The Cost of Undergraduate Housing

Alan Sun
Economics Honors Thesis
Advisor: Malcom Getz

Table of Contents

Introduction

The cost to attend colleges and universities for undergraduates has never been higher, and it continues to grow. College or university housing plays a large role in these costs, coming in at approximately 16% for a private institution like Vanderbilt University while making up almost 34% at a public institution like the University of North Carolina. In urban centers, the cost of living can reach extremely high rates due to the scarcity of residential space within metropolitan areas. For some institutions within these urban areas, housing costs now exceed $15,000 a year. Faced with these mounting costs, my goal was to investigate the specifics of the college and university housing market for both public and private four-year institutions. In examining this question, I sought to evaluate the specific motivations for both the producers and consumers of the good in question, namely undergraduate housing.

Key Issues

For the consumers of undergraduate housing, the key factor is willingness to attend the university or college in question. Once a prospective student has decided on a school, they will usually then elect to purchase the housing package or options that the institution provides its students. Thus choosing a housing option is directly tied to the choice of an undergraduate institution. In examining the factors that influence student choices in deciding upon a institution of higher learning, the most noticeable factors revolve around an institution's reputation (or ranking), total costs (including tuition), regional location, urban setting, and type (public versus private). In order to properly analyze the dynamics behind housing costs, these factors related to student choice must be included.

On the other hand, the motivations and specifics behind university or college are harder to determine. Universities, both public and private, do not give a general breakdown of costs in funding, constructing, or operating residence halls for students. Oftentimes the costs are also mixed in with the tuition costs or those of meal plans and other room and board expenses. However, a general comparison can be made of the yearly housing prices charged to the undergraduates on their campus. Further, this information would definitely be useful for a wide variety of parties, ranging from prospective students to the universities themselves. At most of these institutions of higher learning, there are requirements for living in school dorms ranging from a mandatory stay of one year to up to four years. The rules for this vary depending on the size/ type of school, total dorms built on campus, and the surrounding housing markets. The effect of required housing can fall under several explanations.

One key area behind institutional decision making, though, is clearly the power of national rankings systems and the influence they have upon a large portion of national universities and colleges. College financing in almost all aspects whether it be related to faculty, students, resources, and other services provided has become integrally tied with how rankings systems are calculated and the perceived impact on rankings of any financial changes is often weighed. The widespread perception of an "arms race of spending" among many ranked institutions has become prevalent in much academic and economic literature concerning American undergraduate institutions.[1] As such, the relationship between college housing and rankings system must also be explored to develop a complete picture of how institutions price their dormitories and also what effect these decisions will have upon the total score or evaluation done by the different rankings systems.

---

[1] Ehrenberg, Ronald G. "Tuition Rising: Why College Costs So Much." Cambridge: Harvard University Press, 2000.

Hypothesis

My initial hypothesis was that housing costs would have noticeable correlation with institution reputations, as based on rankings. I postulated that this effect would be seen across the board in both private and public institutions and among both large and small institutions, thus meaning that a significant result could be obtained for private universities across all tiers, public universities across all tiers, and liberal arts colleges in terms of its separate rankings scale. I also believed that private institutions, which are generally small to medium size institutions, will have greater costs of living than those of larger size or that are public universities or colleges. This is due to the fact that smaller institutions will more readily be available to create the necessary housing stock to both offer tying arrangements and bundling policies. Further, smaller institutions along with private institutions are more likely to create captive market conditions, either through their ability to set policy, their location, their surrounding population size, and also their ability to offer a unique product.

As my investigation, progressed, though I changed my focus as I analyzed the data I had collected. When my analysis displayed almost minimal correlation between rankings and housing price across a national spectrum of universities, I first expanded my scope by incorporating total tuition costs into my data, then finalized my area of exploration by narrowing in on the specific interaction between rankings, college selectivity in applicants, and housing costs within large metropolitan areas. I hypothesized that even though rankings did not seem to influence housing costs, there would still be a correlation between rankings and total costs, including tuition, for private universities, public universities, and liberal arts colleges. In

examining this fact, though, I realized that total costs are also highly variable based on the actual location of each institution, with the highest costs often presented by undergraduate institutions located in urban centers. Regardless of school rank, these institutions routinely charged students prices among the top of my surveyed data.

Once a breakdown of these costs was performed, though, I noticed that lower tier schools were often charging the highest prices of their undergraduate housing, driving up their total costs. In fact, out of the top twenty most expensive schools, around half were not even close to the top of their respective rankings. Isolating information from schools just for New York City I found that the highest housing costs were charged by relatively lower ranked schools, with the peak prices found in third and fourth tier institutions. Further, the lowest housing costs were charged by the top ranked and most selective schools of the area, namely Columbia University and New York University. Based on this, I decided my final and most comprehensive area of focus would be the effects of ranking tiers and institution selectivity on housing costs with the most densely populated and expensive urban settings. I hypothesized that the most selective institutions would have substantially cheaper housing costs than all other tiers, very selective schools would also have slightly cheaper costs, and the rest of undergraduate institutions in metropolitan areas would have fairly equal and fairly expensive rates for their housing.

The reasons for this change in hypothesis are mainly attributed to a closer examination of how college rankings systems are determined. The major ranking systems utilize a method that measures the amount of funds each university spends per student. This amount is then used as a relatively large measure in determining an institution's total undergraduate ranking. However, the method in use for current rankings does not include costs that are associated with dorm or student housing. Thus any costs, renovations, scholarships, or other special measures in regards

to student housing do not have a measureable effect on a schools ranking. With many schools seeking to maximize their point totals given by the evaluation methods, there would be strong incentive to not increase student housing prices, not provide student housing scholarships, and not provide extensively renovated or high cost apartments to their students. The combination of these factors would thus also change my first hypothesis. Given the assumption that rankings would give universities incentive to maintain relatively low housing costs, then there would not be an association between rankings and housing costs with the majority of undergraduate institutions keeping relatively similar prices for housing.

Variables of Interest

College Housing Packaging

In college housing policy one of the main approaches to providing student housing is through either a tying arrangement or a bundling approach. These two approaches differ slightly in that they have different implications for both the goal and the product being offered. The definition of a tying arrangement is where a consumer is forced to purchase a low demand or unknown product in order to purchase a high demand or well known product. Such arrangements are typically illegal and take the form of coercion in most aspects of the business world, and on first glance do not seem to be extremely applicable to an educational institution's housing market. However, there are many college institutions where the housing market product is basically the inferior good within a tying arrangement. The known good that is in high demand is the actual education being granted by a college or university institution as this is the product that draws consumers. This fact is evident when you examine college admissions where the prestige of the university and the quality of its institutions and professors draws thousands of applicants for limited spots. The decision to apply, and thus pay for one good, tuition, at many institutions requires the purchase of on campus housing for a determinate amount of years. Most undergraduate students, however, are ambivalent at best about paying for their campus housing, as dorms, living space, or the surrounding residential pricing are usually minor factors in the decision to attend a college. Thus arises the forced purchase of college housing (for the duration

of one to four years) in order to obtain the actual education from the college, creating a tying arrangement.

