

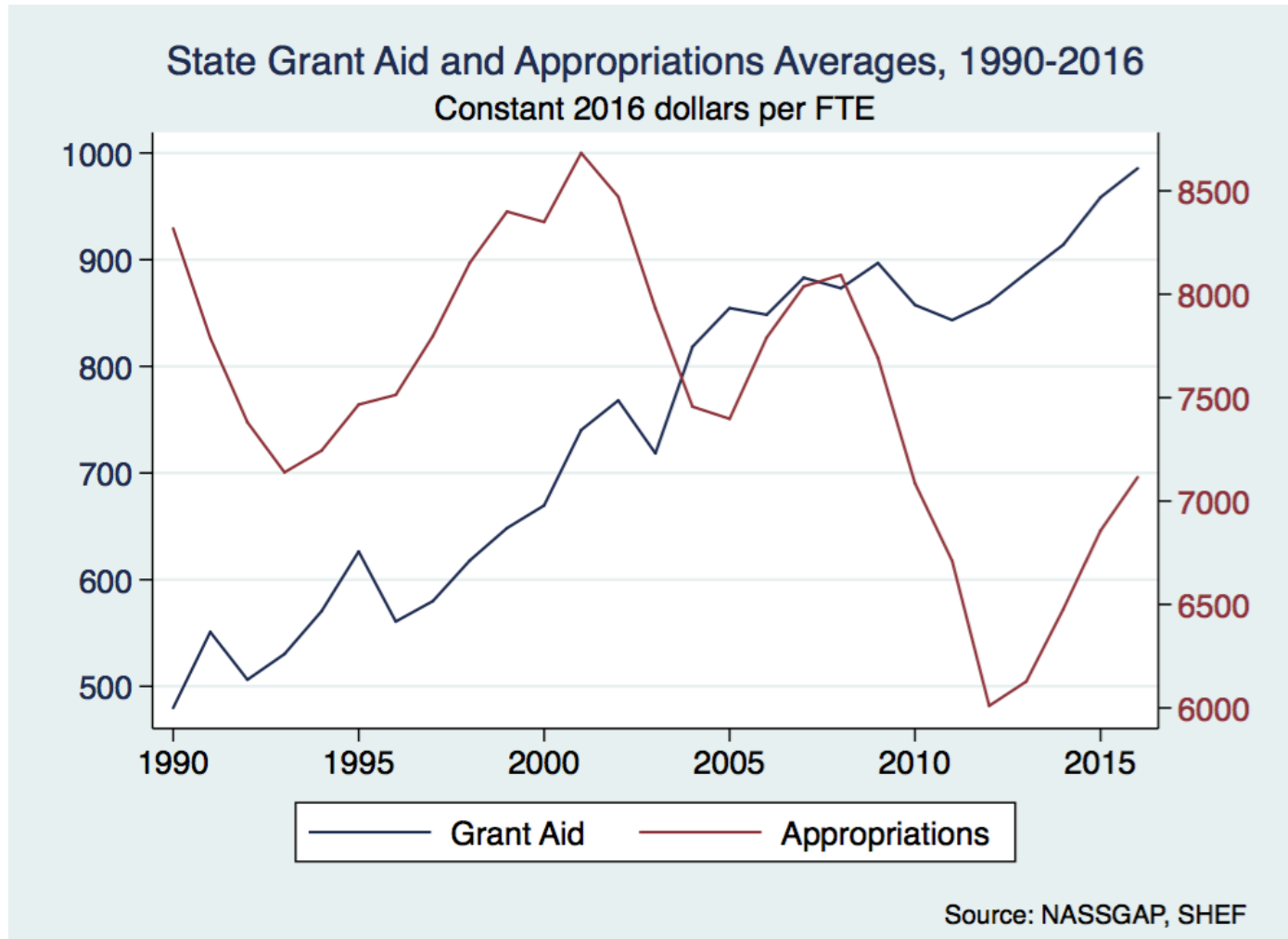
Does High-Tuition, High-Aid Drive a Divergence in College Expenditures?

