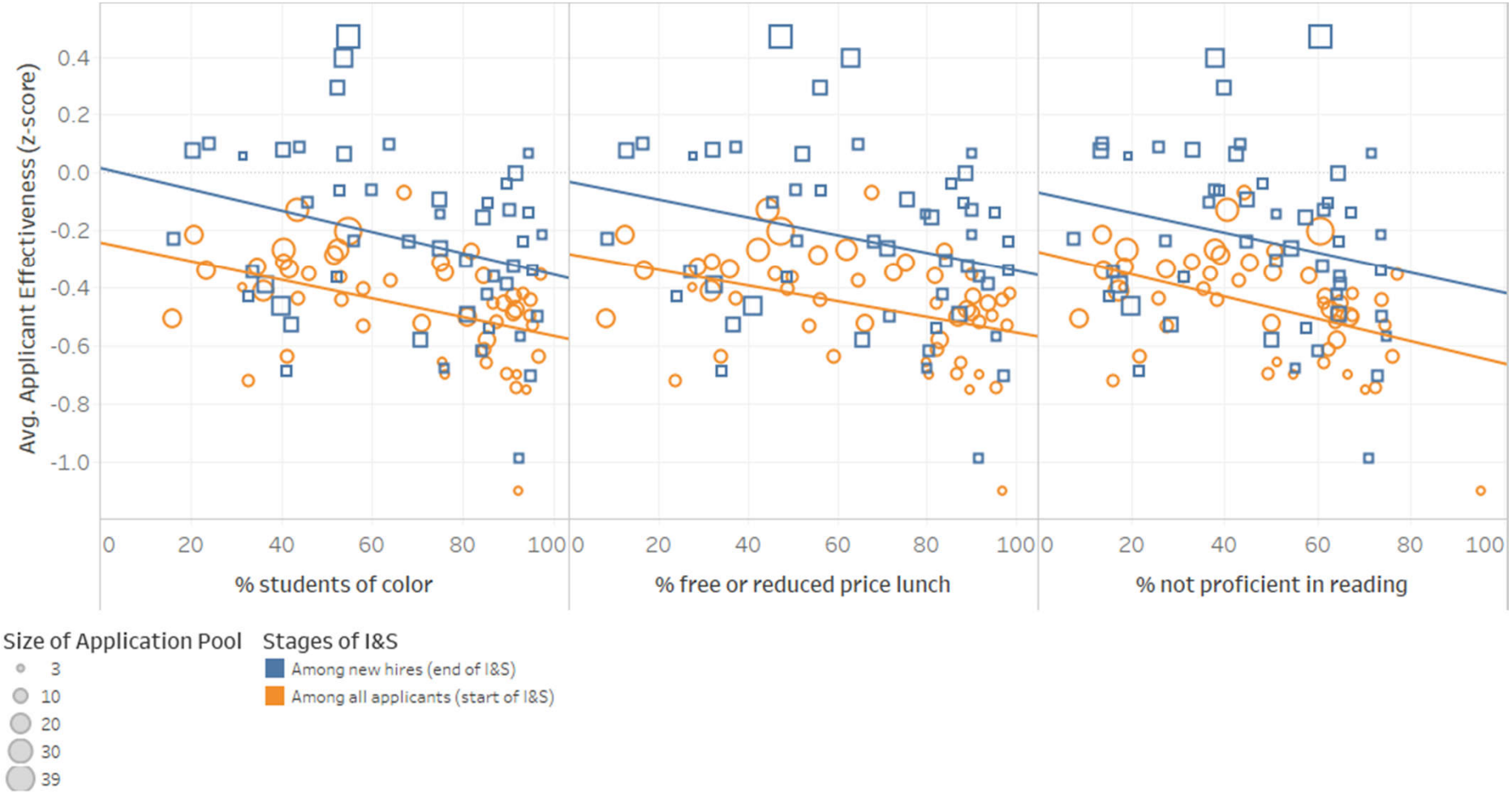
C2: Observe new teacher & school char.

- Existing evidence [Boyd et al. 2011,2013, Bonhomme et al. 2015]
  - Teachers: demographics, pre-hire scores and experience
  - Schools: student demogr & achievement, teacher demogr, pupil:teacher ratio

- Our paper
  - Teachers: + multiple measures of effectiveness, residence address
  - Schools: + variation in pay within district across schools over time

- New leverage
  - Heterogeneity in teacher preferences by effectiveness
  - Monetize school characteristics (cost of time & variation in pay)
  - School preferences for effectiveness & teacher demogr | effectiveness

Average Applicant Effectiveness as a Function of Receiving-school Characteristics by Stage of I&S (2013-2015)



Teacher preferences

Y: teacher decides to 1(apply) or 1(accept)

X: schools' characteristics, k receiving & j sending

T: teacher characteristics

Year and round fixed effects.