For other colleges the housing policy can be better defined as the bundling approach. Bundling is where two or more complementary goods are offered together as a package deal, with the differentiation being "pure bundling" and "mixed bundling." Pure bundling describes where the multiple items are offered only for a package price, basically stating that you cannot purchase either separately and there is only one total price for the entire package. Mixed bundling occurs when components are sold together but the prices for each part can still be quoted separately.[2] These two types of policy apply to college housing to due to the fact while most colleges will state the separate costs of tuition and housing, even if both are required, some colleges will not list separate costs, instead charging one total cost for the entire packaging of attending the institution. Thus with tuition, housing, and living expenses all within one price, this utilization of pure bundling makes it impossible to determine exact costs for each element with the bundling. An example of this is Middlebury College where an all inclusive single price is given to prospective students.[3] This of course engenders difficulties in comparing housing costs with other universities, and thus those four-year institutions that utilize pure bundling must either be analyzed separately or else estimates must be obtained for the unstated pricing of each element. Bundling is actually a type of tying according to some economic theorists, but its emphasis lies in packaging several items together, instead of utilizing the greater demand of one good to force the purchase of an accompanying good.

---

[2] Blair, D. Roger. "Tying Arrangements." *Antitrust Economics.* Oxford University Press, 2008.

[3] "Estimated Costs of Attendence." Middlebury University Office of Undergraduate Admissions, 2009-2010. http://www.middlebury.edu/Admissions/financeCost.php

Market Competition

Another main factor in determining college housing is due to the presence of a captive market. Basically most undergraduate students who are constrained to purchase a good, as in housing, from the institutions they are attending are captive buyers for said institution. There are several possible reasons whereby students are restricted of their purchasing options, each of which falls within the definition of captive market. The most basic form would be the existence of shortages, namely in that the institution owns the only available housing in the area thus leaving students no choice in purchasing this housing. This can be seen in many small colleges, especially those located in non-urban settings where there are little or no surrounding residential apartments available to students. A second and third possibility is due to either competitors' high prices or a lack of competition. Thus if a university offers the best available housing in the area for prices actually lower than any other alternative or there is lack of strong competition then again the students are basically constrained to purchasing housing from the institution. Examples would include graduate student populations who have occupied surrounding off campus housing thus removing competition for housing undergraduates attending an university. Finally, a captive market can arise due to a unique feature or benefit of a product. This accounts for both universities and colleges mandating that students live on campus, thus removing the students' ability to purchase any other option, or universities where existence of planned communities and other such student oriented services draws almost the entirety of the student population. Both would also result in a captive market and constrain selection to one possible good.

At the same time, the fact that there is often a tying arrangement or bundling approach to college housing has most likely created direct competition in pricing housing costs for some

different universities even though their locations and amenities are completely different. This is due to the fact that including another good through a tying or bundling approach means that one must also add the price of that additional good to the total package. Thus the good that is sought after by consumers now has an added cost. Applying this idea principle to undergraduate institutions, the costs of housing and boarding costs have been connected to the valued good of attendance and tuition at an undergraduate institution. With this, schools that are compared on the merits of their reputation, faculty, and tuition are also now compared on their additional costs for housing, as this is an unavoidable factor for many top ranked private or public institutions.

Regional & Institutional Differences

My method of gathering data is to first split institutions into several different categories dependent upon the type of institution (private versus public), the designation as a university or liberal arts college, and the location of the university within an urban or non urban setting. Due to the fact that most graduate students who belong to such institutions usually are not part of any housing plan provided by almost all four-year colleges and universities the housing that is sometimes provided for them is not included within the surveyed data and the pricing for their units is also not used. The designation of private or public is fairly easy to differentiate and is also self reported.

For the selection of metropolitan areas to use in my analysis of rankings and housing costs within high priced urban areas, I chose New York City, Chicago, Boston, and Los Angeles. The selection of these four cities was due to a multi-step process considering several major factors. First, I wanted to achieve a nationwide sample, so I needed cities from several regions in the United States, and not just within the Northeast Corridor. Secondly, there had to be the

existence of a concentrated urban center and large population due to increasingly wide spread real estate differences as a sampled area grew larger. Further, there had to be enough undergraduate institutions located within each city to provide a fair sample size, with the minimum being around eight to seven institutions within a couple miles of each other. Finally, the cities needed to have significantly elevated prices for real estate and housing within their urban centers in order to create noticeable differences between the different institutions. New York City, Boston, Chicago, and Los Angeles were the best cross section of cities that were large enough and fit all these factors.

For each institution selected, there are three key areas of data to determine. The first is the actual price charged for housing within the campus as provided by the college or university. The second data element is the tuition charged by the school. The last part is the general selectivity or ranking of the undergraduate university in question. My process for obtaining relied on directly looking for each undergraduate institution's listed prices in order to get the most accurate data. First, for the institutions set rates on housing, I examined the published rates for the student's housing. These price numbers are usually available on each college or university's own website, or else they are available in many official guides to school housing.

Many schools, however, have slight differences in rental costs based on which dorm is selected, with examples being like Duke University charging slightly more for dorms with air conditioning, or more expensive prices for singles at some public universities like Tennessee University. In this case, I examined if there was a predominant majority price (like in the case of Duke more than 80% of housing has air conditioning, so that price would be predominant). Otherwise I would average the costs of the different unit types to arrive at an average cost for the University. In other cases, the difficulty lies in the fact that housing costs are often bundled

together with boarding costs, which makes it seemingly impossible to obtain an accurate estimate

for just cost of housing. However, this difficulty can often be solved by searching for the

separate pricing of meal plans, due to the fact that students are allowed to select alternate

versions in each year of attendance, and the subtracting the correct meal plan cost from total

room and board. This will leave an accurate estimator of total cost of housing. In case this

method is unavailable, the last method I used was to call the registar or housing office of the

institution in question and ask for an estimate of the housing prices for their undergraduates.

National Rankings System

For determining the ranking and selectivity of each undergraduate institution I relied

upon the US News and World Reports rankings' of colleges and universities as well as

consulting Barron's and Princeton Review's profiles of American undergraduate institutions. I

utilized US News and World Reports ranking system for top institutions as they are widely

viewed by the students considering applying to colleges. As it is their choices that are

influencing school tuition and housing costs, I believed that using this system would provide a

more accurate picture of student's perception of a school's admissions selectivity and general

reputation. Further, I used all three surveys' and rankings' different measurements on selectivity

to create a ranking tier of reputation and rank. Schools were classified by the magazines as

belonging either to different tiers (US News and World Report utilized Tier Three and Four to

indicate less selective colleges) while also giving each institution a general ranking on

admissions selectivity ranging from "most selective" to "least selective".

