

The Dramatic Economics of the U.S. Market for Higher Education: The Full Spectrum from Greatness to Mediocrity



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SOME FIGURES IN THIS PRESENTATION ARE BASED ON “THE VALUE-ADDED OF U.S. POSTSECONDARY INSTITUTIONS” WHICH IS A COMPONENT OF A LARGER PROJECT EXAMINING THE EFFECTS OF FEDERAL TAX AND OTHER EXPENDITURES THAT AFFECT HIGHER EDUCATION THROUGH CONTRACT TIR-NO-12-P-00378 WITH THE STATISTICS OF INCOME (SOI) DIVISION AT THE U.S. INTERNAL REVENUE SERVICE. OPINIONS EXPRESSED IN THIS PRESENTATION ARE THOSE OF THE AUTHOR ALONE AND DO NOT REPRESENT THE VIEWS OF THE INTERNAL REVENUE SERVICE OR THE U.S. TREASURY DEPARTMENT.

I will argue that



1. The market for higher education exhibits strong correlation between students' college readiness (CR) & the educational resources of the institution they attend.
 - This correlation is stronger where market forces are more powerful.
2. The productivity of educational resources is fairly similar among institutions that experience fairly strong market forces.
 - Market forces appear to force schools to be more productive and productive at the same level as others.

Productivity is lower and more dispersed among institutions that experience weak market forces.
 - If productivity in higher education is important for economic growth, then it may be problematic that the institutions expanding most quickly have the weakest market forces and lowest productivity.
3. If we take the productivity results and the resources/CR relationship as manifestations of market forces, there are very important implications.
 - The tertiary education production function must exhibit strong single crossing in resources and CR. This has consequences for income *growth* and income *equality*.

Part 1:

The U.S. Market for Higher Education



THE U.S. HAS ARGUABLY THE ONLY TRUE *MARKET* FOR HIGHER EDUCATION. IT IS CERTAINLY THE MOST INFORMATIVE MARKET FOR ECONOMIC ANALYSIS.

THERE ARE NUMEROUS GOVERNMENT INTERVENTIONS IN U.S. HIGHER EDUCATION, BUT THEY INTERACT WITH, RATHER THAN DOMINATE, MARKET FORCES.

The market exhibits strong variation, highly correlated with selectivity



- At the highly selective end of the spectrum, the market is
 - integrated/competitive
 - relatively informed (about schools, about students)
 - privately financed
 - populated by students who are elastic to institutions' academic and other resources
 - characterized by strong assortative matching between educational resources and students' CR
- At the other end of the spectrum, fairly opposite conditions prevail.

Quick Review of the Market



- ~7,500 postsecondary institutions.
- 3 types of governance: public, non-profit, for-profit.
- Institutions choose tuition, application requirements, students, faculty, curriculum, salaries, financial aid, and how to raise money from donors (if non-profit) or investors (if for-profit).
 - Public institutions less autonomous but very autonomous by international standards.
- Selective schools admit holistically but test scores are statistically most powerful indicator of students' CR.
 - "more selective" = higher scores.

Financial
Aid

Quick Review, cont.

State
appropriations,
Gifts



- Net tuition \neq list tuition \neq educational resources
 - Strikingly, the most selective schools have high resources and list tuition, but they are *free* for low-income students and subsidize tuition for *all* students.
- Federal intervention is mainly portable grants, loans, and tax credits/deductions.
- Think of U.S. postsecondary education as a market with many price distortions, not a centrally controlled sector.

From Previous Work



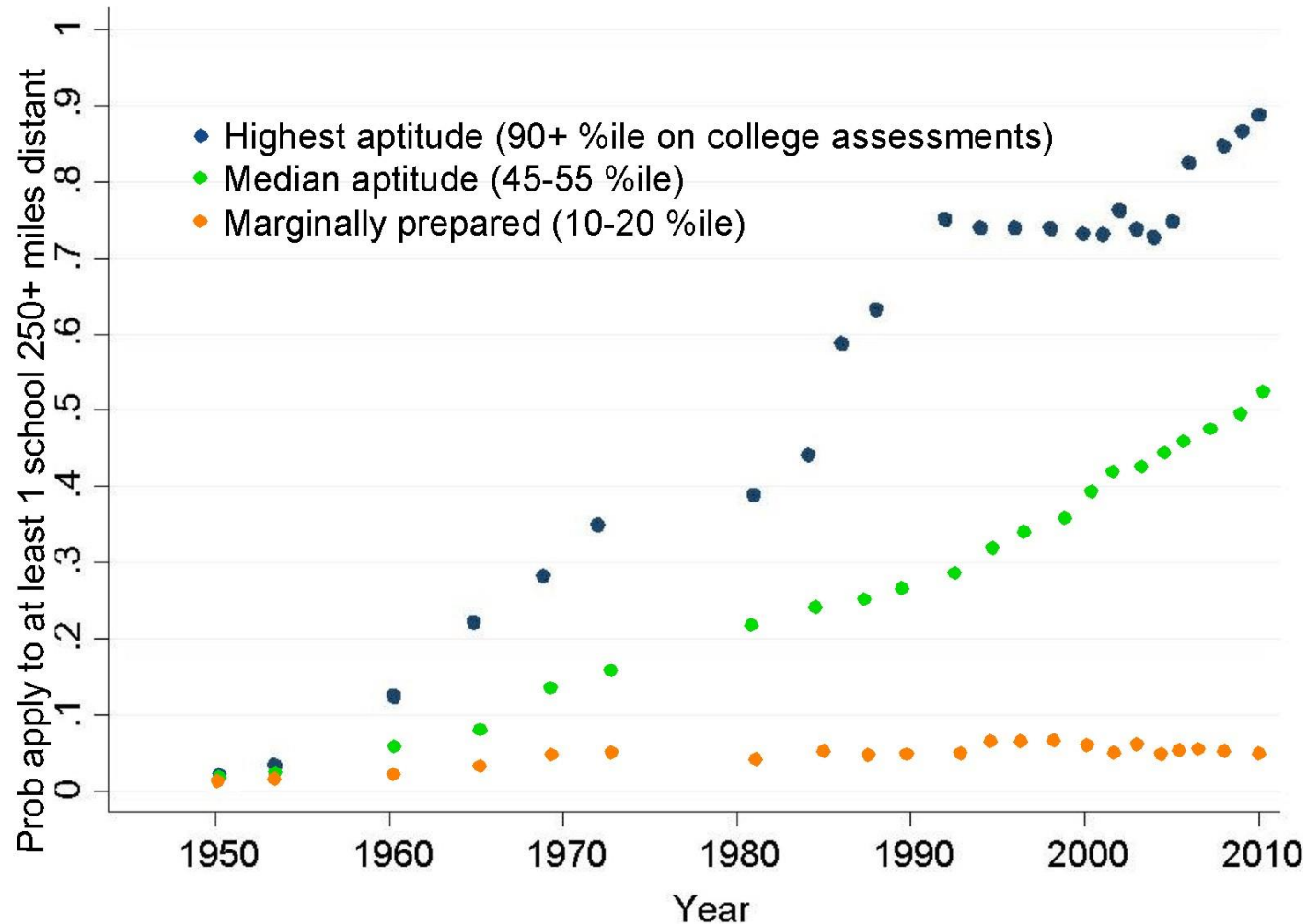
- Starting from near autarky in 1875, the postsecondary market became geographically integrated, especially for high CR students and after 1950 when information on students and institutions improved.
- As the market became more integrated, high CR students tended more and more to attend the institutions with the most resources per student.
- Since many high CR students could not pay for these resources up front, this was achieved by increasingly large subsidies for students at selective institutions.
 - In consequence, the correlation between parents' income and educational resources fell.

From Autarky to Integration



A QUICK RETROSPECTIVE OF THE U.S. POSTSECONDARY MARKET

Percent of Students who Apply to a Postsecondary Institution at a Distance of at least 250 miles



Statistical models of postsecondary choice...



- ...based on comparable, longitudinal data from U.S. Dept. of Education* show that over time:

- Distance *decreasing in importance*

- Maternal and paternal education *decreasing in importance*

All of these changes over time much more dramatic for students with high CR.

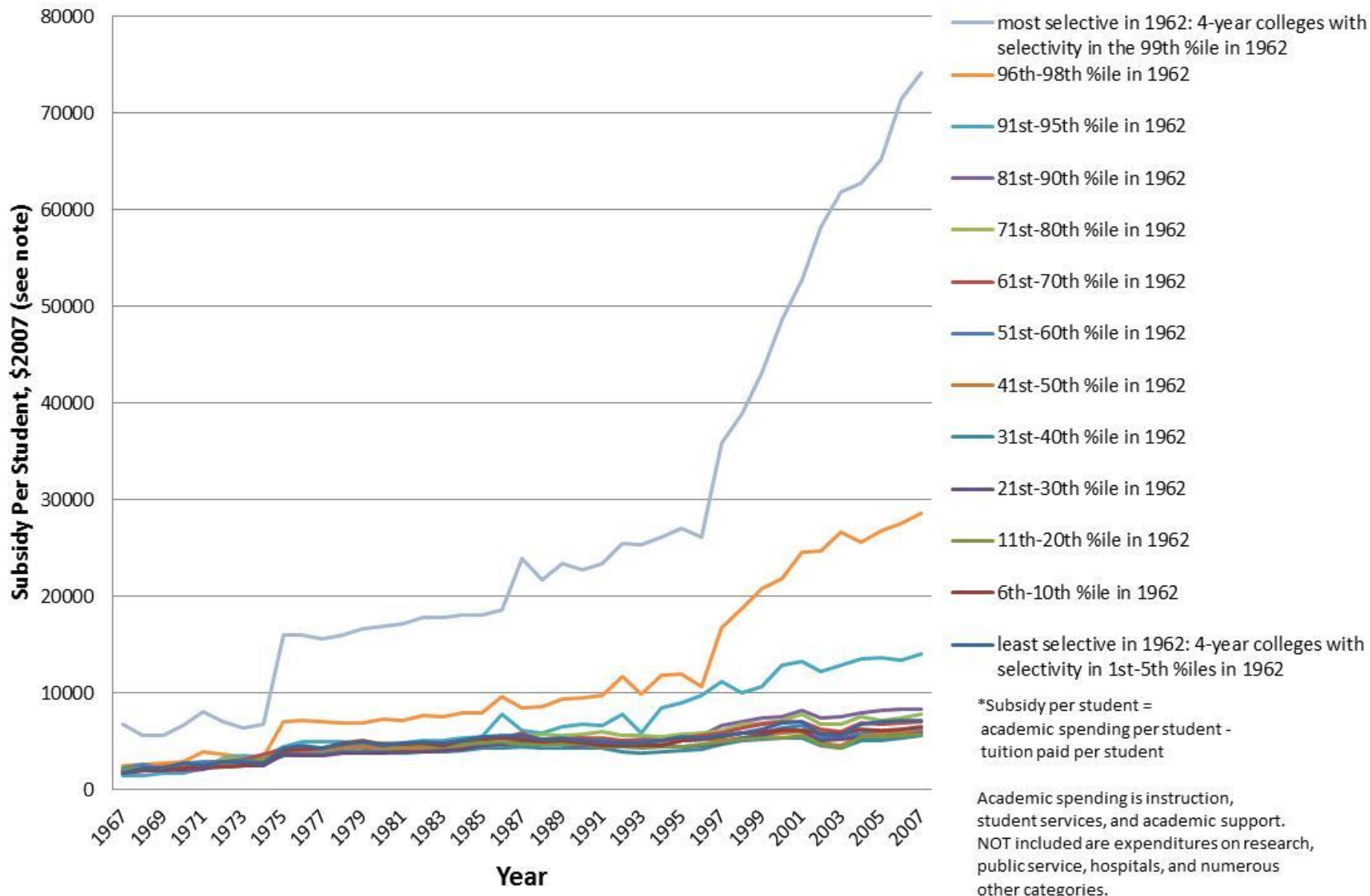
- Parents' ability to pay for school's educational resources *decreasing in importance*

*SURVEY/GRADUATING CLASS: NLS (1972), HSB (1982), NELS (1992), ELS (2002), HSLS (2013).