AS3

T1 models: no interactions or teacher fixed effects

- $Pr(Y_{ijky} \mid X_{iky}, X_{ijy}, T_{iy},) = \frac{e^a}{1+e^a}$
- $a = (X_{iky} - X_{ijy}) \propto_1 + T_{iy} \propto_2 + \delta_y + \delta_r + \epsilon_{ijky}$

T2: T1 + interactions

T3: T1 + teacher-fixed effects

T4: + both

AS3 Be clear about the identifying conditions, unobservable determinants uncorrelated with observable ones.
Aaron Sojourner, 10/25/2017

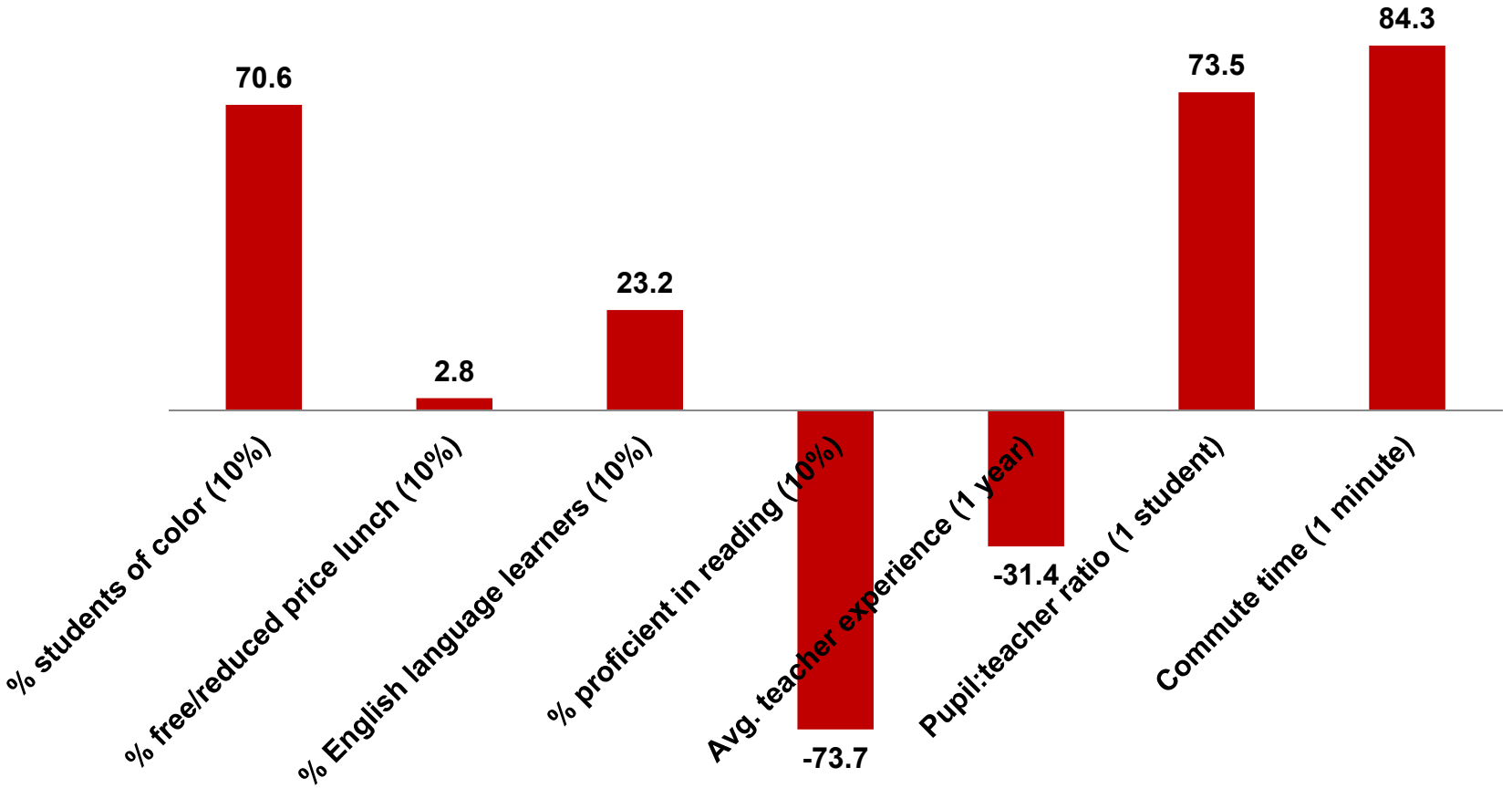
Marginal Rates of Substitution

We can use the estimated preferences to do trade-off calculation among school characteristics