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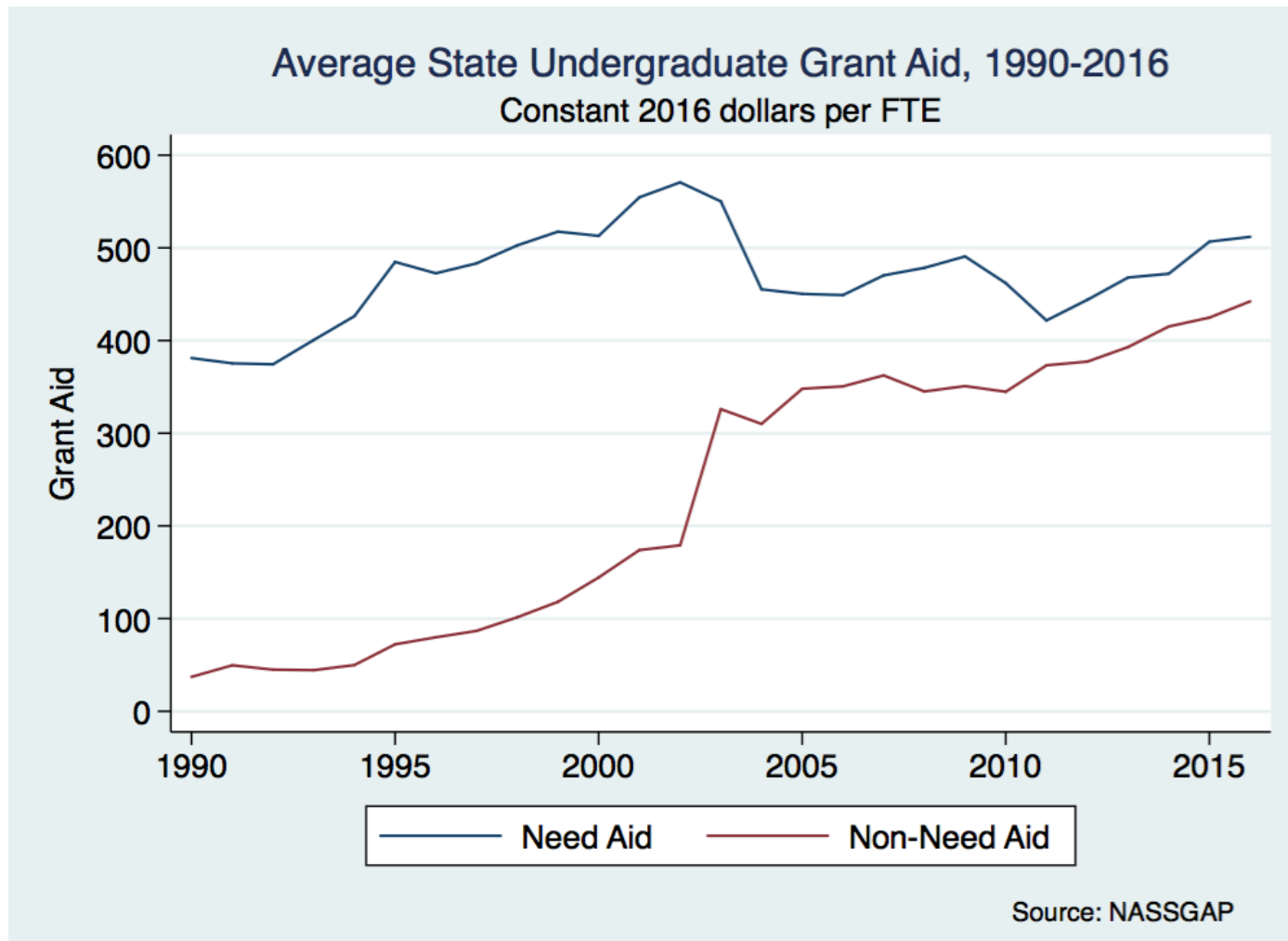
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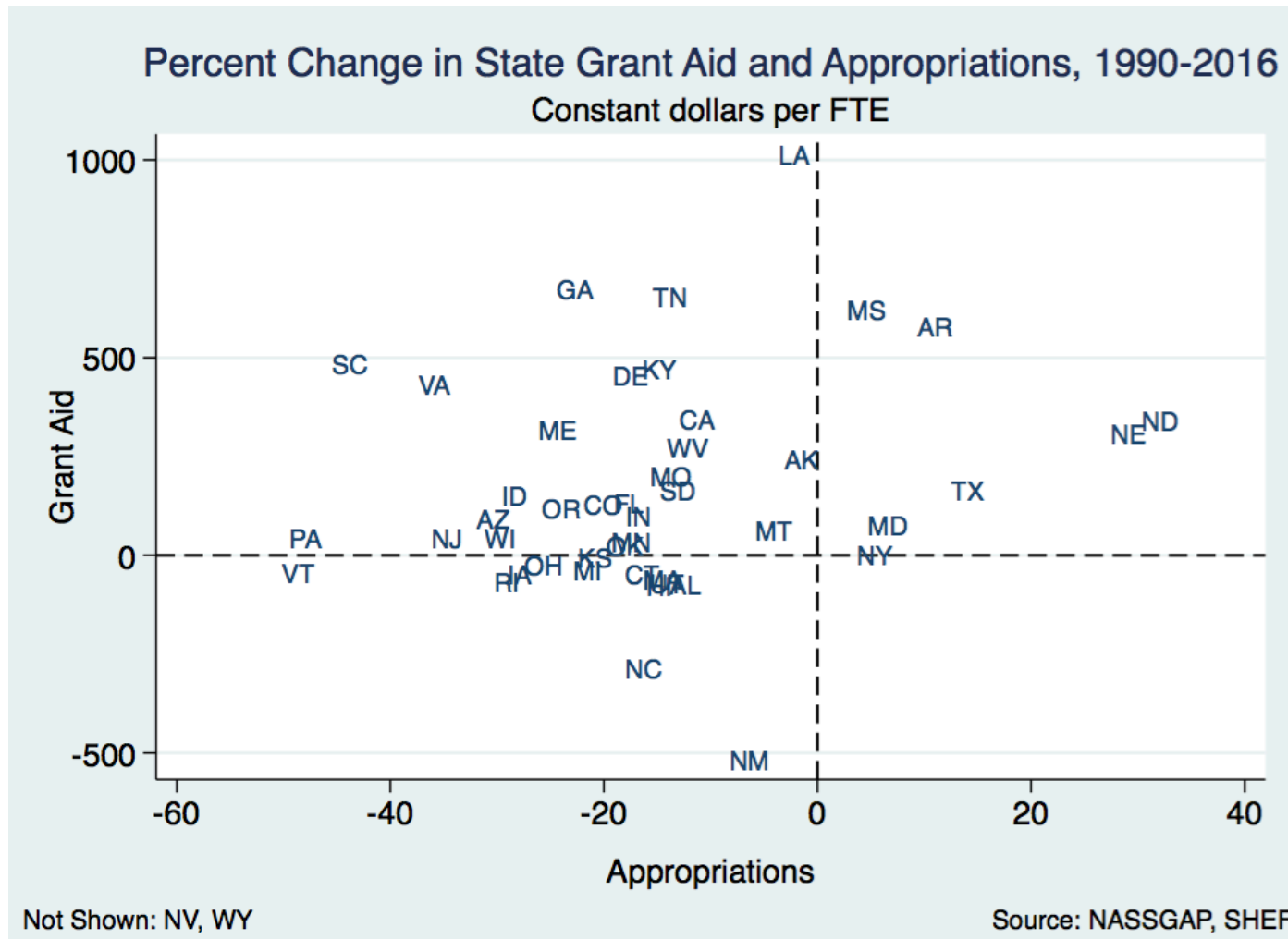
Since 1990, average state grant aid has increased \$500 per FTE, appropriations has declined \$1000. Referred to as high-tuition, high-aid (HTHA).