Increasing Subsidies for Students, especially at Selective Institutions

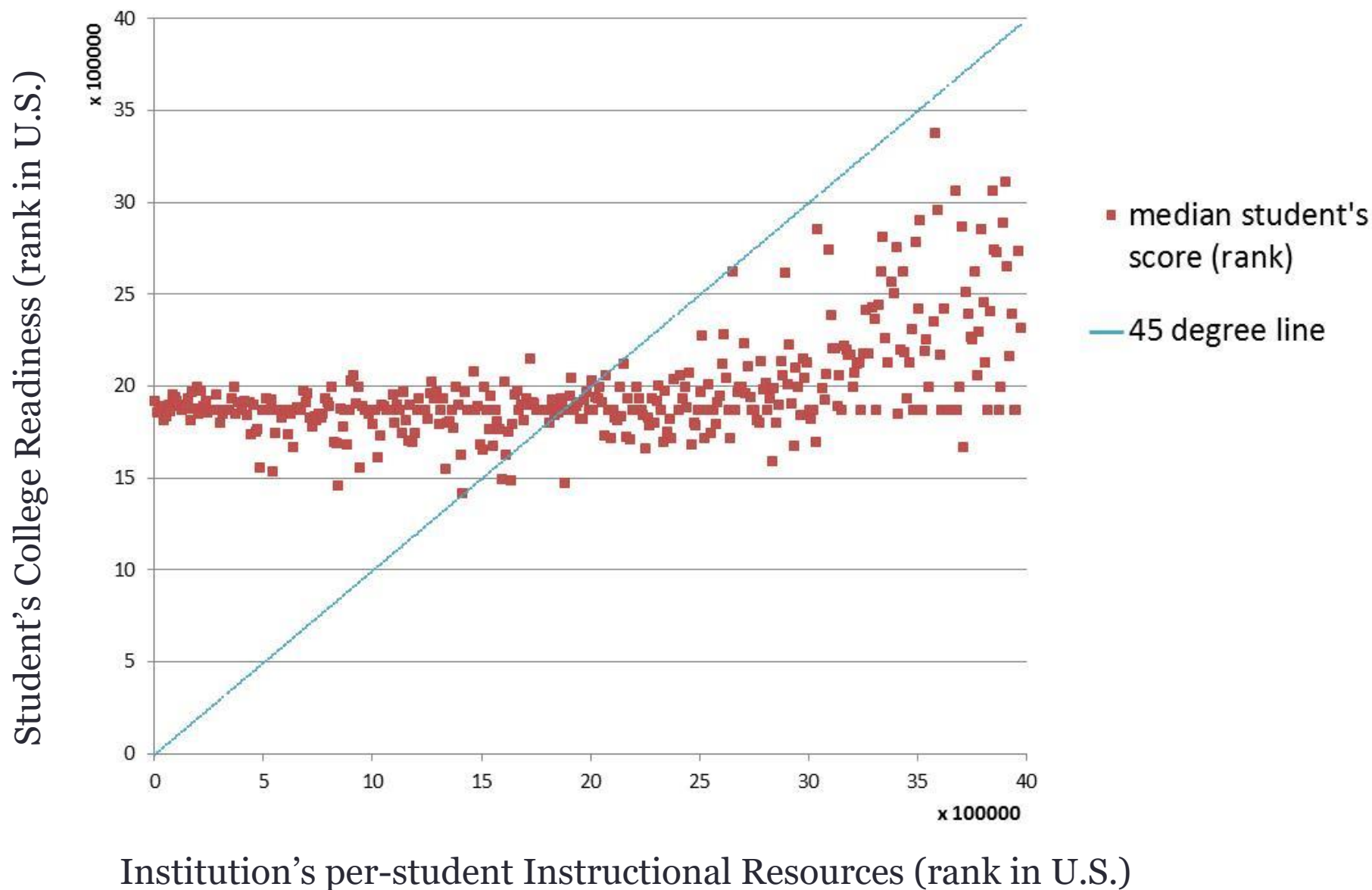
Average Subsidy Per Student (in \$2007)*, by Colleges' Selectivity in 1962



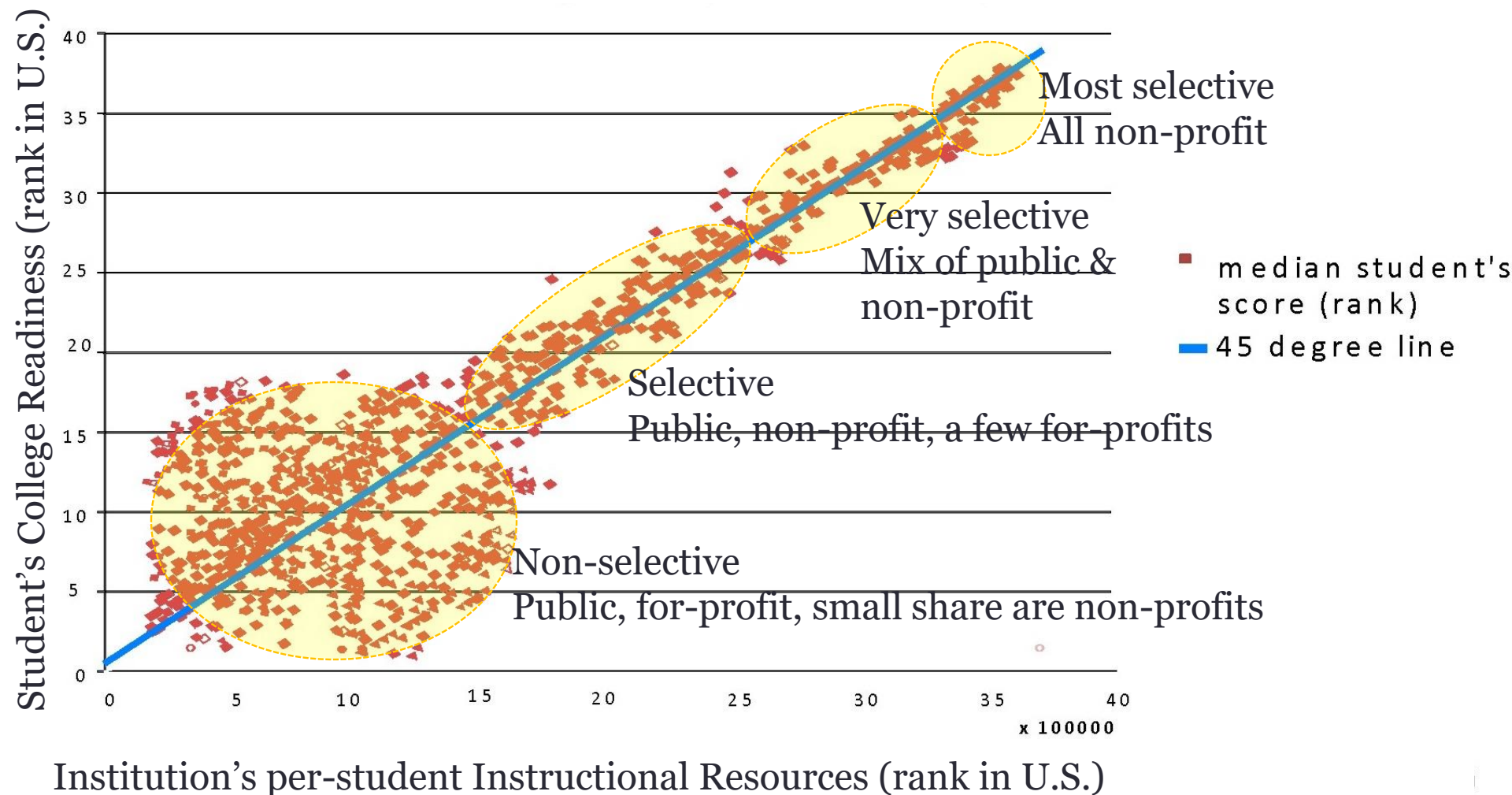


Sorting of students to educational resources circa 1967 and 2013

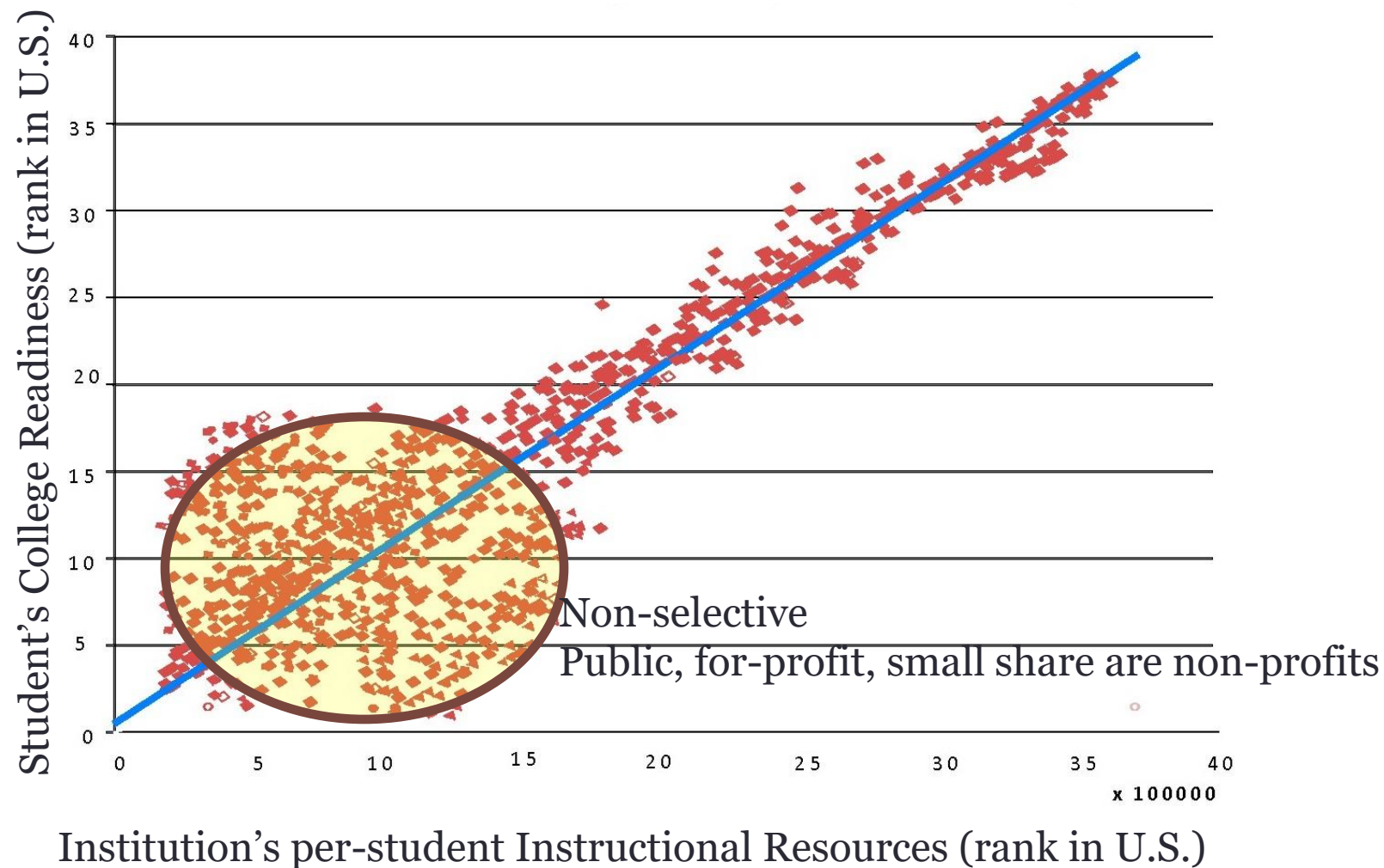
1967 Matching between Student's Rank on College Readiness and Institution's Rank on Educational Resources