- MRS = the rate at which a teacher is ready to face a one unit increase in one school characteristic in exchange for another school characteristic while maintaining the same level of utility
- $U_i = \boldsymbol{\beta}(\boldsymbol{X}_{ky} - \boldsymbol{X}_{jy}) + \epsilon_{ijky}$
- $U_i = \boldsymbol{\beta}\boldsymbol{D}_{jky} + \epsilon_{ijky}$
- $MRS_{D1,D2} = \frac{\beta_1}{\beta_2}$

Changes in Pay Required to Cancel out Differences in School Characteristics

(Receiving School's minus Sending-School's)



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AS5 Reorder these.

Start with all student chars together (of color, FRPL, ELL, achievement (is this average or % prof)... and limit use of acronyms).

Then, add school policy chars (avg tchr exp, pupil:teacher ratio).

Omit high-priority school, or move to near end.

Finish with commute time.
Aaron Sojourner, 10/25/2017

Attracting Different Types of Teachers from Top to Bottom Quintile Schools

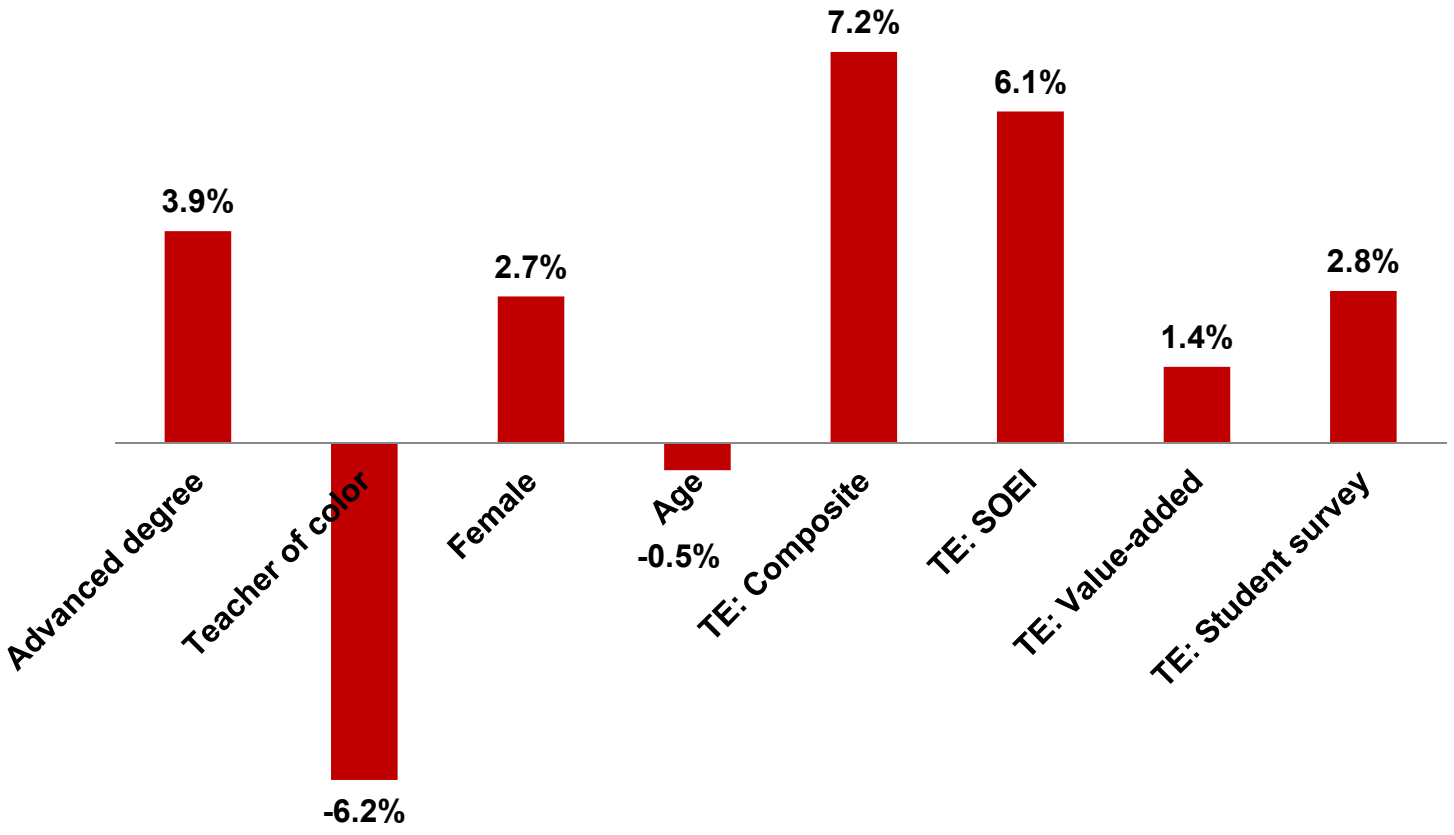
Type of Teacher	Change Required at Bottom Quintile School		
	Pay (method 1)	Pay (method 2)	Pupil-Teacher Ratio
Average teacher	$746 (354,1264)	$658 (387,880)	-17.4 (-19.9,-14.0)
Effectiveness 1SD above average	$1,424 (1203,1717)	$1,269 (1199,1354)	-25.4 (-27.2,-24.0)

