Impact of University Expansions to Local Real Estate Markets

Melinda Wang – `mlwang@usc.edu`

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Department of Economics
University of Southern California

Advisor: Professor Richard Green

Abstract

Colleges and universities have extensive economic impacts to the local populations and neighborhoods they are embedded in, bringing an influx of students that typically seek housing within these neighborhoods. In the past twenty years, student populations have dramatically increased, and in turn, their need for housing. How varying real estate markets respond to their local growing universities remains to be explored in detail. This paper examines the house price and rent impacts of four-year, degree granting universities in response to growing student enrollment. Using a fixed-effects model, data suggests that university expansions there is no change in the local rent and house prices by increased enrollment at the census tract level.

1 Introduction

Academic institutions are undeniable drivers of economic growth. These institutions bring in jobs and purchasers of goods and services while also creating housing and new businesses. As such strong economic powerhouses, student enrollment has seen massive increases over the 21st century. During the fall of 2006, 10.5 million students were enrolled in colleges or universities in the United States. By the fall of 2020, the number of students almost doubled to 19.4 million students (Bureau of Labor Statistics 2020). Both historically and recently, universities with on campus housing will adjust to growing student enrollments by expanding their geographic campus lines into nearby neighborhoods. Institutions like University of Southern California's recent Village campus expansion project can house up to 2500 students. The completion of USC and many other university's housing projects increase housing supply, which has an unclear effect on local housing markets.

While the impact of universities on their regional economy is relatively well known, there is little research exploring the effects of physically growing universities on their local real estate market. Considering that approximately half of colleges in metropolitan areas have student populations below 2000, analysis for varying student populations is necessary. Beyond student populations, existing neighborhood markets and their respective demographics create a large diversity of neighborhoods and real estate prices surrounding universities for students to interact with.

already existing low-income university neighborhoods, there is also extra interest in examining universities as drivers of gentrification. As universities grow, their student population usually reflects an underrepresented share of low-income students (Dynarski, 2020). With an influx of wealthier transplant students and new housing and businesses, these local communities face potential gentrification from larger, more urban universities they house. Universities accommodate their growing population of students by providing campus housing. However, up to thousands of students seek housing within close proximity to their university. In wealthier neighborhoods, there is potential for an opposite reaction.

It is clear that there is a unique relationship between colleges and universities with their local housing markets. In order to ubiquitously measure across universities the effects of their expansion, this study looks at student enrollment over a 15 year period. This study aims to look at the relationship between price impacts and each additional student increase. I use data from the U.S. Department of Education's National Center for Education Statistics (NCES). Student enrollment data over time is then matched to a census tract and its immediate surrounding tracts from the U.S. Census Bureau's American Community Survey. I run a fixed-effects regression in order to quantify house and rent prices in response to increased enrollment. In my regressions I find a lack of evidence that universities and colleges universally increase or decrease nearby house prices and rents. This paper is one of the first to examine effects on local housing markets by university expansion and contributes to a growing literature of housing market impacts by points of interest.

2 Literature Review

There are no clear studies specifically on university expansion on housing price and rent growth, thus I discuss below relevant existing literature around housing and points of interest.

2.1 Points of Interest

Several papers have explored the relationship between points of interest and the impact of the local housing market. Using sales prices, geographic data, and neighborhood and home characteristics, Bolitzer and Netusil (2000) find open spaces such as parks, natural areas, and golf courses have statistically significant effects on nearby home sale prices. Turner (2017) also finds similar results that museums, fitness centers, restaurants, etc. have significant impact on home values. Expanding museums can increase house prices by at least 20 percent, but proximity to poor quality parks actually decrease value by 14 percent.

Rascoff and Humphries (2015) identify a "Starbucks effect" which connects increasing house prices with proximity to Starbucks cafes. Glaeser et. al (2018) builds on this work and finds that each additional starbucks that enters a zip code is associated with increased prices. However, they suggest that this correlation may reflect the endogeneity of Starbucks locations that already target house prices that are increasing. In response, they perform a regression with a zip code fixed effect to eliminate possible correlation due to Starbucks targeting already changing neighborhoods. This decreases their initial estimated regression and increases their r-squared.

Prices in large cities are subject to different influences than in smaller cities or rural areas (Kholodolin, 2015). Oftentimes, there are cases where especially urban universities have overlap with other universities and colleges in the same regional area. Debrezion et. al (2006) find that in Dutch metropolitan areas, especially more urbanized areas, house price estimates are affected by proximity to railway stations. These effects vary depending on whether the railway station is closer or is a more frequently visited station. Universities in urban areas may have similar effects - house and rent prices may react more to institutions with greater enrollment and regional economic effects than the specific university or college immediately nearby.

2.2 Demand for Education

Lovenheim and Reynolds (2013) suggest that with their application data, increases in home price actually lead to the increase in the total number of applications to all four - year universities. They point out a relationship that increased house prices give especially low-income families more home equity to fund college endeavors, but their conclusions of their results are only centered around how an increase in house prices leads to greater enrollment of public flagship universities relative to non flagship universities. Considering the general trend of increased house prices over the past two decades, their evidence supplements the idea that if applications are one way to measure demand for postsecondary education, university enrollment defines the current supply at the time. However, increased enrollment isn't uniform across universities, and this fails to capture the effects specifically of increased universities on their local housing market - which likely responds more directly to enrollment.

2.3 Human Capital Spillovers

To look at how universities centralize high-skilled individuals in one area, we consider how several studies have demonstrated measurement of human capital spillovers to local economies. In a study that investigates the impact of human capital gains in cities, Enrico Moretti (2003) explains that human capital spillovers can be estimated by measuring land prices in higher and lower skilled cities. Conley et. al. (2003) find that land prices have a positive correlation with the stock of human capital, but find significant results that human capital externalities disappear when individuals travel over 90 minutes. Effects of universities with high commuter populations are less likely to be adequately captured.