2013 Matching between Student's Rank on College Readiness and Institution's Rank on Educational Resources



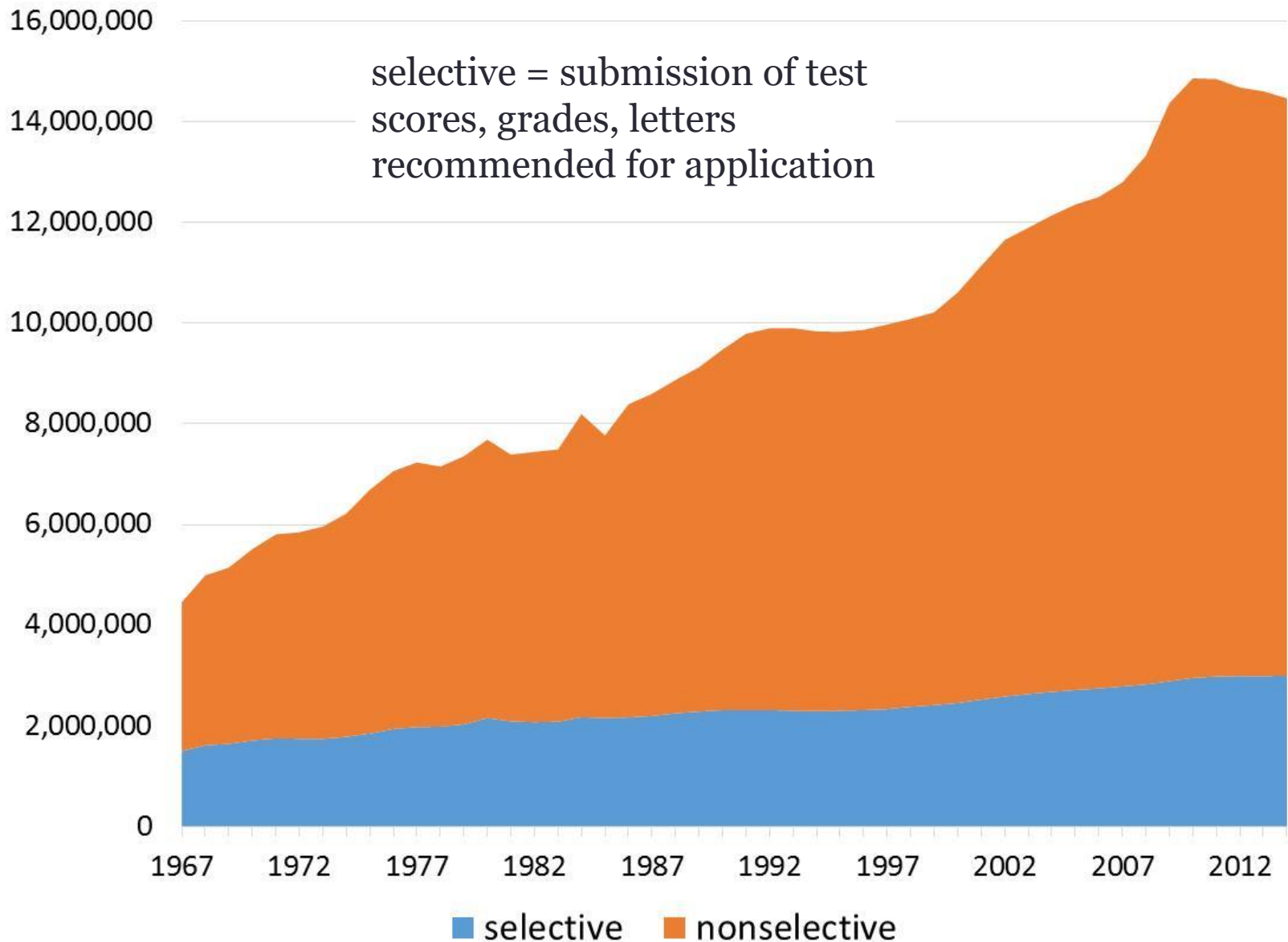
2013 Matching between Student's Rank on College Readiness and Institution's Rank on Educational Resources



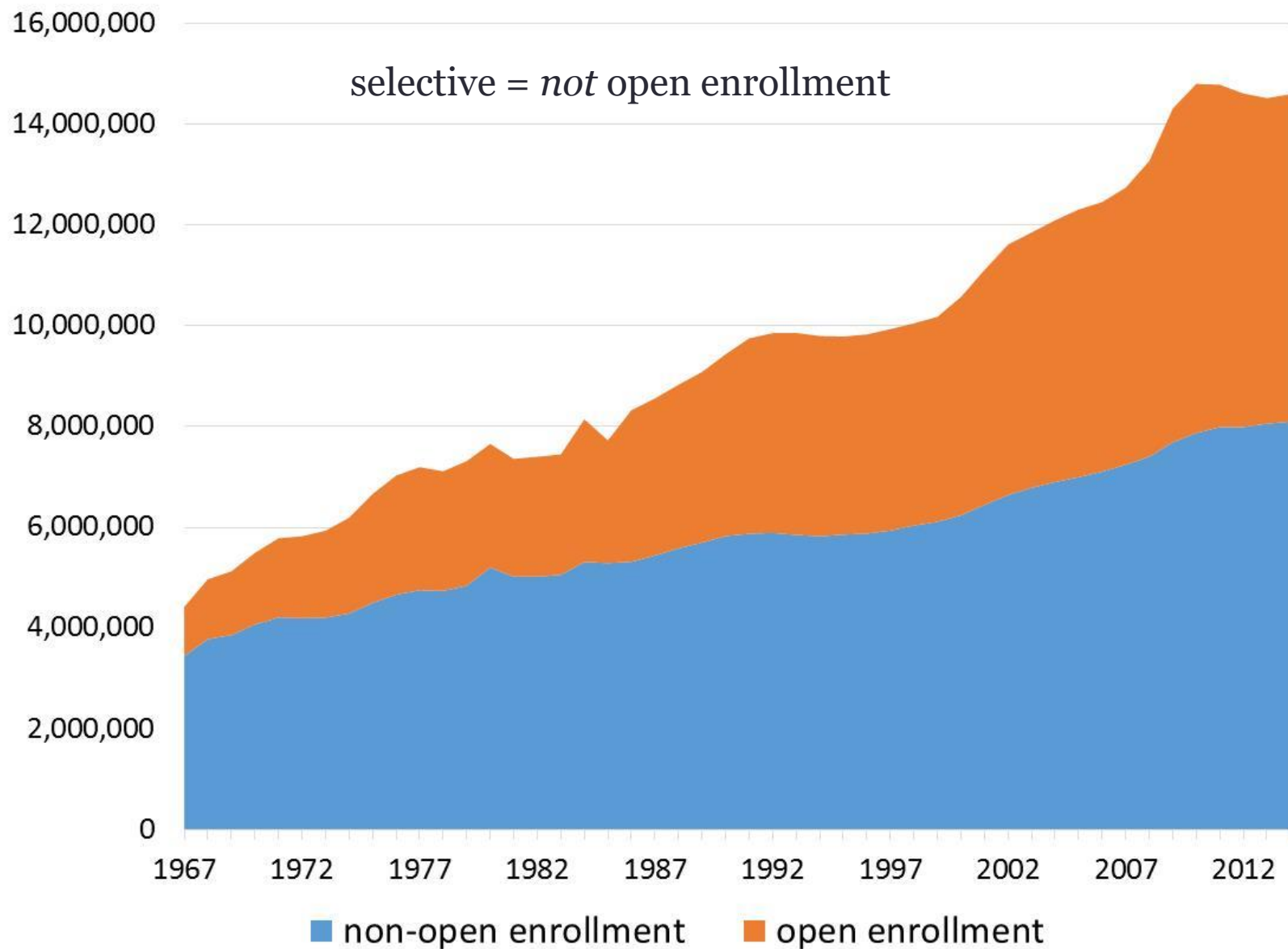


Expansion of the Non-Selective Sector

Growth of Enrollment in the Non-Selective Sector



Growth of Enrollment in the Non-Selective Sector



The U.S. Postsecondary Market Today



THE HIGHLY AND NON-SELECTIVE PARTS OF THE MARKET DIFFER IN:

- educational resources
- integration/competition
- information (about schools, about students)
- degree to which undergraduate education is paid by students
- students' sensitivity to institutions' resources
- degree of assortative matching between students' CR and institutions' resources