School-Preferences Estimation

- Rank-ordered logistic regression
  - $Pr\left(R_{isjy}|T_{iy},\eta_{sjy}\right) = \frac{e^{b}}{1+e^{b}}$
  - $b = T_{iy}\beta_1 + \eta_{sjy} + \epsilon_{ijsy}$
- Rank = 1 is the highest rank. Censored at 0.
- Choice set is clearly defined.
- Standard errors clustered at the hiring-school level

School Preferences Results (pooled)

(% change in the probability that the average teacher receives a higher ranking)



AS6

*TE ➔ Teacher Evaluations

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AS6 Can you make a bar chart for this like you did for the other? Do one with the 3 measures of effectiveness separately.
Aaron Sojourner, 10/25/2017

School Preferences Results (Separate) AS7

- Age, gender, and effectiveness ratings matter **more** in the interview stage
- Race equally matters in the two stages
- Advanced degree, experience, and history of school hopping matter **less** in the interview stage
- Schools exhibit strong distaste for automatic interview candidates

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AS7 Is this still true?
Aaron Sojourner, 10/25/2017

School Preferences Results

	(S1A)	(S1B)	(S2A)	(S2B)
Age	-0.020693***	-0.020704***	-0.020690***	-0.020700***
	(0.002759)	(0.002747)	(0.002755)	(0.002744)
Female	0.104905**	0.109752**	0.104691**	0.109528**
	(0.051508)	(0.050946)	(0.051576)	(0.051025)
Teacher of color	-0.247915***	-0.246061***	-0.219973	-0.215099
	(0.059363)	(0.059392)	(0.154204)	(0.156329)
Holding an advanced degree	0.158620***	0.154168***	0.158630***	0.154174***
	(0.057105)	(0.056724)	(0.057103)	(0.056726)
Mid-career (4-10 years)	0.053051	0.060893	0.053122	0.060966
	(0.069116)	(0.069605)	(0.068973)	(0.069457)
Late-career (over 10 years)	0.148065*	0.149136*	0.148398*	0.149485*
	(0.081075)	(0.081153)	(0.081000)	(0.081056)
Early offers candidate	0.091804	0.081764	0.091978	0.081960
	(0.149591)	(0.151511)	(0.149747)	(0.151662)
Automatically interview	1.296517***	1.296620***	1.296495***	1.296598***
	(0.053095)	(0.053104)	(0.053090)	(0.053101)
Average number of years at all previous schools	0.072413***	0.078991***	0.072336***	0.078901***
	(0.018389)	(0.017728)	(0.018357)	(0.017689)
TE: SOEI (z-score)	0.243779***		0.243753***	
	(0.058059)		(0.058038)	
TE: Student survey (z-score)	0.110648*		0.110824*	
	(0.057088)		(0.056895)	
TE: Value-added (z-score)	0.053806		0.053626	
	(0.066413)		(0.066179)	
TE: Composite (z-score)		0.289941***		0.289990***
		(0.055820)		(0.055839)
Teacher of color X % student of color at receiving school			-0.000386	-0.000428
Observations	12,427	12,427	12,427	12,427

Conclusions

- Sorting patterns stem from teacher preferences and not counteracted by school preferences

- Possible ways forward
  - Modest pay increase would induce indifference and is more cost-effective than using pupil:teacher ratio reductions

  - Supplying information about applicants at the resume-screening stage so hard-to-staff schools don't miss out on quality candidates

  - Modify the interview rule that currently favors senior teachers
  - Change student demographics