An example of such a process for Vanderbilt University involves classifying it within the

proper type of institution, determining its urban or non-urban setting, determining its relative

ranking and its general selectivity, and finding the average price of its housing costs. This process was repeated for all the institutions surveyed and, once all the data is gathered, statistical analyses were run on several schools at once, separating the data into differing groups based on the previous divisions into categories that I have listed above.

Once this data is compiled, the discrepancies in the regions were tabulated. One of the first goals in analyzing this data is in seeing if the college or university is charging a substantial (i.e. statistically significant) amount in excess of the surrounding private housing market. However, it would be unrealistically difficult to determine if universities or other four year institutions where making a profit from student housing or funding other institutional expenses with housing revenue due to the restricted and non-linear information available on funding housing construction along with costs for maintenance.

Empirical Implementation

Effect of National Rankings on Housing

In examining the data of my initial investigation, though, it seems as if school rankings do not play a substantial role in deciding housing costs over a large cross section of the schools present within the American school system. To approximate an effective estimate for this question, I first created a basic model containing the important variables influencing housing costs. In examining prices, it seems as if, beyond the ranking tiers, important factors include location, university type, and distance from a metropolitan center (ranging from rural to suburban to urban).

$$housing\ price = \beta_0 + \beta_1 ranking + \beta_2 university\ type + \beta_3 location + \beta_4 distance + u$$

With the high amount of variation that was present across all colleges due mainly to differences between private and public institutions as well as institutions located in urban centers, I split my data into public institutions and private institutions. Then in order to further eliminate variables of *location* and *distance* I selectively took out universities and colleges located in the most expensive urban centers like Boston, New York, Los Angeles, and Chicago. With these variables eliminated, a simple regression model that seeks to explain housing price in terms of rankings could be obtained. With the simplified model being:

$$\text{housing price} = \beta_0 + \beta_1 \text{ ranking} + u$$

Using this model, an ordinary least squares estimate for the population parameters β_0 and β_1 can be obtained, along with the coefficient of the determination, R-squared:

$$\beta_1 = \frac{\Sigma\left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\Sigma\left(x_i - \bar{x}\right)^2} \text{ and } \beta_0 = \bar{y} - \beta_1 \bar{x}$$

$$R^2 = \frac{y'LPy}{y'Ly} = 1 - \frac{y'My}{y'Ly} = 1 - \frac{\Sigma\left(y_i - x'_i\hat{\beta}\right)^2}{\Sigma\left(y_i - \bar{y}\right)^2}$$

Running this model, though, gave results that seem to indicate there was not much of a relationship between the variables *housing price* and *ranking.*

Ranking vs Housing Price
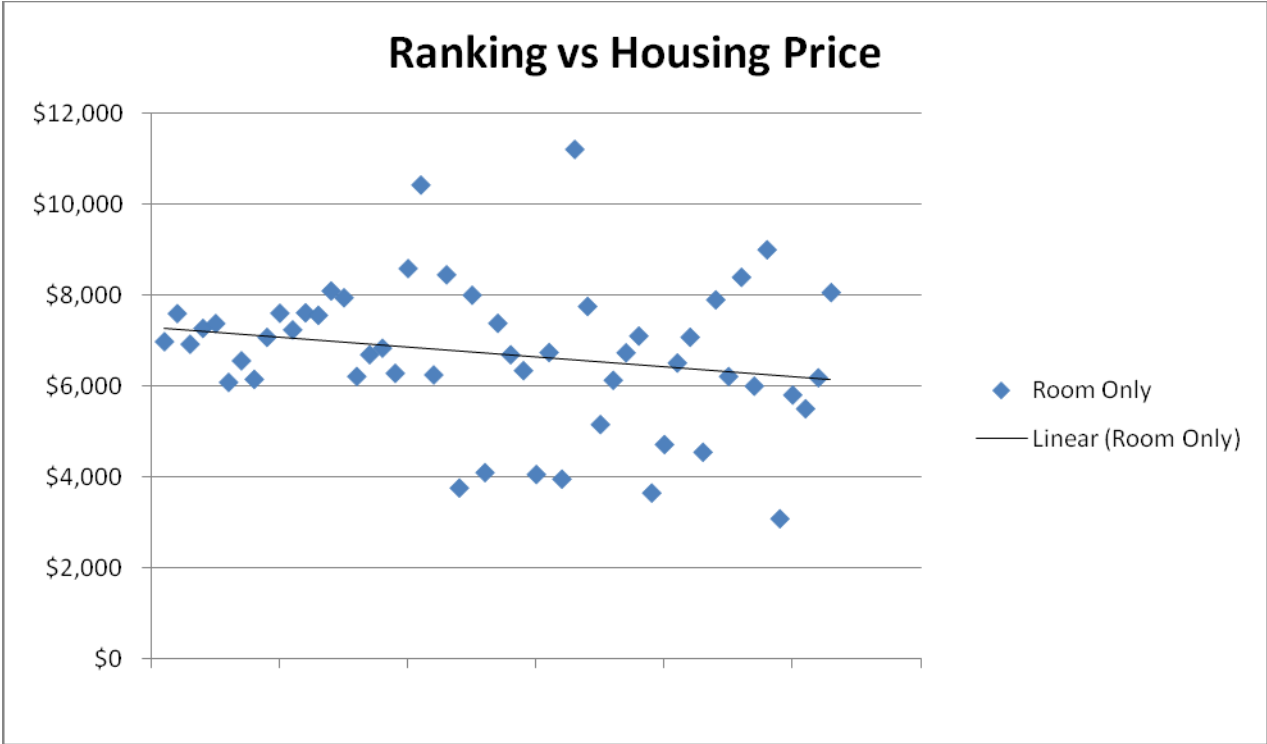
With the R-squared of 0.08763 for the model of public schools across all tiers (removing those in urban centers), the results show that only 8.763% of the variation is explained by the model. Running regressions on the full data set along with other iterations of public school data still gave similar results, with R-squared results all below 0.15.

	Coefficients	Standard Error	t Stat	P-value
Intercept	19755.89961	252.9722033	78.09513992	4.38913E-53
X Variable 1	-176.2459223	76.75435191	-2.296233607	0.025978656

Further, as even a low R-squared does not necessarily mean the an Ordinary Least Square regression is useless or demonstrates low correlation, examination of the actual data along with

population parameters show that the data lies on a basically a horizontal line, with prices scattered evenly across and consistently falling within the same band of prices no matter the tier. In fact the price for housing for many fourth tier institutions like Tennessee State University and a top public institution like University of Virginia were indistinguishable. Even those in the same area, with perhaps competition for similar students, had similar pricing across all four tiers. For example, the University of North Carolina (as a top public), the University of North Carolina State (a fairly high ranked public), and the University of North Carolina Greensboro (a third-tier institution), all had housing costs right around $5000 a year.