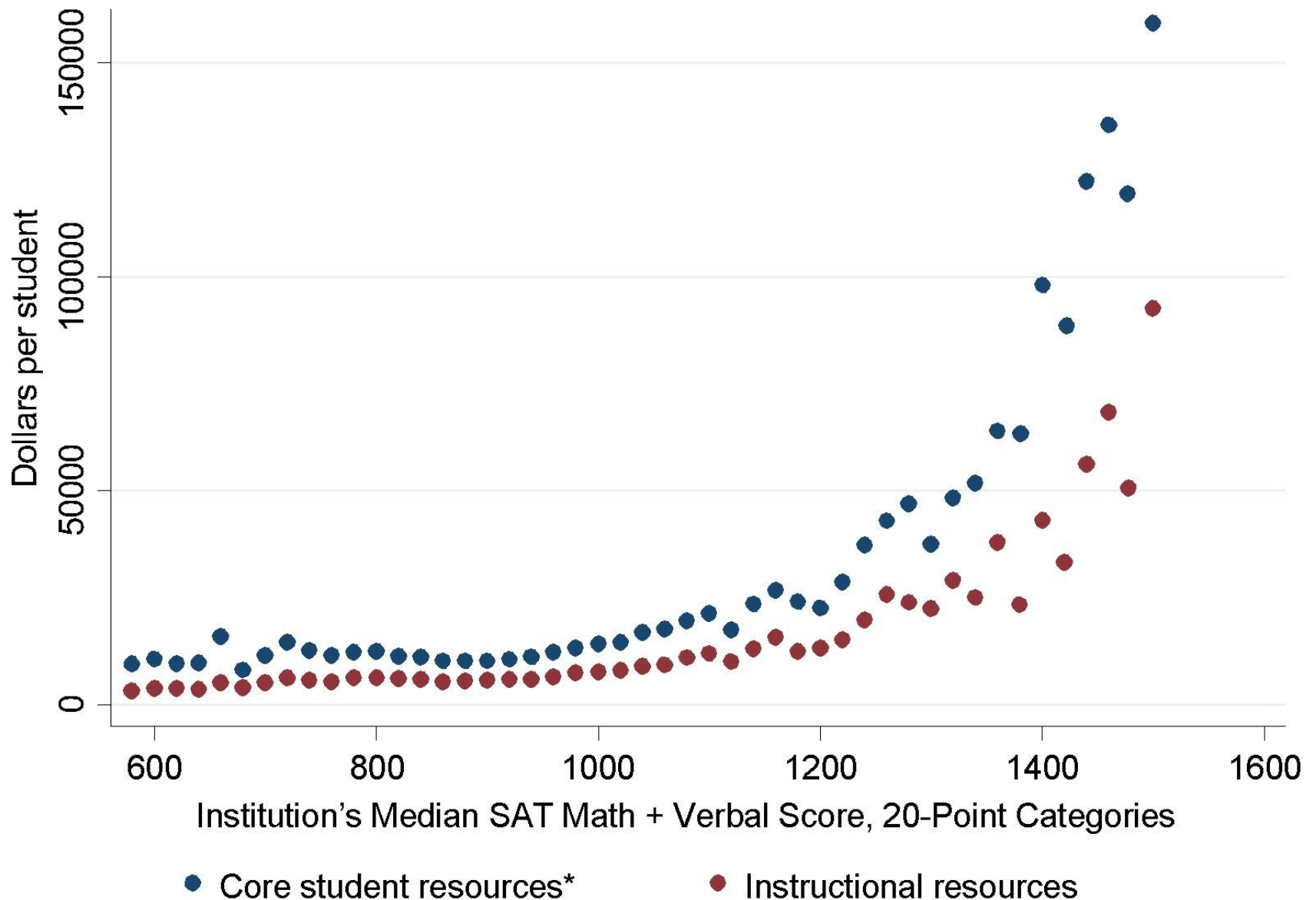
The U.S. Postsecondary Market Today



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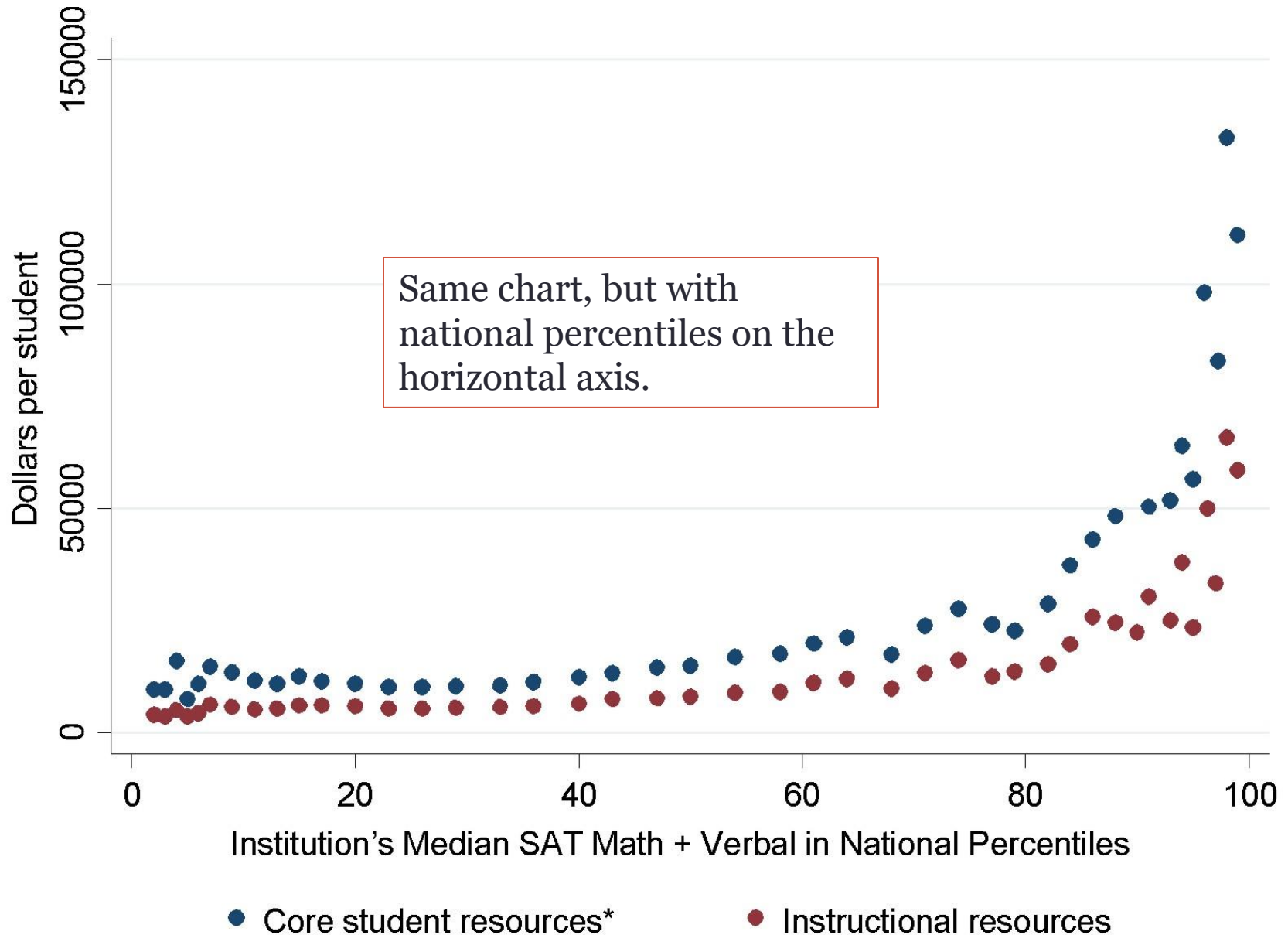
- educational resources
- integration/competition
- information (about schools, about students)
- degree to which undergraduate education is paid by students
- ~~• students' sensitivity to institutions' resources~~
- ~~• degree of assortative matching between students' CR and institutions' resources~~

Core Student & Instructional Resources per student, 2013-14 by Institution's Selectivity

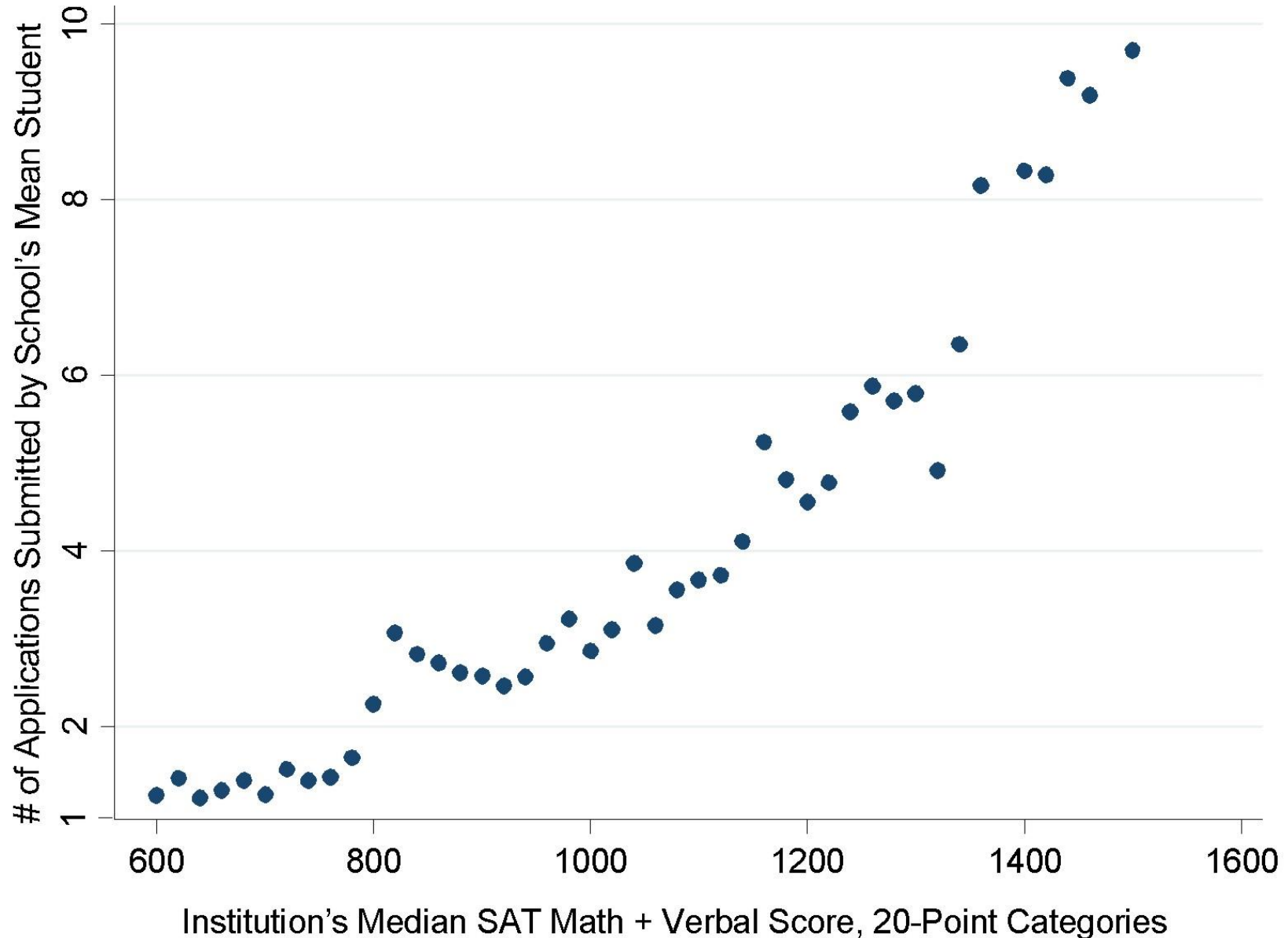


*CORE RESOURCES: INSTRUCTION, STUDENT SERVICES, ACADEMIC SUPPORT, INSTITUTIONAL SUPPORT

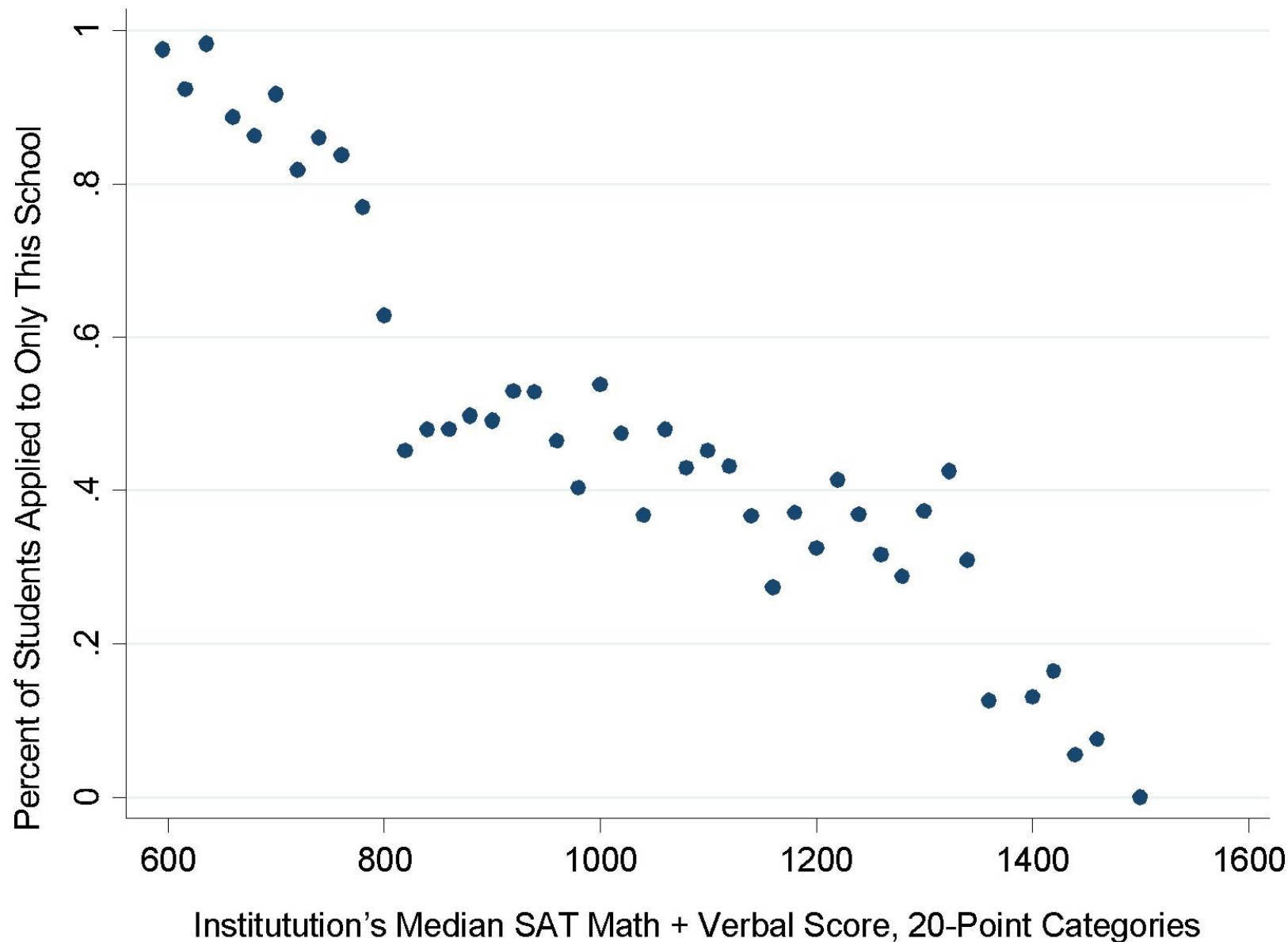
Core Student & Instructional Resources per student, 2013-14 by Institution's Selectivity