Non-need aid accounts for most of the increase in grant aid and is now of comparable size to need aid.



The change in grant aid and appropriations from 1990 to 2016 varies widely across states. Most states exhibit HTHA.



Background

- A state's mix of appropriations and financial aid is a key policy lever to alter its higher education market through prices
- Numerous studies examine how college student demand responds to price (Heller, 1999; Kane, 2003; Long, 2003; Perna & Titus, 2004; Toutkoushian & Hillman, 2012)
- Less is known about institutional response (Rizzo & Ehrenberg, 2004; Jacquette & Curs, 2015, 2016; Rabovsky, 2012)

Research Question

- **Research Question:** Does HTHA cause institutions to alter expenditures and in such a way that expenditures diverge between educational quality and amenities?
- Why this might matter:
 - Path for testing effect of state subsidy structure on college student demand
 - Institutional expenditures affect student persistence and graduation (Webber & Ehrenburg, 2010; Webber, 2012)
 - States could lose or gain public benefits (McMahon, 2009)

Theoretical Motivation

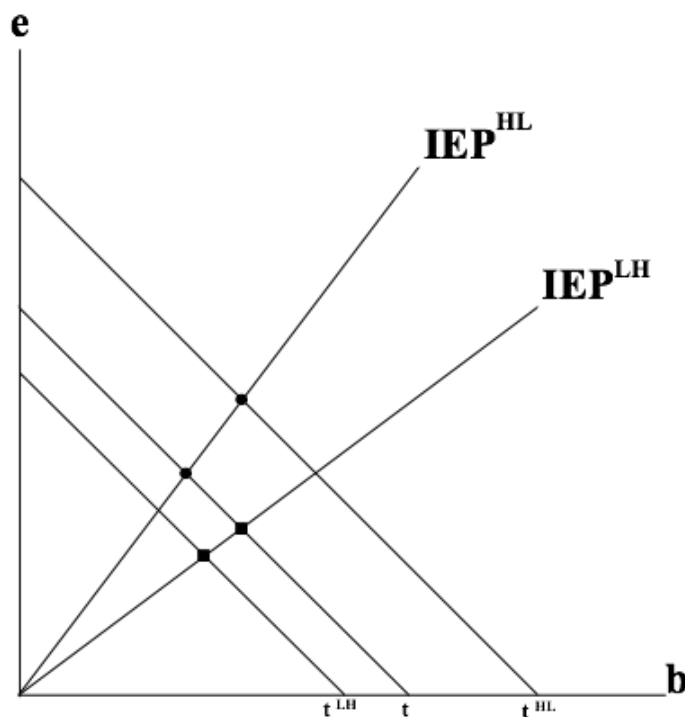
- HTHA increases competition (analogous to vouchers)
- Competition causes sorting across institutions by student ability (Epple et al., 2013; Hoxby, 2000)
- College inputs are modeled as single dimension of educational quality
- College choice is also influenced by consumption amenities (Mixon 1992; Mixon & Hsing, 1994)

Theoretical Setup

- Student types by high/low ability and income S^{AY}
- Demand in higher education is a function of educational inputs and amenities
- Two assumptions about demand and student type
 - Return on educational quality is greater for high-ability
 - Return on amenities is not greater for high-income
- Only low-income students receive need aid and high-ability students receive merit aid

Theoretical Effect of HTHA

- Scenario: State increases need and merit aid equal to a reduction in appropriations
- Change in subsidy levels decreases tuition for S^{HL} and increases tuition for S^{LH}



- Extent to which subsidies diverge drives a divergence in demand b/t e and b
- If institutional expenditures reflect student demand, then HTHA may alter expenditures

Data

- Institutional expenditures from Delta Cost Project
 - Educational quality: instruction and research
 - Amenities: academic support, student services, and institutional support
- State grant aid from NASSGAP
 - Need aid, mixed aid, merit aid
- State appropriations from SHEEO/SHEF
- Sample spans 1990-2015
- Includes public, 4-year, baccalaureate or higher institutions

Methods

$$\%Exp_{jst} = \beta_0 + HTHA_{st}\beta_1 + S_{st}\beta_2 + Z_{st}\beta_3 + \theta_j + \tau_t + \epsilon_{jst}$$

$$\%Expenditures = \frac{\textit{Category}}{\textit{Total Operational Expenditures}}$$

$$HTHA = \frac{\$ \textit{Grant Aid (by type)}}{\$100 \textit{ Appropriations}}$$

S = levels of each type of subsidy

Z = state controls: unemployment and poverty rates

θ = institution j fixed effects

τ = year fixed effects

Results

Table 3 – Effect of HTHA on %Expenditures by Need, Mixed, and Merit Aid

	Instruction	Research	Academic Support	Student Services	Institutional Support
[Mean]	[34.30]	[6.61]	[8.30]	[6.59]	[9.83]
HTHA Need	-0.0659 (0.1034)	-0.0404 (0.0803)	0.0727 (0.0411)	0.0894** (0.0343)	0.1219 (0.0622)
HTHA Mixed	0.7638*** (0.1692)	-0.0157 (0.1613)	0.0889 (0.0912)	0.0955 (0.0869)	0.5166*** (0.1093)
HTHA Merit	-0.1576 (0.1047)	-0.0032 (0.0690)	-0.0647 (0.0485)	0.1109* (0.0487)	-0.0039 (0.0685)
N	10,767	10,060	10,767	10,767	10,765
Groups	423	417	423	423	423