This effect seems especially relevant to the discussion on college motivations for housing costs as the rankings system criteria seems to be backed up with the data. With all schools keeping costs in relatively the same price range with a uniform scatter, the basic criteria for determining costs seems to be the lowest prices available within a region and on the specific financial circumstances of each school. Thus the data reflects no correlation between rankings and housing cost showing that the two fields are basically unrelated across a national sample.

Effect of National Rankings on Total Cost

Such results caused me to change the direction of my investigation. In order to figure out the areas where rankings would have a noticeable and measureable effect on costs of education, I narrowed my focus within the analysis of tuition, rankings, and housing costs. Based on prior research, tuition seems to have a noticeable relationship to rankings in both that the very top ranked schools have the highest tuitions in several areas, including all student tuitions for a private institution and out-of-state tuitions for public institutions. Out-of-state tuitions was used instead of the normal in-state tuitions since this mostly eliminates the large variation between the two types, and also reflects the relative expenses charged by an institution in regards to the entire

17

pool of students wishing to matriculate from across the nation. As rankings decrease, prior

literature shows that tuition will also go down slightly, with both private institutions' tuition

costs and public institutions' out-of-state tuition costs decreasing on average. Interestingly

though, some studies have shown that the correlation might in fact be explained by the opposite

causation direction.[4] Instead of higher rankings drawing greater demand and leading to higher

tuition with costs increasing due to a larger population of willing consumers, in fact some

colleges have noticed an uptick in applicants and quality of applicants upon increasing their

tuition. This phenomenon might result due to a higher tuition signaling a higher quality product,

thus increasing demand. In order to more closely measure this affect, I focused on the rankings

for only the top 100 universities along with the top 50 liberal arts colleges and examined the

relationship between total cost of attendance and ranking.

    Again it seems that isolating the costs for private institutions alone did not show much of

an effective of rankings on housing prices. Utilizing the top 100 ranked universities and running

linear regression models showed similar results to the regression on public universities

$$housing\ price_{top100} = \beta_0 + \beta_1\ ranking + u$$

$$tuition_{top100} = \beta_0 + \beta_1\ ranking + u$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.291[a]	.085	.066	1581.721

1. [4] Kane, Thomas J. "The Price of Admission: Rethinking How Americans Pay for College." Washington DC: The Brookings Institution. 1999
2.

a. Housing Price, Predictors: (Constant), Ranking

With a R-square value of only 0.085, combined with an evaluation of the data showing relatively similar housing prices across the entire rankings, the idea that housing prices are not substantially influenced by rankings on the whole is further supported. Especially noticeable is that the very highest ranked schools have housing prices that are indistinguishable from much lower ranked schools and in fact are lower than many schools interspersed throughout the rankings. However, the results of the linear regression on ranking show a different story:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.475[a]	.226	.211	5154.15327

b. Tuition, Predictors: (Constant), Ranking

With tuition replacing housing prices, a noticeable effect is seen this time. With a R-squared value of 0.226, meaning that 22.6% of the variation in tuition price is explained by the Ranking predictor, it seems like there is an actual correlation between a schools ranking and the total tuition it charges. The linear regression model generated a negative β_1 value, meaning that as a schools ranking number increased or declined in reputation, then tuition similarly fell. This trend seems to support the idea that rankings and costs are still correlated in some fashion, with consumers willing to pay a premium to attend the most sought after institutions. However, other

factors not accounted for that might be present within the u variable include the presence of large

financial aid or scholarships that might be causing errors within the model result. Overall,

though, the presence of some predicative power of rankings suggests that rankings might

influence consumer costs and the presence of a competitive market between different

undergraduate institutions that can be further studied within a focused evaluation of schools in

direct competition.

Interestingly, though, was the fact that Liberal Arts Colleges did not seem to exhibit the

same results as public and private universities when regressions were performed in a similar

manner:

$$housing\ price_{LACtop30} = \beta_0 + \beta_1\ ranking + u$$

$$tuition_{LACtop30} = \beta_0 + \beta_1\ ranking + u$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.226[a]	.051	.040	1523.66528

a. Housing Costs, Predictors: (Constant) , Ranking

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.314[a]	.098	.073	1289.72876

a. Tuition, Predictors: (Constant), Ranking

Replacing the top 100 public and private universities with the top 50 liberal arts colleges gave similar results in housing costs, showing almost no correlation, but also displayed very low correlation between rankings and tuition. Again, the idea that housing costs are not significantly influenced by rankings on a national scale were shown by a R-square value of only 0.051, but replacing housing costs with tuition only elicited a 0.098 R-square value. However, the correlation was still shown to be in a negative direction so there still might be a causative factor stemming from the ranking's variable. The difference might be in the generally smaller size of liberal arts college, causing less variability between colleges as a larger student pool competing for limited admission spots within top liberal arts colleges. With enough students seeking admission to these schools, the majority of them could have enough willing matriculates to charge equally high tuitions and not have to discount prices in order to make up for a lower, perceived reputation. This is supported by the fact that liberal arts colleges generally had smaller class sizes while all charging fairly high tuition that were equivalent of or exceeding similarly ranked universities.

Effect of Rankings on Metropolitan College Housing Costs

With the presence of slight correlation of increased costs for tuition at the highest level of rankings, there are ancillary effects upon housing costs. Based on these results, it would seem

like Universities then might compete for similar applicants belonging to several stratified ranking tiers. Thus, even though several universities and colleges might all be located in a close area, they would not be competing for the same set of students. This would result in a noticeable difference in housing prices if the proper areas were examined. I hypothesized that

$$housing\ price_{Urban} = \beta_0 + \beta_1\ ranking\ tier + u$$

$$\log[(housing\ price]_{Urban}) = \beta_0 + \beta_2\ ranking\ tier + u$$

$$\%\Delta\ housing\ price_{Urban} = \Delta\beta_2\ ranking\ tier$$

would show meaningful results, with ranking tier being a significant explanatory variable in terms of causing housing price in urban environments to be substantially lower than higher tiers within the ranking system. However, in searching for a percentage change of housing prices, my hypothesis did not believe there would be large differences past the top tier levels and thus R-squared correlation might not be as high. Further, if this turned out to be true, then running the logarithmic regression on ranking tiers would not produce results that were applicable to all tiers, instead just providing a general estimate for the difference between top institutions and the rest of the institutions within the downtown area of large cities.