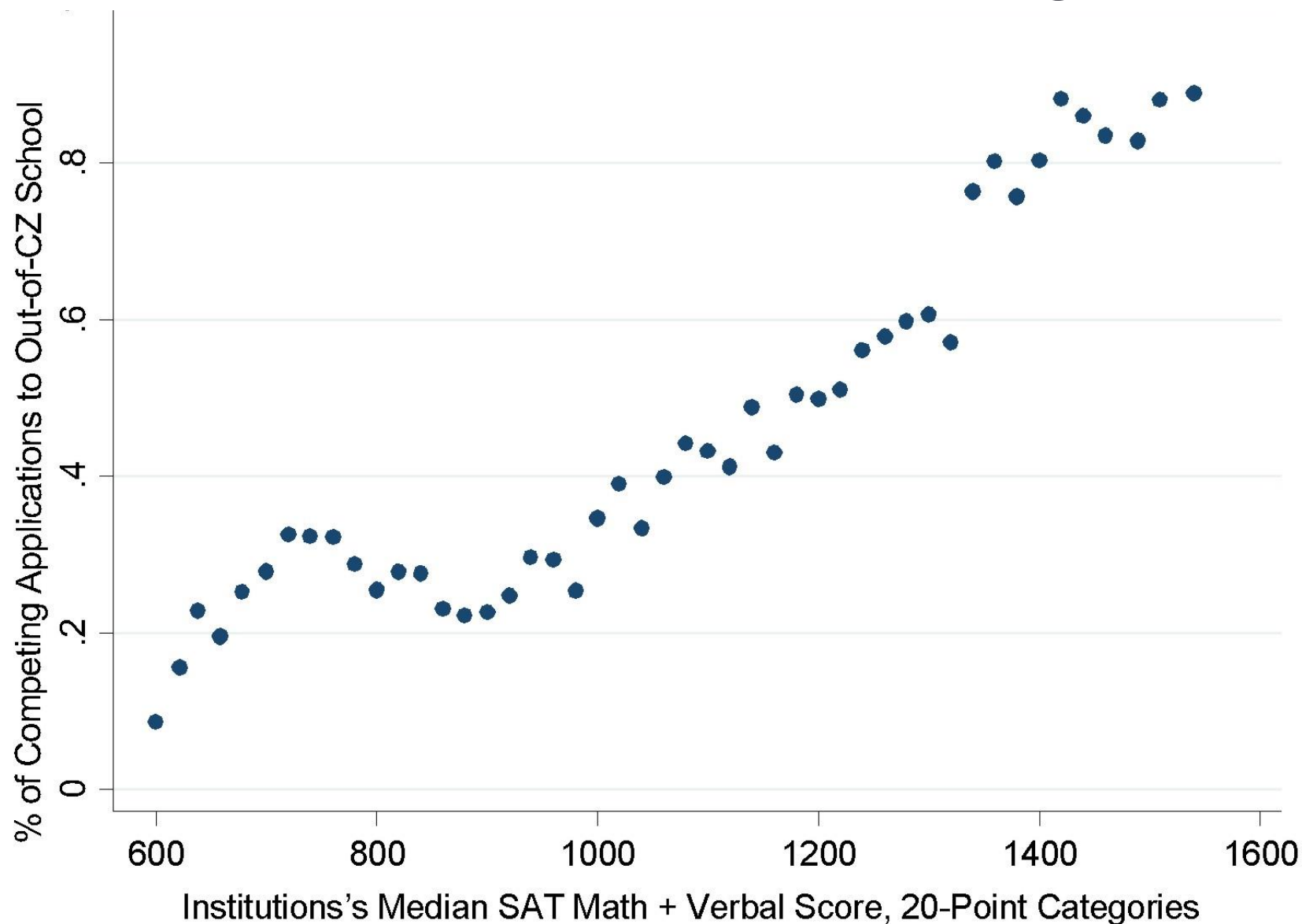
Competition/Integration 1: Average Number of Applications Submitted by Institution's Students



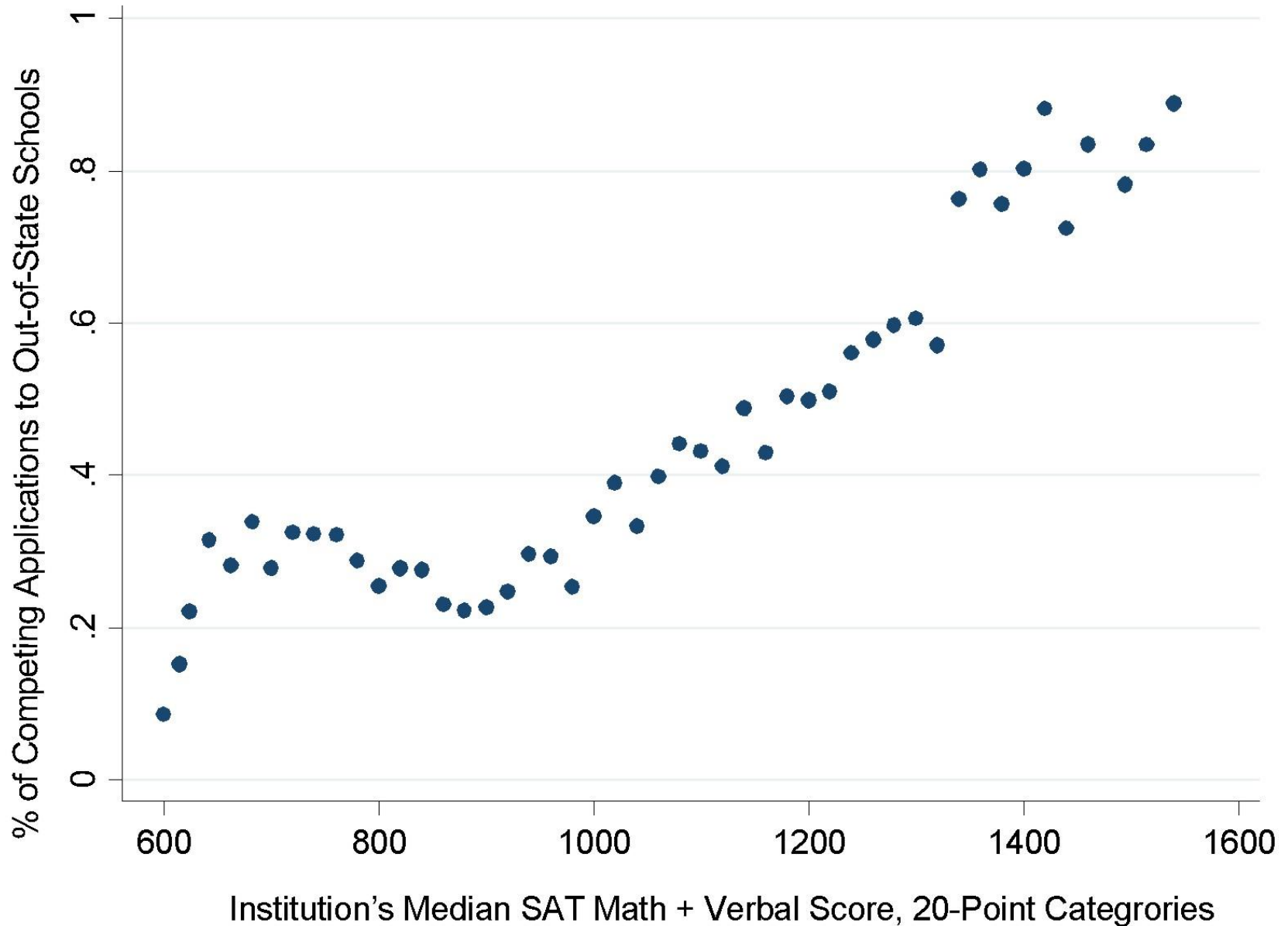
Competition/Integration 2: Share of Institution's Students who Applied *Only* to the School Itself



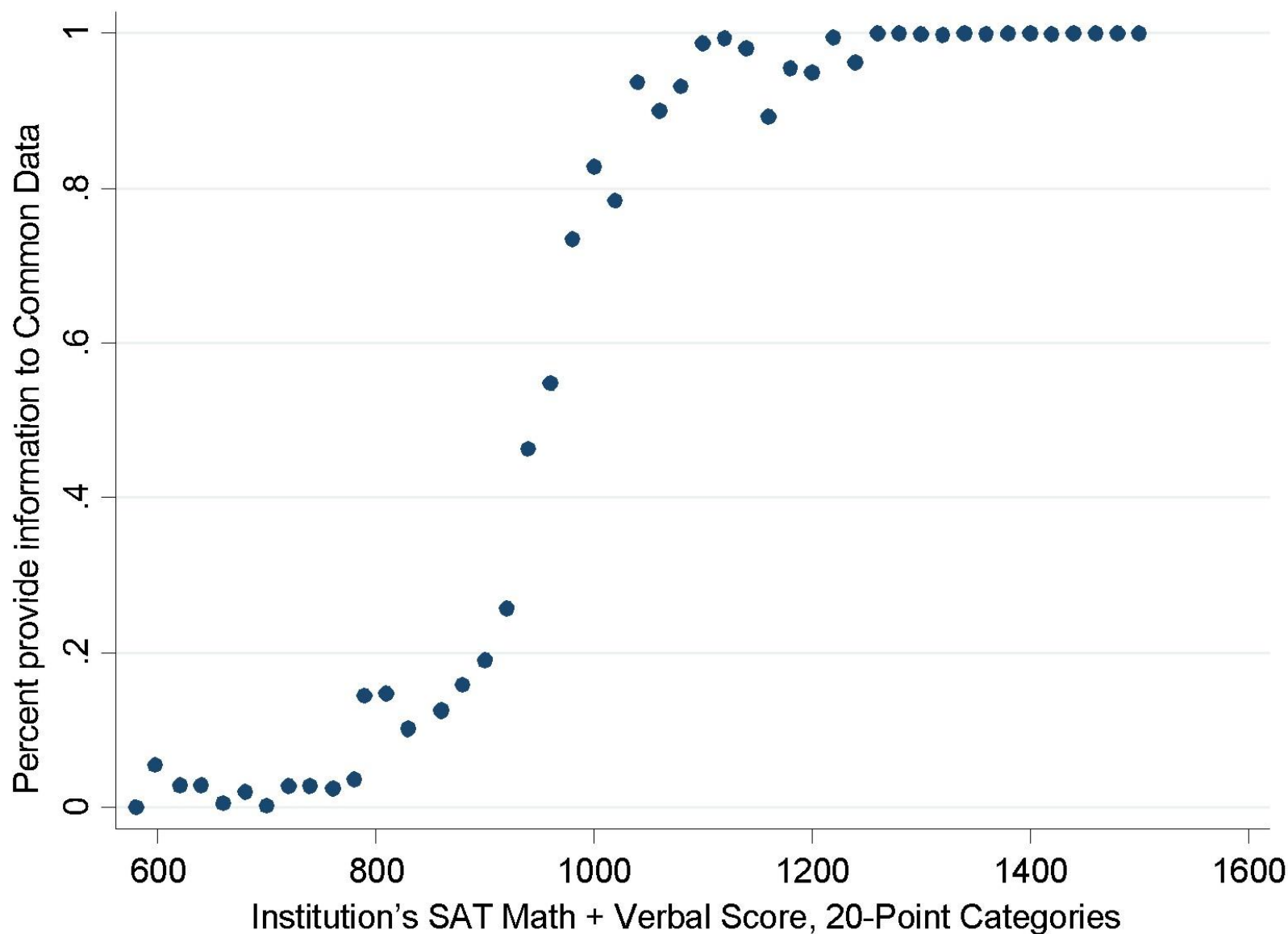
Competition/Integration 3: Share of “Competing Applications” Sent to Institutions in Another Commuting Zone