*p<0.05; **p<0.01; ***p<0.001

Clustered-robust standard errors

Results

Table 4 - Effect of HTHA on %Expenditures by More and Less Competitive

	Instruction		Academic Support		Student Services		Institution Support	
	More	Less	More	Less	More	Less	More	Less
[Mean]	[32.5]	[35.1]	[8.1]	[8.4]	[5.6]	[7.1]	[8.3]	[10.4]
HTHA Need	-0.3916*	0.0190	0.0155	0.0905	-0.1048*	0.1254**	-0.1077	0.1833**
	(0.1948)	(0.1196)	(0.0667)	(0.0505)	(0.0490)	(0.0391)	(0.0961)	(0.0707)
HTHA Mixed	0.4719	0.8341***	0.4857**	-0.1150	0.0036	0.0798	0.6581**	0.4546***
	(0.3292)	(0.1919)	(0.1492)	(0.1081)	(0.1069)	(0.1178)	(0.2117)	(0.1269)
HTHA Merit	-0.1155	-0.1578	-0.2015***	0.0036	0.0342	0.1504**	-0.1471	0.0696
	(0.1554)	(0.1350)	(0.0567)	(0.0647)	(0.0868)	(0.0575)	(0.1493)	(0.0764)
N	3,455	7,164	3,455	7,164	3,455	7,164	3,455	7,162
Groups	135	282	135	282	135	282	135	282

*p<0.05; **p<0.01; ***p<0.001

Clustered-robust standard errors

Marginal Effects of HTHA

- State decreases appropriations \$600 (2 SD) and
 1. Maintains need-based aid
 2. Raises mixed aid \$64 (1 SD)
 3. Raises merit aid \$77 (1 SD)

	More Selective	Less Selective
(1)	Instruction: -1.15pp (-3.5%) Student services: 0.18pp (3.2%)	Student services: 0.24pp (3.4%)
(2)	Academic support: 0.47pp (5.8%)	Instruction: 1.04pp (3%)
(3)	Academic support: -0.67pp (-8.2%)	Student services: 0.07pp (1%)

Effects on Student Outcomes

- Using Webber & Ehrenburg (2010) effects of institutional expenditures on graduation rates
- HTHA toward need aid could have negative effect on grad rates among the more selective
- In all cases the less selective increase grad rates
- Merit aid would have little impact

Conclusion

- State subsidies alter institutional expenditures
- Not only in terms of levels, but also composition
- Some evidence that the extent to which subsidies are targeted on the basis of income or ability drives a divergence in expenditures between educational quality and amenities
- Whether the mechanism is student demand remains a question

Thank you

Summary Statistics

Table 1 – Summary Statistics				
	Mean	SD	Min	Max
Expenditures				
%Instruction	33.39	6.99	6.51	64.76
%Research	6.27	7.84	0.00	48.10
%AcadSup	7.93	2.66	0.92	25.34
%StServ	6.18	3.05	0.42	27.54
%InstSup	9.52	3.86	1.04	42.43
%Aux	12.70	6.52	0.00	44.59
State Subsidy Structure				
HHA	9.32	7.67	0.00	46.60
HHA Need	5.71	6.28	0.00	36.76
HHA NonNeed	3.02	5.76	0.00	38.44
HHA Mixed	1.51	2.93	0.00	19.97
HHA Merit	1.76	4.83	0.00	31.94
Observations	8,490			
Institutions	433			

Expectations

- Increase in HTHA toward need-based aid increases expenditure shares on educational quality
- Increase in HTHA toward non-need based aid increases expenditure shares on amenities
- Effects will vary by selectivity of institution

Marginal Effects of HTHA - Mixed

- State decreases appropriations \$600 (2 SD) and raises mixed aid \$64 (1SD)

More Selective

Acad support share: 0.47pp (5.8%)