Tiers themselves were created by splitting schools into five tiers, with tier 1 including the top 25 ranked public and private universities with the most selective admissions, tier 2 including the 25-50 top ranked public universities and other very selective institutions, tier 3 included relatively selective institutions and public and private universities ranked from 50-100, tier 4 included less selective institutions such as USNWR's Tier 3 institutions, and finally tier 5 included the least selective institutions as determined by different organizations rankings and USNWR's Tier 4 institutions.

In selecting my data samples to use, I basically kept to within a circular radius of the city center, meaning that it had to be within a designated central region of a major city. This location is usually easy to determine through examination of city maps, roads, buildings, and public transportation routes. Further this can also be seen in the location of universities and colleges themselves. Most cities often have several main institutions centered within the city center, and many more surrounding or spread between them. An example of this is how NYU and Columbia

University are large campuses in Manhattan, with smaller schools interspersed between them. These universities include Fordham College, Barnard College, CUNY, Lang College, Pace University, and more which were all included within the data. Universities outside of Manhattan were not included as they were spread much more widely and in areas with disparate and cheaper housing prices, and thus would not be in as much direct competition or share the same real-estate market costs. Thus examining the graphic of Boston, Massachusetts on the next page, the

difference between central institutions and peripheral institutions can be seen. Universities and colleges near Boston's center were include, such as Boston College, Lesley University, Harvard University, MIT, Northeastern University, and so on. Institutions that were located farther from the city center weren't included within the data. These areas' housing and their surround residential rates weren't as expensive and tended to be separate in price from any other institutions, with examples like Curry College, Brandeis University, or Tufts University.
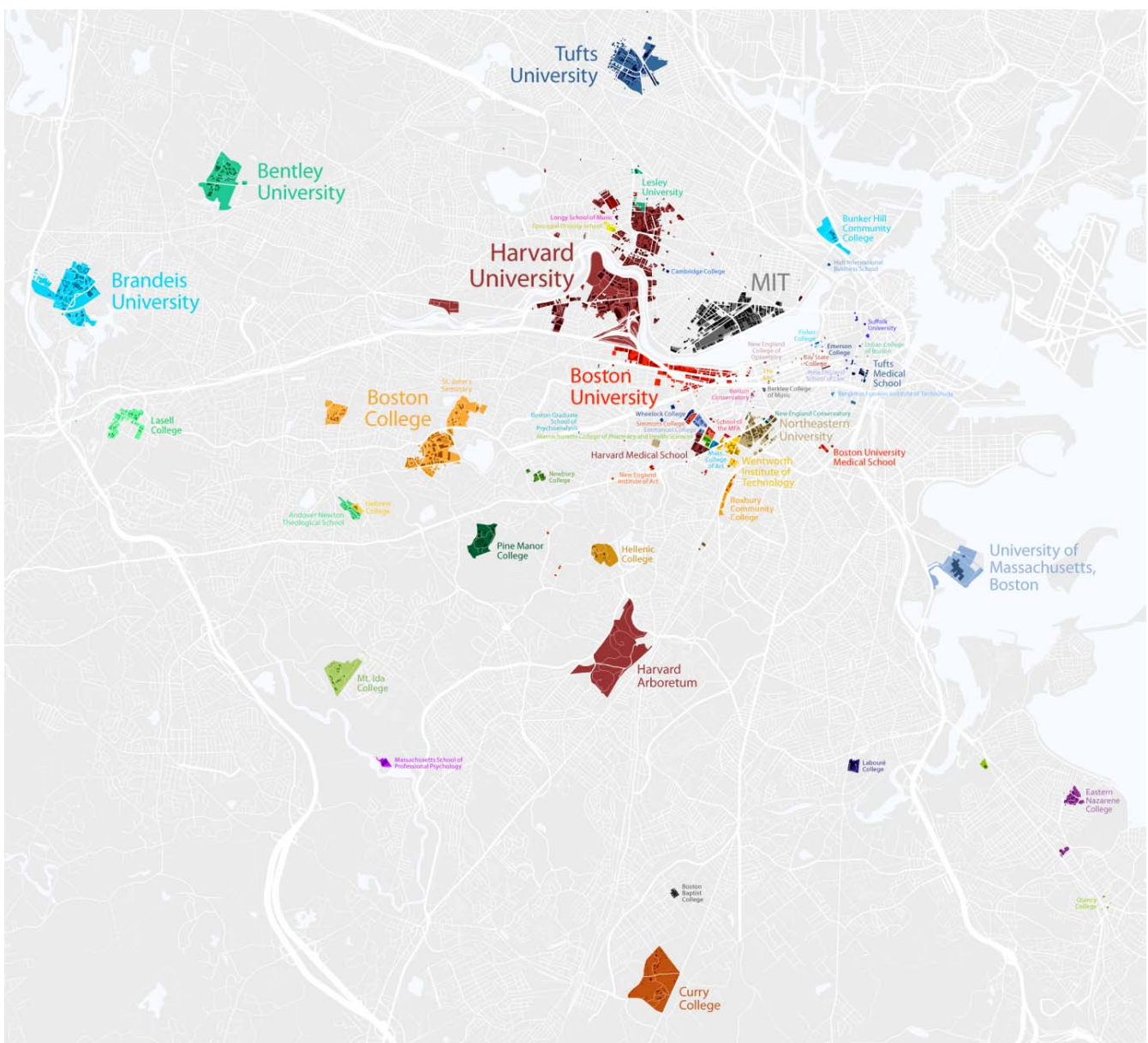
Applying this formula to four major metropolitan areas, including the New York, Boston, Chicago, and Los Angeles, this linear regression would seek to isolate the housing costs of the most selective schools and see if they are competing for a group of students consisting of a national composition, comparing the very best institutions regardless of location within the country. At lower levels of selectivity, though, schools no longer have to set housing prices to compete with average costs across a large area, knowing that students are selecting from a more limited set of universities with less competition for their matriculation.