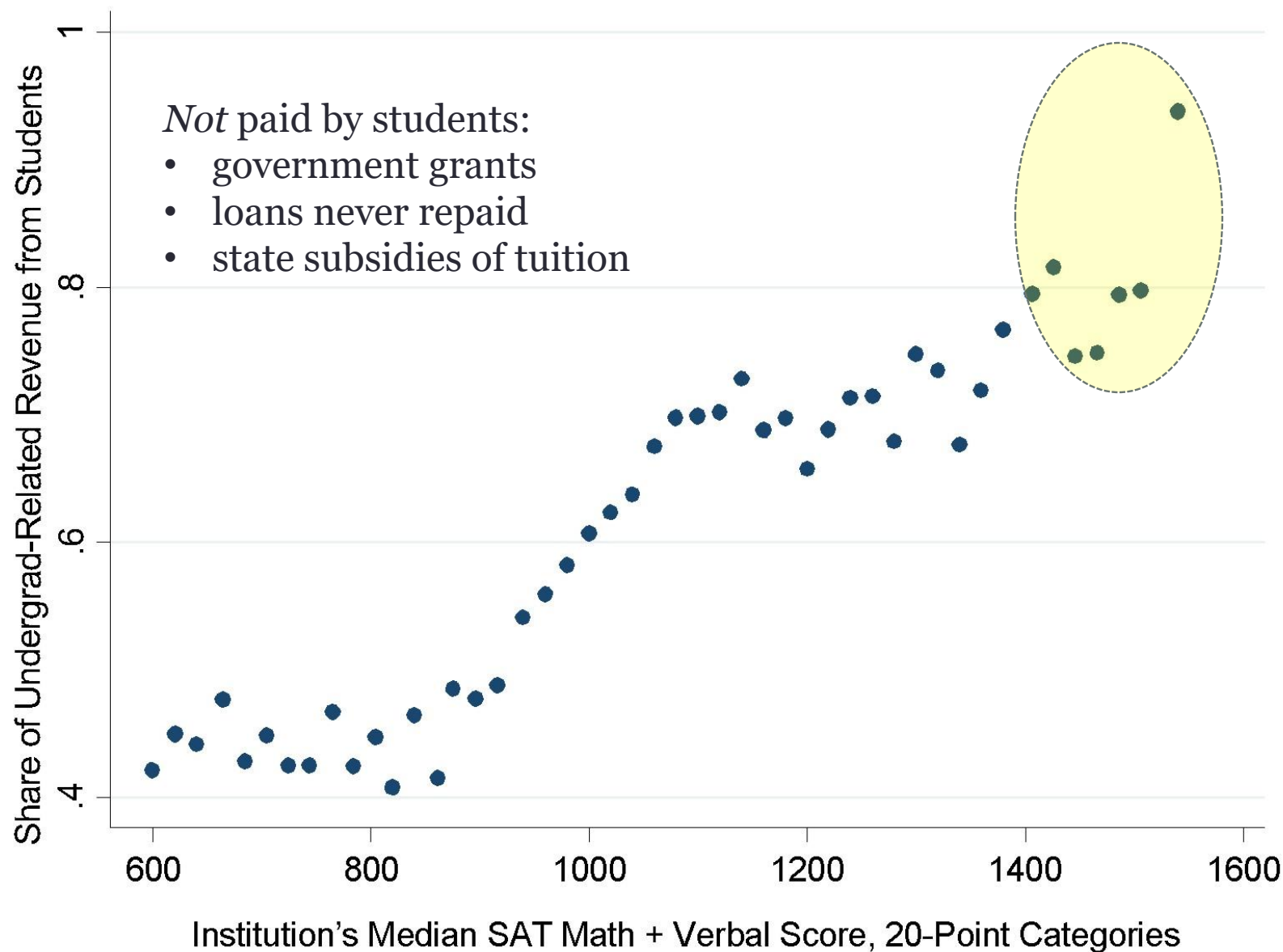
Competition/Integration 4: Share of “Competing Applications” Sent to Institutions in Another State



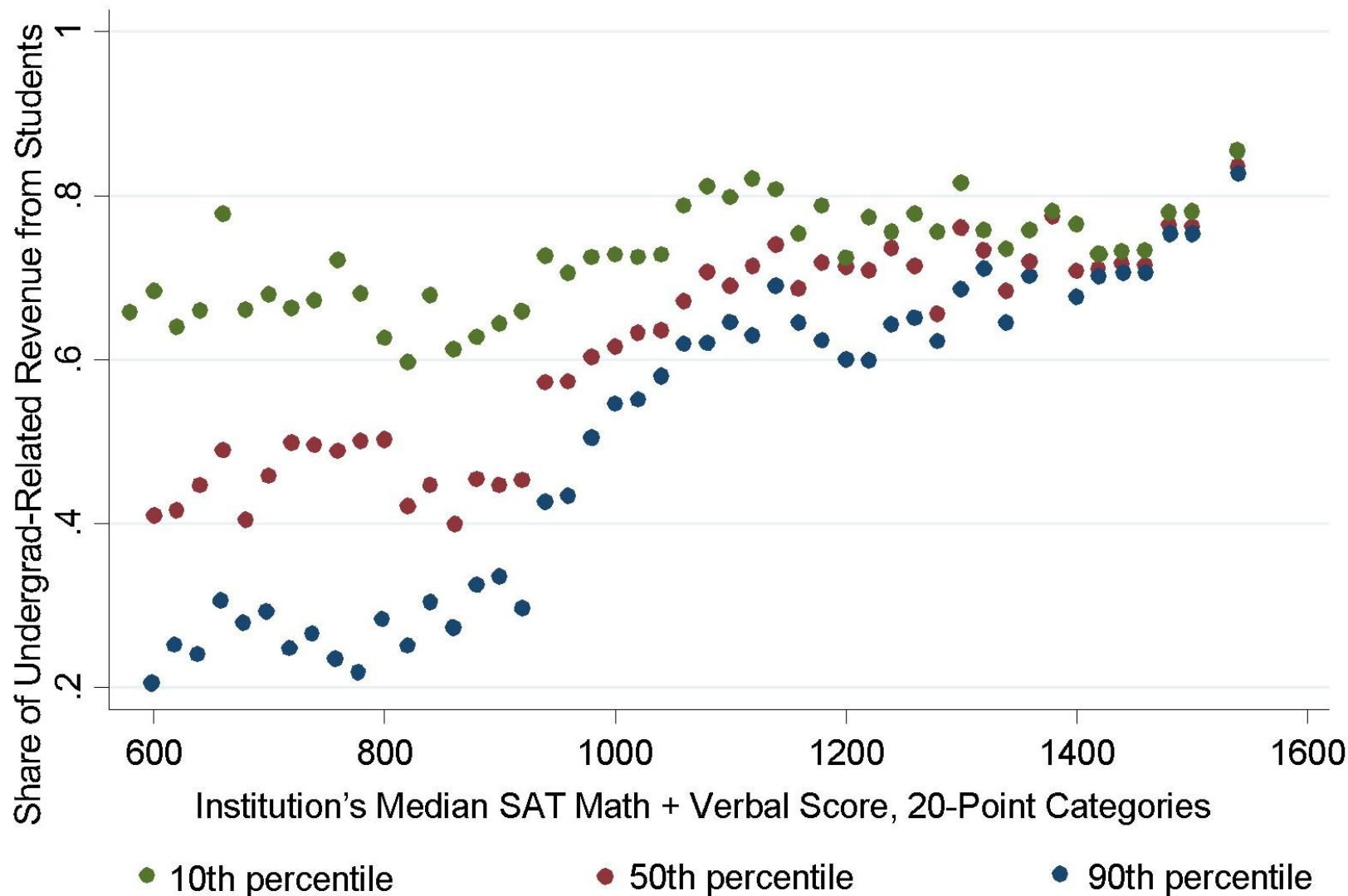
Information: Share of Institutions that Provide Comparable Information to the Common Data Set used in Guides



Share of Undergraduate Revenue Paid by Students*



Share of Undergraduate Revenue Paid by Students



Part 2: Productivity of Postsecondary Institutions



NUMERATOR: the *causal* increase in lifetime earnings triggered by enrolling in the institution.
“Value-added”

DENOMINATOR: the *causal* increase in lifetime educational spending triggered by enrolling in the institution. “Social Investment”

PROBLEM: bias from vertical & horizontal selection

Vertical: schools enroll students who differ in CR.

Horizontal: schools that enroll students who are alike on CR may differ on geography etc.

The Method from 1000 Feet



- Deal with vertical selection by finding each school's "on the bubble" range in admission. Treat students on the bubble as randomized by *admissions staff*. Result: many A versus B experiments where college B is somewhat less selective.
- Deal with horizontal selection by finding *students* choosing among colleges that are in an indifference set (very similar selectivity on vertical grounds). Treat students as randomizing among them. Result: many A versus C experiments where A and C have very similar students.
- Using paired comparison methods, combine the results of all the pairwise experiments to obtain value-added and social investment that is as free of selection bias as possible.

Summary of the Method



1. Gather the differences in earnings and social investment from all vertical experiments involving students who are on-the-bubble at some selective school and exposed to randomization by admission staff.
 - Longitudinal data used up to age 32, projected thereafter.
2. Gather the differences in earnings and social investment from all horizontal experiments involving students who choose between equally selective schools.
3. Combine the experimental results using paired comparison techniques.

Strengths and Limitations of the Method



Strength: We remove most or possibly all selection bias.

Strength: Common support is always fulfilled.

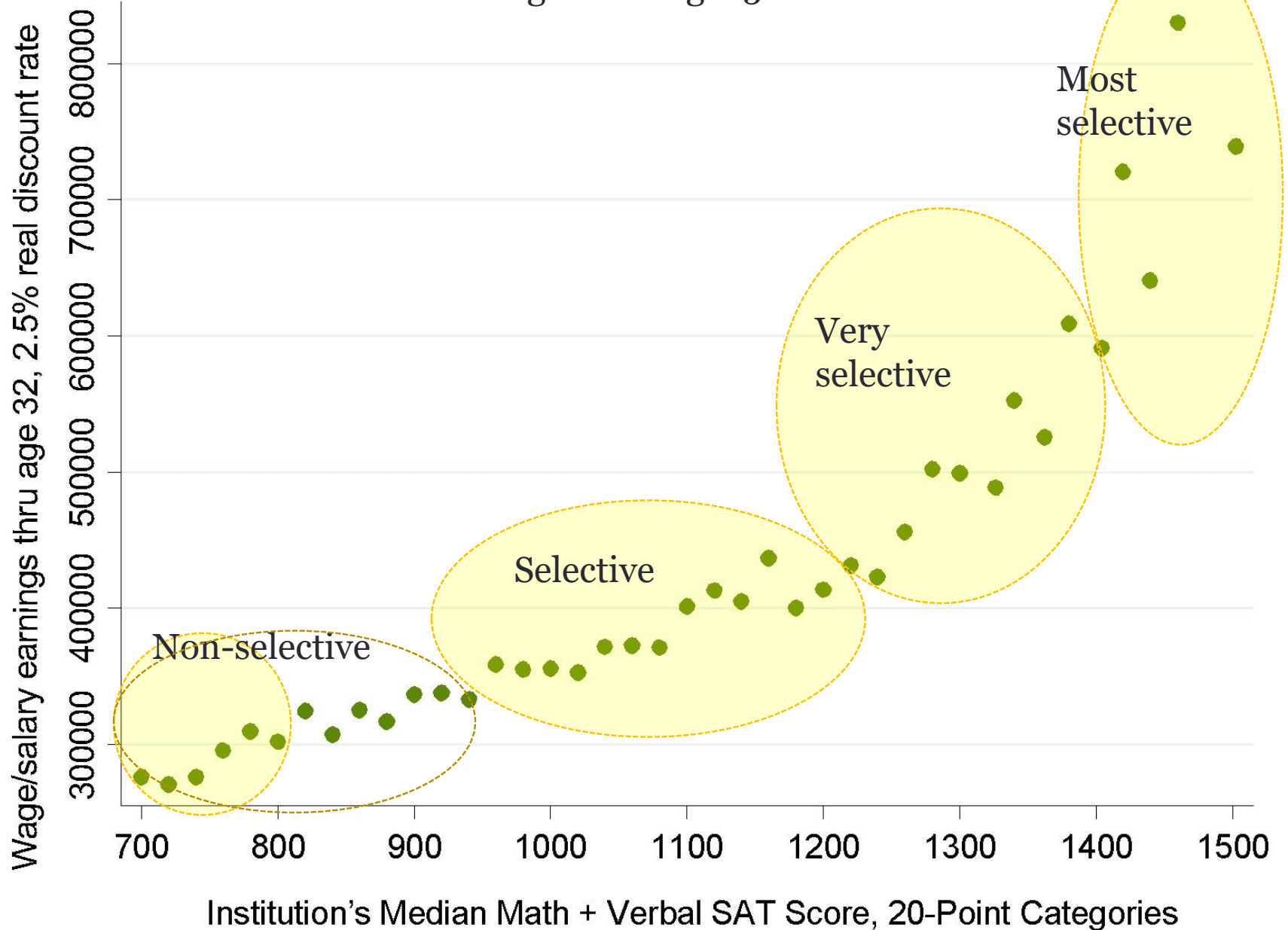
Strength: No form imposed on relationship between value-added & CR.

Strength: It is obvious which assumptions need robustness checks.

Limitation: I know of no general fix for nonselective vs. no-postsecondary-at-all selection. Thus, we learn about productivity relative to the *least selective institutions*.