Less Selective

Instruction share: 1.04pp (3%)

Marginal Effects of HTHA - Merit

- State decreases appropriations \$600 (2 SD) and raises merit aid \$77 (1SD)

More Selective

Acad support share: -0.67pp (-8.2%)

Less Selective

Student services share: 0.07pp (1%)

Effects on Student Outcomes

- Using Webber & Ehrenburg (2010) effects of institutional expenditures on graduation rates
- HTHA toward need aid could have negative effect on grad rates among the more selective

In all cases the less selective increase grad rates

- Merit aid would have little impact

	More Selective	Less Selective
(1)	0.38pp	0.71pp
(2)	0.4pp	0.5pp
(3)	-0.02pp	0.15pp

Results

Table 5 – Effect of HTHA on State-Wide Standard Deviation of Expenditures

	(1)	(2)	(3)	(4)	(5)	(6)
	Instruction	Research	Academic Support	Student Services	Institution Support	Auxiliary
HTHA Need	-0.2381 (0.1338)	-0.5277 (0.2714)	0.0497 (0.0742)	-0.0875 (0.0722)	0.0336 (0.0716)	-0.1935* (0.0773)
HTHA Mixed	0.1230 (0.1372)	-0.2856 (0.1880)	-0.0233 (0.0847)	-0.0998 (0.0721)	0.1560 (0.1404)	-0.1051 (0.1376)
HTHA Merit	-0.2397 (0.1331)	0.0702 (0.1074)	0.0723 (0.0933)	0.0389 (0.0573)	0.0475 (0.0936)	-0.0033 (0.0773)
Obs.	863	858	863	863	863	863
States	44	44	44	44	44	44

Conclusions

	More Selective	Less Selective
Need Aid	Decreases % Instruction	Increases % Academic Support
Mixed Aid	Increases % Academic Support	Increases % Instruction
Merit Aid	Decreases % Academic Support	

- Results fail to reject null that HTHA leads to segmentation
- Statistical power is limited
- Estimates suggest that HTHA actually reduces segmentation

Conclusions

- A \$1 increase in need aid per \$100 appropriations:
 - Decreases % Instruction 0.29 points among more selective
 - Increases % Academic Support 0.16 points among less selective
- Mixed aid
 - Increases % Instruction 0.50 points among less selective
 - Increases % Academic Support 0.42 points among more selective
- Merit aid
 - Decreases % Academic Support 0.23

When a state government funds financial aid instead of appropriations, what effects should it expect?

Student Response

- Reduced appropriations: lower overall enrollment, higher out-of-state
- Merit-based aid: higher in-state enrollment, larger effect than appropriations
- Need-based aid: mixed evidence

(Heller, 1999; Kane, 2003; Long, 2003; Perna & Titus, 2004; Toutkoushian & Hillman, 2012)

Institutional Response

- Increased tuition
- Higher share of out-of-state students
- Higher institutional merit-based aid

(Hoxby 2000; Rizzo & Ehrenberg, 2004; Epple et al., 2006; Jacquette & Curs 2015)

HTHA and Institutional Expenditures

- **Hypothesis 1:** HTHA alters proportion of expenditures on educational quality.
 - Effect will vary by type of need and selectivity of institution
- **Hypothesis 2:** HTHA, specifically need aid, alters amenity expenditures among less selective institutions
- **Hypothesis 3:** HTHA increases state-wide segmentation in educational quality and amenities

Methods

$$(1) \quad \%Exp_{jst} = \beta_0 + HTHA_{st}\beta_1 + S_{st}\beta_2 + Z_{st}\beta_3 + \theta_j + \tau_t + \epsilon_{jst}$$

$$(2) \quad SD(\%Exp_{st}) = \beta_0 + HTHA_{st}\beta_1 + S_{st}\beta_2 + Z_{st}\beta_3 + \theta_s + \tau_t + \epsilon_{st}$$

$$\%Expenditures = \frac{\textit{Category}}{\textit{Total Operational Expenditures}}$$

$$HTHA = \frac{\$ \textit{Grant Aid (by type)}}{\$100 \textit{ Appropriations}}$$

S = levels of each type of subsidy

Z = state controls: unemployment and poverty rates

θ = institution j fixed effects or state s fixed effects

τ = year fixed effects