New York Metropolitan Area
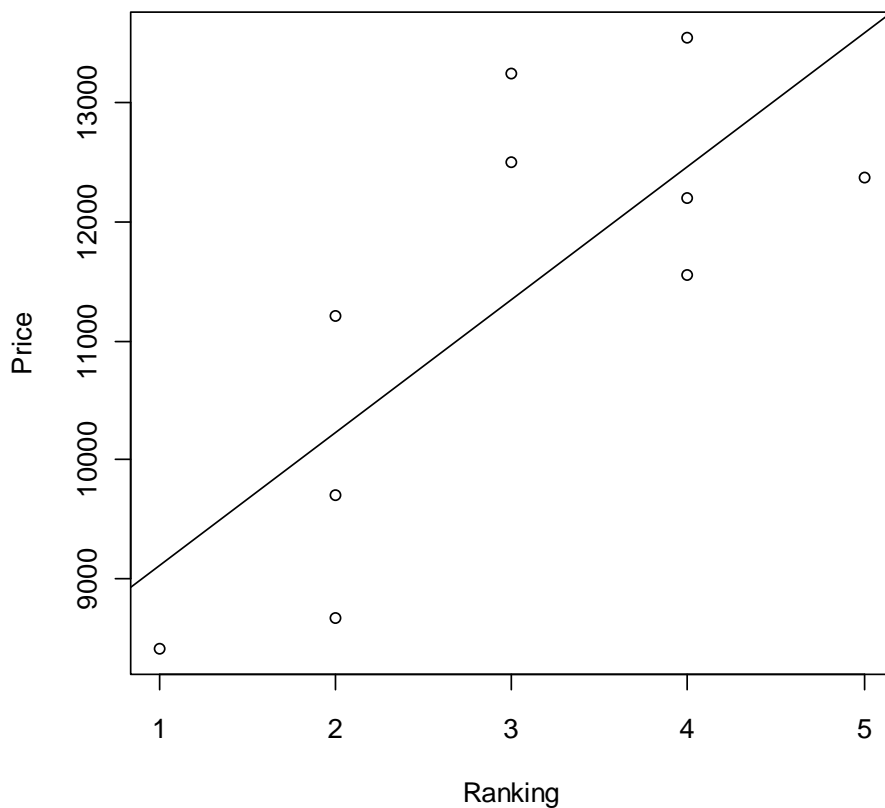
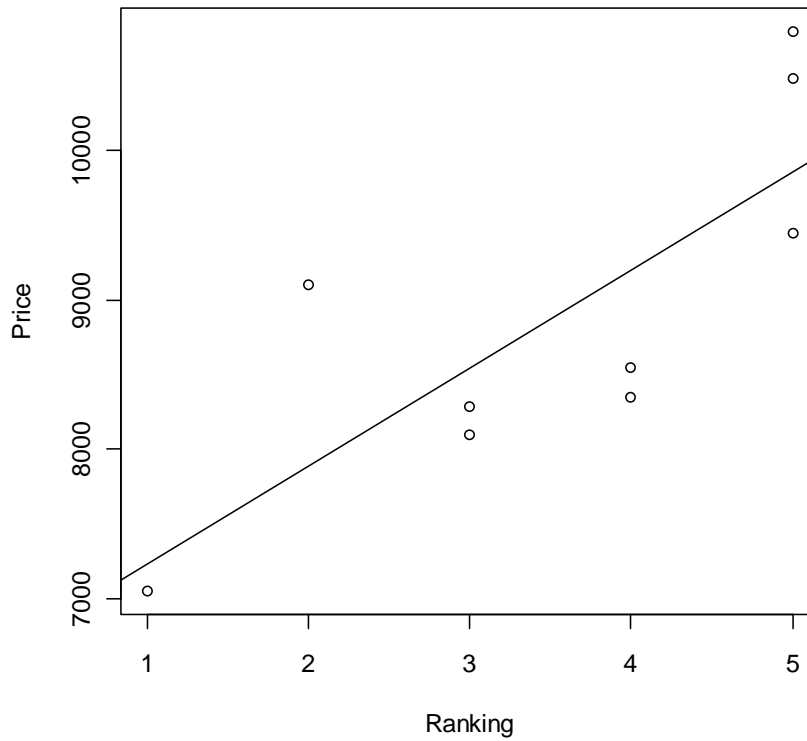$$housing\ price_{Urban} = 7977.8 + 1121.2\ ranking\ tier$$
$$R^2 = 0.5816$$

$$[\log(housing\ price)_{Urban}) = \ 9.00576 + \ 0.10595\ ranking\ tier$$
$$R^2 = 0.5946$$

	Std. Error	T value	Pr(>|t|)
(Intercept)	0.09976	90.275	2.53E-13
V2	0.03093	3.425	0.00902
Residual standard error: 0.1157 on 8 degrees of freedom			

As can be seen above, the results for just New York City were surprising in that they

exceeded my initial hypothesis. With the results isolated to just those universities in Manhattan,

there was substantial correlation between ranking tiers and housing prices. In fact, with 0.5816

given as the R-squared value, 58.16% of the variation in housing price within the New York City

area utilized can be explained by the ranking and selectivity of the schools. Further the results do

not seem to be just limited to the top tiers of ranking selectivity. In fact, the price for housing

increases steadily as a institutions ranking tier worsens, with the logarithmic approach showing a

10.5% increase in price for each unit increase within the ranking tier. This association between

price and rankings is seen throughout the data, with the line of best fit conforming fairly well to

all data points. However, as the data points are limited, further analysis of other cities was

needed before any conclusions could be drawn.

Chicago Metropolitan Area

Chicago Metropolitan Area Results

$$housing\ price_{Urban} = 6575.5 + 655.5\ ranking\ tier$$
$$R^2 = 0.615$$
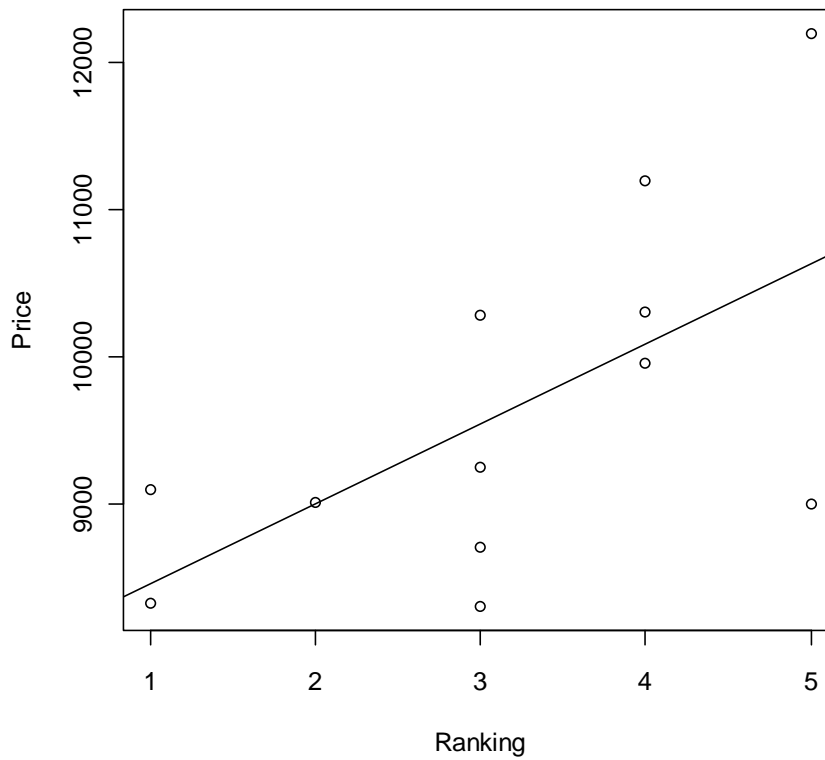$$\log(housing\ price_{Urban}) = 8.8213 + 0.07461\ ranking\ tier$$
$$R^2 = 0.6357$$