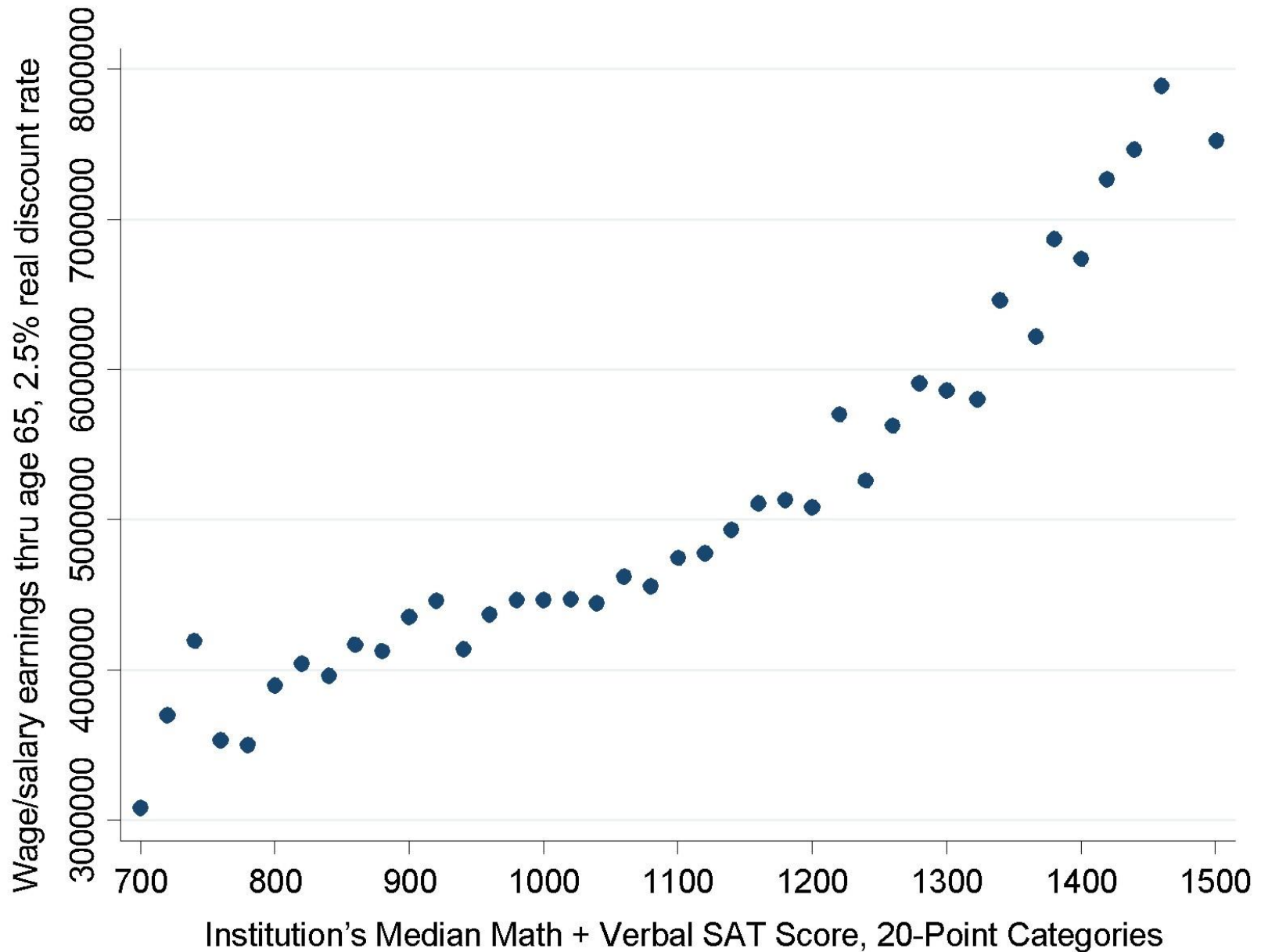
Wage & Salary Earnings through Age 32

discounted back to age 18 using 2.5% real discount rate



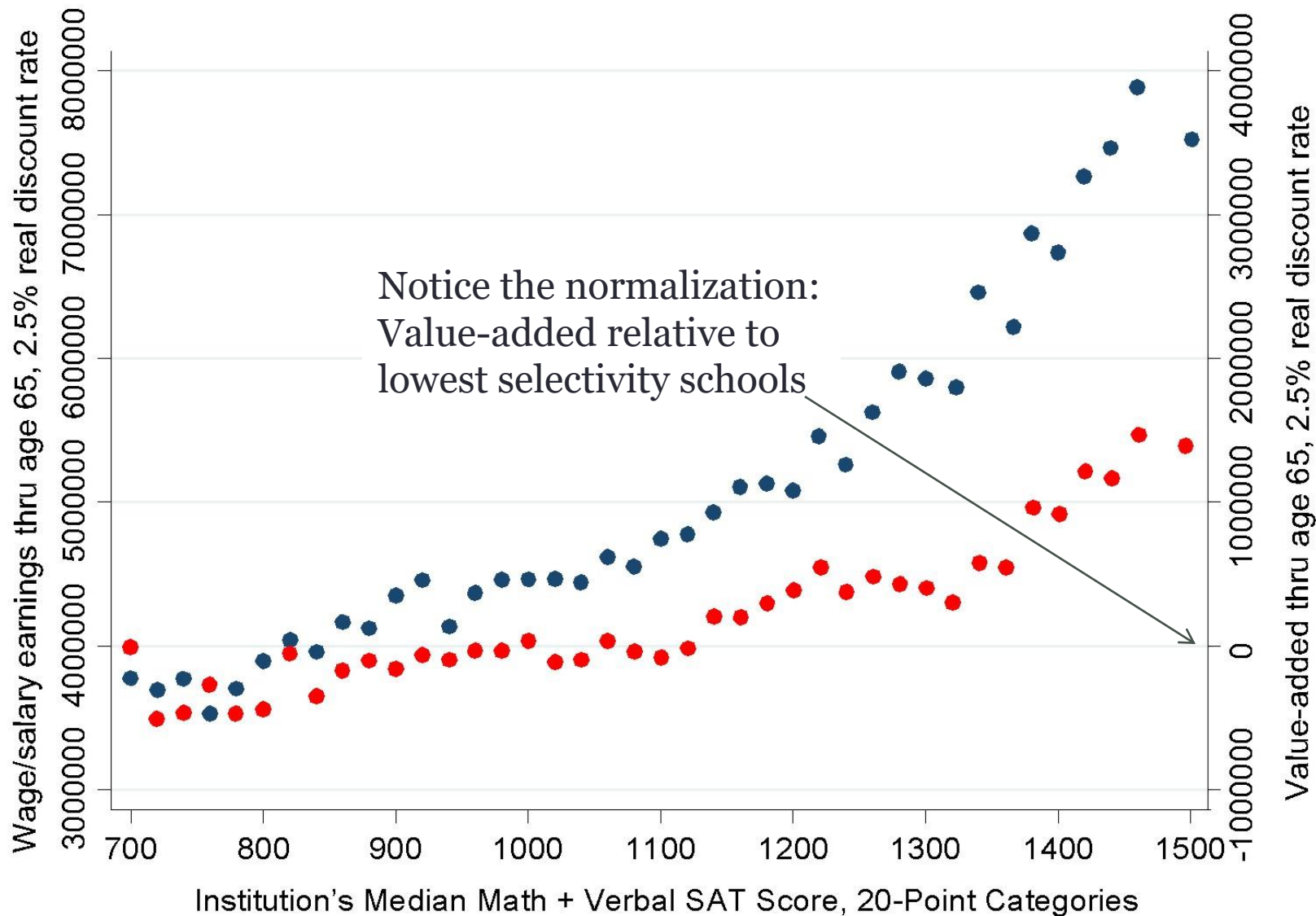
Wage & Salary Earnings Projected through Age 65