	Std. Error	T value	Pr(>|t|)
(Intercept)	745	8.827	4.84E-05
V2	196	3.344	0.0123
Residual standard error: 789.5 on 7 degrees of freedom			

Boston Metropolitan Area

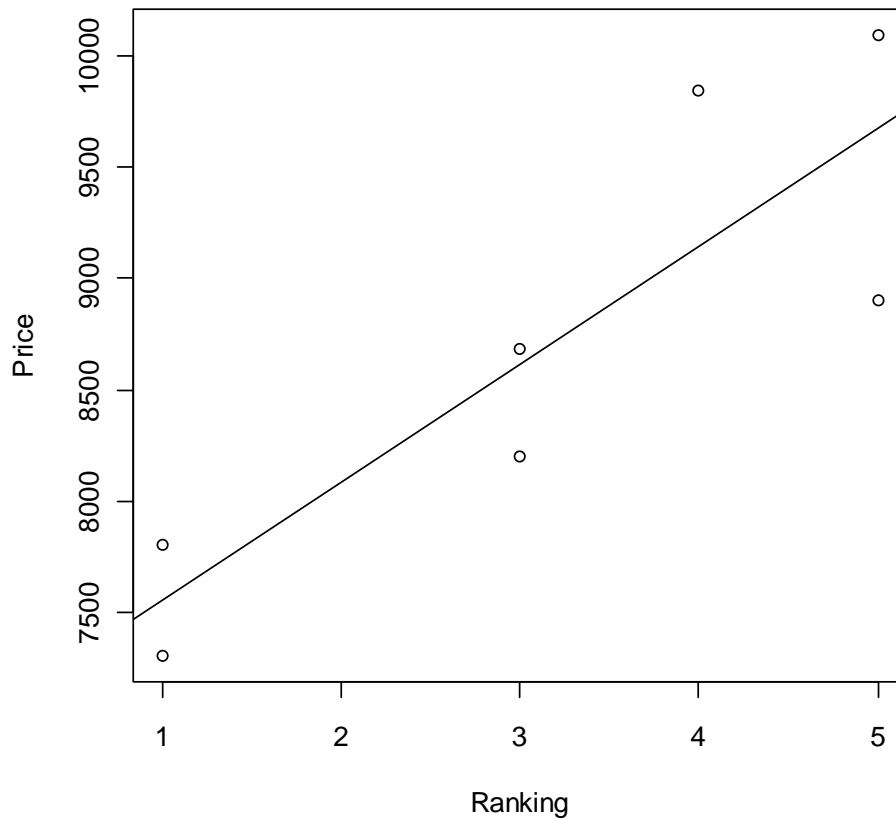
$$housing\ price_{Urban} = 7906.2 + 760.3\ ranking\ tier$$
$$R^2 = 0.3754$$
$$\log(housing\ price_{Urban}) = 8.99358 + 0.07593\ ranking\ tier$$
$$R^2 = 0.3761$$

	Std. Error	T value	Pr(>|t|)
(Intercept)	760.3	10.399	1.11E-06
V2	222.6	2.452	0.0342
Residual standard error: 987.1 on 10 degrees of freedom			

Los Angeles Metropolitan Area

$$housing\ price_{Urban} = \quad 7019.5 + \quad 531.5\ ranking\ tier$$
$$R^2 = 0.7509$$
$$\log(housing\ price_{Urban}) = \quad 8.8692 + \quad 0.05309\ ranking\ tier$$
$$R^2 = 0.770$$

	Std. Error	T value	Pr(>|t|)
(Intercept)	479.9	14.628	2.70E-05
V2	136.9	3.882	0.0116
Residual standard error: 562.1 on 5 degrees of freedom			

From these results, it seems evident that undergraduate housing costs for the largest

metropolitan areas is actually negatively associated with a school's ranking or selectivity, with

the highest costs associated with the lowest tier schools while the cheapest housing was provided

by the most selective schools. This finding was relatively consistent across all four of the large

metropolitan cities surveyed. In fact, when selectivity was divided within five tiers, there seemed

to be a stable increase of $500 to $700 in annual housing costs per unit decrease in an institutions

ranking tier for most of the samples. Further, it seems like all four cities show very high

correlation between the results, with the lowest being Boston's R-squared value of 0.37651 to

Lost Angeles' highest result of R-squared being 0.7509. With the limited data perhaps causing

such high individual results, the fact that consistent results are obtained across the four areas

creates stronger evidence for rankings being a causal factor in housing prices. A supporting

argument can be found through the examination of all four cities' data put together and viewed at
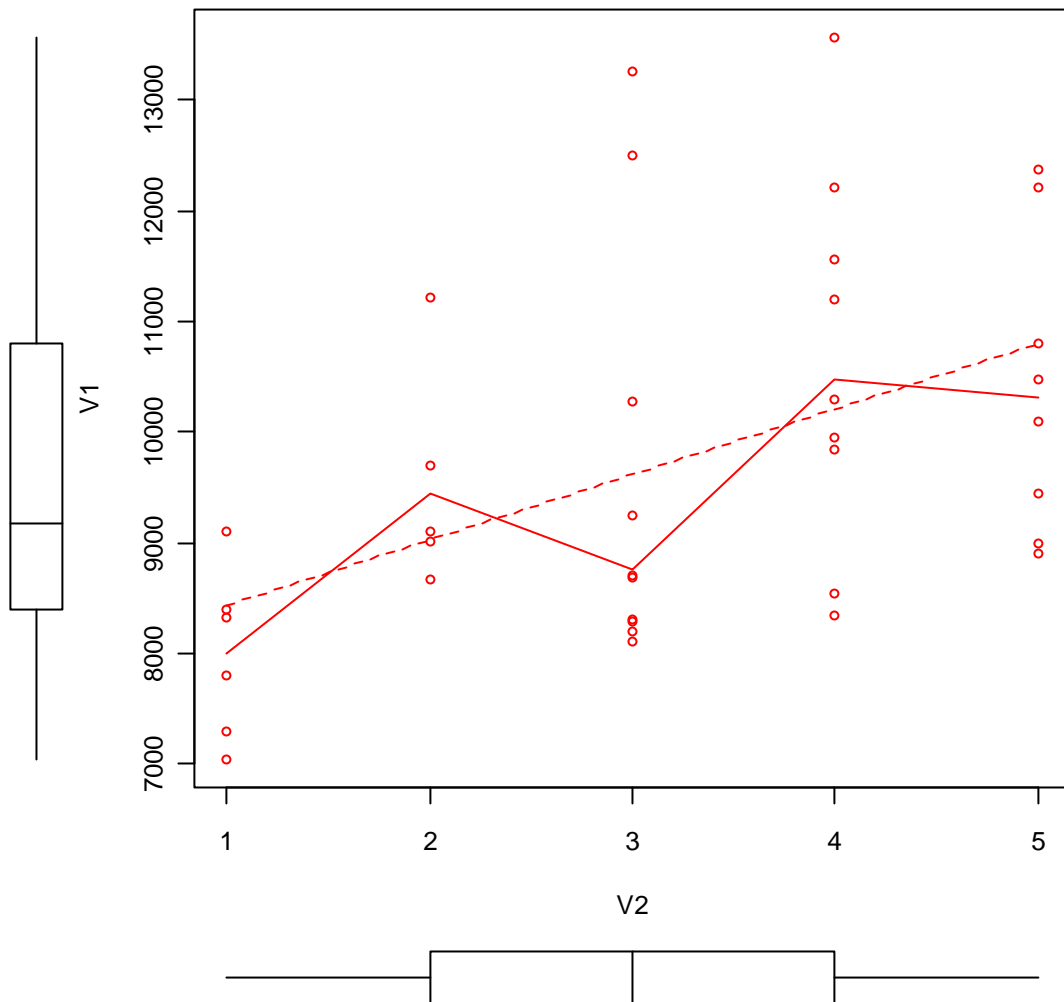
once.

The results are definitely confounded by the large differences between average housing prices for the four cities, but still provide a meaningful look at the differences between ranking tiers. At the top of the rankings, the variance and range between schools is the least, with all of them grouped within $7000 to $9000 annually for housing. However, as the ranking tier worsens, then the variability grows significantly, displaying a greater range between institutions from different cities.

Conclusion

The reason for these occurrences within the data for separate institutions and an overall look at the results is probably attributable to a confluence of several important factors. First, the elite institutions, in terms of admissions selectivity, seem to share a remarkably similar housing price. For the top twenty-five schools within the US News and World Report's ranking system, the housing costs are very stable for private institutions, no matter the location of each institution. Thus schools like Columbia University or Harvard University, located in the heart of premium urban real estate, still charge equal or lower housing costs in comparison to schools like Rice University or Cornell University, located in areas with much cheaper real estate. The reason for this equality is most likely due to the fact that these schools draw applicants from the entire nation, and thus are competing with every other elite institution for the matriculation of top students. With their competition not necessarily being located in the same urban areas, these top institutions might not have the leeway to charge near-market prices for their housing. If they did, then applicants might notice the disparity between housing costs and prefer institutions with cheaper housing, causing metropolitan institutions to lose a measureable edge in the highly competitive college admissions process. Thus as their product, namely the four years of undergraduate education, is marketed to a national group of consumers, they must tailor its costs to match that of their competitors.

For lower tier institutions, their institutions are marketed to a more regional group of consumers. Fairly selective undergraduate schools might draw most of their applicants from several states in the region, thus still causing some need to present a comparable housing cost as non-urban schools, but less selective schools might no longer have this issue. For these schools, their applicants might only be considering schools within the city, and thus their competitors also

are dealing with the high costs of real estate. With applicants considering only schools in such a market, each school could charge relatively high prices for housing that are basically parallel to the local market costs.

Further, most top ranking institutions have greater funds, tuition revenues, and endowments to draw upon in comparison to lower ranked ones. This would also allow them to subsidize or fund their housing projects in order to create cheaper housing that might actually greatly differ from the prices in the local area. The higher levels of tuition per student means there are more funds available per capita in order to provide greater services or housing. However, lower ranked institutions with lower reputations and smaller amounts of available funds can't provide the same level of resources and thus must charge closer to the actual amount needed to provide housing for their students.

In conclusion, it seems as if rankings are the number one motivating factor behind the basic pricing schemes of Universities and how they charge students for housing costs. However, the relationship is not a direct relationship of higher rankings leading to higher costs or a reversed negative correlation. Instead the rankings influence colleges and universities to prices housing in a way that will create the greatest rankings boost or generate the largest ranking points based on the evaluation criteria. On a national scale the data reflects no correlation between rankings and housing cost showing that the two fields are basically unrelated across a national sample. The reason would be that the only factors that go into determining housing costs are associated with specific fixed costs or other unique attributes of each location, with the rankings providing no incentive to further raise costs above this point.

Further, it seems as if rankings can have actually the opposite effect than expected upon undergraduate housing prices under certain conditions. An initial look at the rankings set up and

reputations of most universities and colleges seems to create a market where higher reputations and selectivity should be able to command premium prices in all areas. However, due to the method in which housing is bundled or tied in with tuition and the competition that arises between universities with national reach compared to those with a local bent, the greater selectivity or reputation of schools actually acts to lower housing costs within expensive urban areas. Similarly, as reputations decline and selectivity lowers, the narrower focus of such universities and colleges act to both allow and induce higher prices as their targeted market both accepts these prices and their own situation disallows the creation of cheaper housing.

Bibilography

1. "Tying Arrangements." Aurora WDC, 2008.

   http://www.aurorawdc.com/arj_cics_tying_arrangements.htm

2. Blair, D. Roger. "Tying Arrangements." *Antitrust Economics.* Oxford University Press,

   2008.

3. Cristina, Caffarra. "Economic Theories of Bundling and their Policy Implication in

   Abuse Cases." Centre for Economic Policy Research, 2004.

4. "Costs of Attendence." University of North Carolina Office of Financial Aid, 2009-2010.

   http://studentaid.unc.edu/studentaid/cost/ssa_ug_general.html

5. "Costs of Attendence." Tennessee State University Admissions, 2009-2010.

   http://tennessee.stateuniversity.com/

6. "Estimated Costs of Attendence." Vanderbilt University Office of Undergraduate

   Admissions, 2009-2010. http://www.vanderbilt.edu/Admissions/financeCost.php

7. "Estimated Costs of Attendence." Middlebury University Office of Undergraduate

   Admissions, 2009-2010. http://www.middlebury.edu/Admissions/financeCost.php

8. **Etc. (Costs of Attendence for all ranked schools found from similar sources as 4-6)**

9. Rubinfield, Daniel L. "Bundling." *Microeconomics*. Pearson Publishing, 2008.

10. "Best Colleges 2010." US News and World Report. 2010.

    http://colleges.usnews.rankingsandreviews.com/best-colleges

11. *The Best 371 Colleges, 2010 Rankings.* Princeton Review. Random House Publishing,

    2010.

12. Kane, Thomas J. "The Price of Admission: Rethinking How Americans Pay for College."Washington DC: The Brookings Institution. 1999

13. Ehrenberg, Ronald G. "Tuition Rising: Why College Costs So Much." Cambridge: Harvard University Press, 2000.