discounted back to age 18 using 2.5% real discount rate

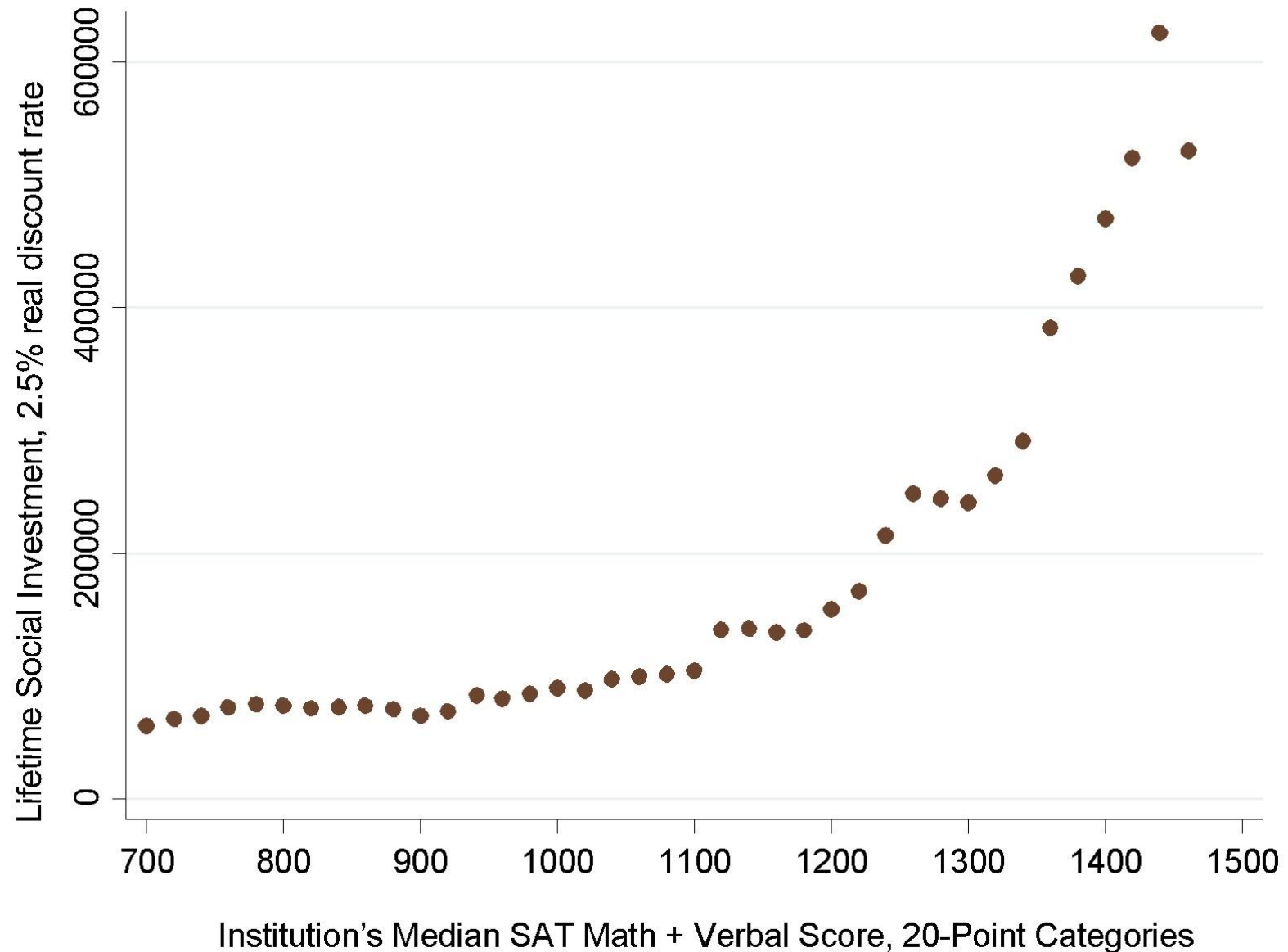


Wage & Salary Earnings and *Value-Added* Projected through Age 65

discounted back to age 18 using 2.5% real discount rate

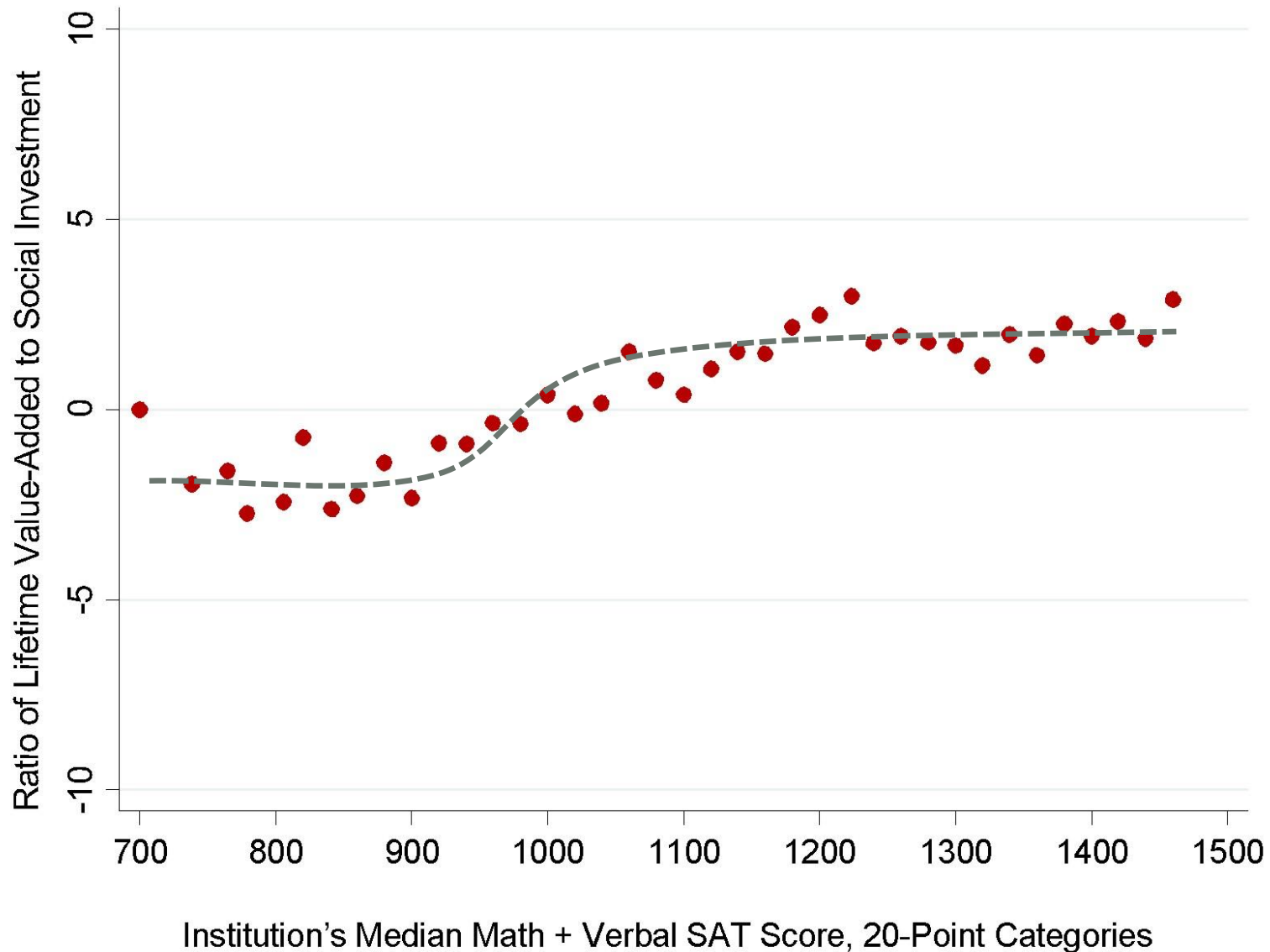


Lifetime Social Investment in Postsecondary Education (through age 32), discounted back to age 18 using 2.5% real discount rate



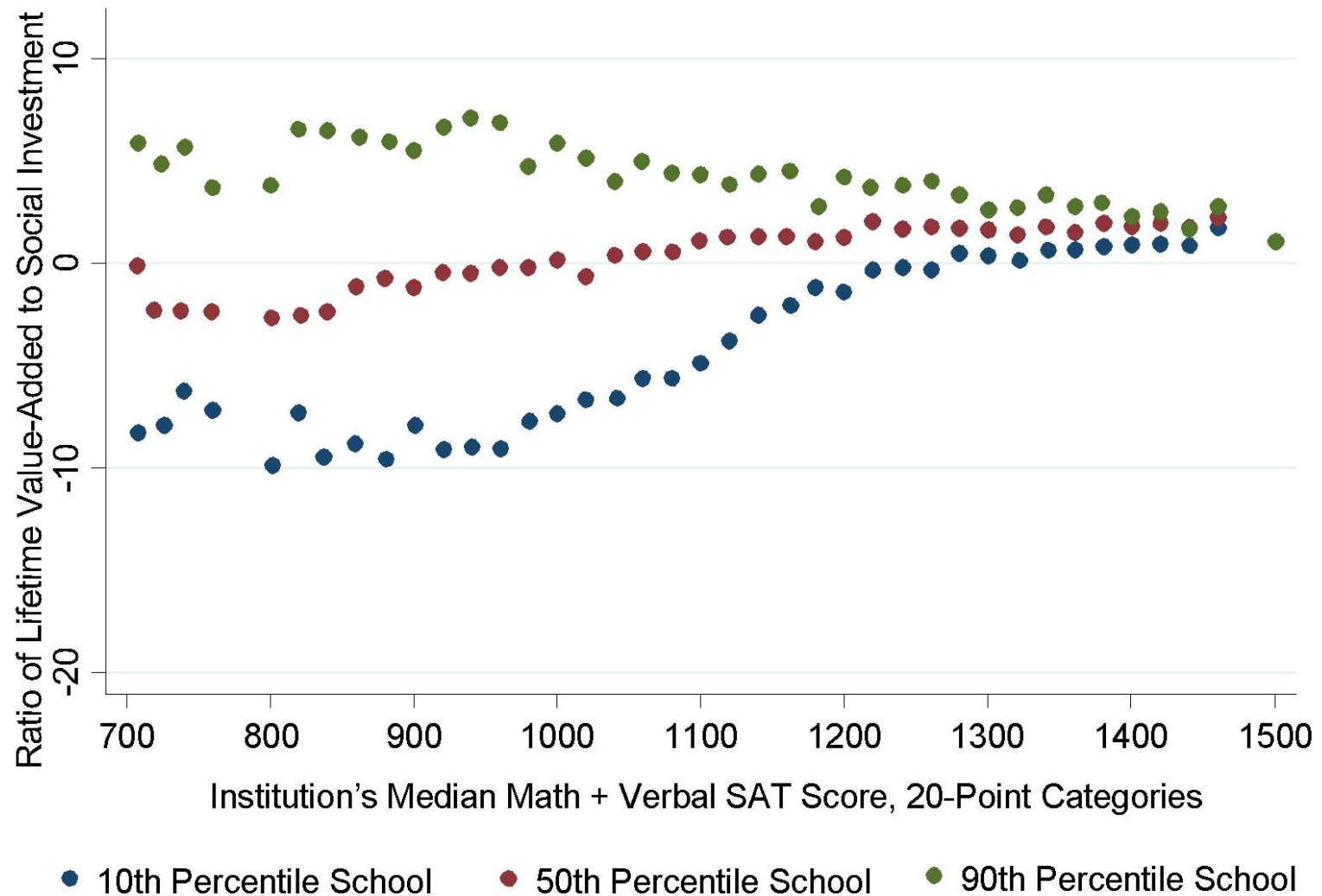
Average Productivity of a Dollar of Social Investment

= Lifetime Value-Added/Lifetime Social Investment
(relative to least selective institutions)



Dispersion among Institutions in the Productivity of a Dollar of Social Investment

(relative to least selective institutions)



Assess Where We Are



- Productivity for a dollar of social investment is flat across a range of selectivity.
 - Striking because these schools have very different educational resources.
 - Suggests that resources are scaling up with students' CR such that there are no easy gains to be had from reallocating a dollar among the selective schools.
 - This does not mean that selective schools make maximally productive use of resources. They could just be similarly inefficient.

Assess Where We Are, cont.



- Relative to the least selective institutions, productivity of a dollar is sufficiently positive at selective institutions that their additional resources seem like a good investment for the students who attend them.
- Non-selective institutions are less productive on average but their productivity is also much more dispersed.
 - Students choosing among non-selectives can make big mistakes.
 - Potentially problematic that the non-selectives are expanding much faster than the selectives.
- Hard to say whether the non-selective institutions are a good investment vis-à-vis alternatives like the military, on-the-job training, etc.

Productivity and Market Forces



- We have already seen evidence that predictors of strong market forces prevail among selective schools but not among non-selectives.
- Among *similarly selective* schools, are these same predictors correlated with productivity?

A Regression that Dummies-Out Selectivity Suggests that the Answer is Yes



- Dependent variable: institution's productivity
- Dummy out: median test score in 20-point bins
- Covariates of interest:
 - Integration/competition measures: productivity ↑
 - Information measure: productivity ↑
 - Share of student-related revenue paid by students: productivity ↑

Part 3: Economic Implications



**A SIMPLE ECONOMIC MODEL CAN
POTENTIALLY EXPLAIN THE
DATA.**

**IF CORRECT, IT HAS IMPORTANT
IMPLICATIONS.**

A Simple Model



- Suppose:
 - There is single-crossing in the productivity of educational resources and CR.
 - Students maximize their return on educational investments.
 - Students are insensitive to arbitrary features like geography so all institutions are well-integrated into the market;
 - Students are fully informed and not liquidity constrained.
- Then, student choices and market forces will generate an assortatively matched allocation in which students with higher CR are paired with more educational resources and, *crucially*, each dollar of resources generates the same value-added and institutions are forced to be x-efficient.

Single-crossing



CR_i = college readiness
of student i

r_j = educational resources
at institution j

p_j = (undistorted) price
of institution j

$$\begin{aligned}
 & \frac{\partial Y_i^{lifetime}(CR_i, r_j, p_j)}{\partial r_j} \\
 - & \frac{\partial Y_i^{lifetime}(CR_i, r_j, p_j)}{\partial p_j} \equiv M(CR_i, r_j, p_j)
 \end{aligned}$$

Single-crossing: $M()$ is monotonic in CR . That is, a student with higher CR is always willing to pay more for a unit of educational resources than a student with lower CR .

Market equilibrium will exhibit:



- Stratification and positive assortative matching between CR and education resources.
- Allocative efficiency: the return to a dollar of educational resources will be equal across institutions.
- Productive efficiency: institutions will be forced to produce on the production possibility frontier.

$$\frac{dp_j}{dr_j} = - \frac{\frac{\partial Y_i^{lifetime}(CR_i, r_j, p_j)}{\partial r_j}}{\frac{\partial Y_i^{lifetime}(CR_i, r_j, p_j)}{\partial p_j}} \equiv M(CR_i, r_j, p_j)$$

This Model Explains the Data if:



- We apply it to selective schools where its assumptions fit fairly well.
- We do not apply it non-selective schools where the evidence suggests that there are weak integration/competition, poor information, low degree of self-pay, and students who are sensitive to distance.

While we would expect the model to explain the data if schools were ordinary investments with non-distorted prices and an pool of flexible, rational, informed, interchangeable investors, it was certainly not obvious to me that postsecondary education was sufficiently like this for the fairly-constant productivity result to be obtained.

Implications for Economic Growth



- To make its maximum contribution to growth, a higher education sector should allow educational resources to scale up with CR.
 - The extent of scaling-up is unique to the U.S.
 - Elsewhere, Aghion and I have argued that top U.S. research universities are unusually productive and the market, their financing, and their governance are responsible.
- All this is exacerbated in highly developed countries if their growth depends disproportionately on innovation and thus advanced higher education (Acemoglu, Aghion, Zilibotti).

Implications for Economic Growth, cont.



- While all postsecondary investments may earn high returns relative to alternatives, reallocating students and resources from less to more productive schools would be obviously pro-growth.
- Policies that facilitate market forces in higher education (e.g. information, integration/competition, financing that makes students and school internalize consequences of their choices) may be pro-growth.

Implications for Income Equality



- If there is strong single-crossing between CR and educational resources in tertiary education, what is good for growth may be bad for income equality.
- But CR is partly due to primary and secondary education, and there is reason to think that educational resources may be *more* productive in early childhood programs that serve disadvantaged.
- Thus, a country that wants to grow fast should feel extra pressure to make all students have high CR.