3 Data

In order to construct a dataset that included universities and geographic population data, I combined data from the National Center for Education Statistics (NCES) and the U.S. Census Bureau's American Community Survey (ACS) from 2006 - 2020. In adjustment with my use of ACS 5 year estimates, the final dataset is split into three periods from 2006 - 2010, 2011 - 2015, and 2016 - 2020. Below I will describe the choices behind my cleaning and merging of the data to affirm that the data used in the regression analysis represents my desired metrics.

3.1 University and College Data

The NCES collects data from numerous interrelated surveys that are conducted annually by the Integrated Postsecondary Education Data System (IPED). All four year, degree granting universities provided by the NCES comes with a unique identifier IPEDSID. From the NCES I collected two main datasets - one regarding college and university enrollment data over time, and the other detailed characteristics about the institution. These datasets are combined using their IPEDSID.

Data on each university's fall enrollment was collected yearly from 2006 - 2020. In order to account for universities who had high enrollment but multiple years of zero enrollment before its first year running, maximum and minimum enrollments for each five years were dropped and its remaining three values averaged. The data for university characteristics are collected to attach the unique IPEDSID to its respective zip code. Included in this dataset was an Office of Postsecondary Education identification (OPEID), which is used to indicate whether students are eligible to receive Federal Student Financial Assistance. Universities and colleges with a missing OPEID showed either a relatively small student population (less than 370 students) or online universities ineligible for federal aid. These missing values were thus dropped from the dataset. Extra characteristics included were campus setting, which describes universities by their surrounding neighborhood as rural, suburban, or city and whether or not these settings were small, midsize, or large. These specific urban boundaries are defined using a methodology by the U.S. Census Bureau. Also included was the presence of on campus housing, but without any specifications whether on campus housing was provided for all students or only some.

3.2 American Community Survey 5 Year Estimates

For house price, rent, and demographic data, I use Integrated Public Use Microdata Series's (IPUMS) National Historical Geographic Information System. Since the American Community Survey only has data available for five-year windows, the downloaded data from IPUMS NHGIS provided ACS 5 year estimates from 2006 - 2010, 2011 - 2015, and 2016 - 2020 at the tract level. Data is aggregated amongst the five years, but since the Census surveys data sporadically throughout the five years there may be some error with data collected earlier or later in the window.

I chose the tract level in order to capture local effects more accurately than at the zip code level. Zip Codes across the state of California were inconsistent in size, and Census tracts provided more consistent size and geographies surrounding universities. Tracts consistently have between a minimum of 1,200 to 8,000 people. To accommodate for possible price inflation, house price and rents are adjusted for 2010 dollars.

Some tracts had missing values for median house price and rent. Some of the lack of housing values are due to the physical tract being the actual university itself with no reported house price or rental data. Some are dead spaces in response to high rates of homelessness or airports.

3.3 Constructing the Panel Data

Since the NCES enrollment data came in zip code, it was necessary to use a Zip Code to Tract Crosswalk to aggregate ACS and NCES datasets. Using the U.S. Department of Housing and Urban Development's 2010 USPS Zip - Tract Crosswalk, I could assign zip codes to my ACS data to merge with my enrollment data. Considering there were multiple universities in one zip code, all tracts were assigned to every university within that particular zip code. For my 2016 - 2020 ACS dataset, I used a 2010 - 2020 tract crosswalk to ensure continuity between population data for their respective tracts. Tracts have a weight that shows the percentage overlap between the 2010 and 2020 tracts. All tracts under 95 percent are dropped.

Some tracts had missing values for median house price and rent and were subsequently dropped. Some of these lack of housing values are due to the physical tract being the actual university itself with no reported housing data, or dead spaces in response to high rates of homelessness or airports.

After merging ACS and enrollment data, I hand-coded to keep tracts for each university and college that directly surround or touch the institution. This method guarantees that I am not measuring all the Census tracts within a university's zip code. It also ensures that the demographic data is more consistent across universities since tracts are determined by population, and zip codes are not. Impacts to other tracts outside of these the ones directly surrounding are not measured.

The table below provides some Summary Statistics regarding all universities, large city universities, and high rent universities (rent greater than $1000) across the three periods of interest. Enrollment data is also listed below.

Table 1: Summary Statistics

Variable	**Obs.**	**Mean**	**SD**	**Min**	**Max**
University	1,829	261,930	243,740	550	1,875,601
Large City University HP	438	353,153	312,397	8,422	1,875,601
High Rent University HP	175	465,373	299,999	13,598	1,875,601
Median Enrollment 06 - 10	1,829	6,374	8,465	0	62209
Median Enrollment 11 - 15	1,829	6,883	9,310	90	77,401
Median Enrollment 16 - 20	1,829	7,100	10,218	243	102,845

4 Empirical Methodology

My paper provides analysis in its aim to answer the following questions: When universities bring in more students, how do rent and house prices respond? Do housing prices and rents increase more in urban areas? Do pre-existing neighborhood demographics change the effects of increased enrollment?

4.1 Panel Regression with Fixed Effects

In order to answer the questions listed earlier, I perform regressions and introduce fixed effects by each university and college for median house price and median rent. I utilize census-tract level demographic data as control variables: percent black, percent white, percent hispanic, percent married household with children under 18, household income, percent without high school education, percent with high school education, percent without college education, and percent with college education. By using a fixed effects model, I can sweep out the effect of individual university characteristics to measure the net effect of increasing enrollment to house prices and rents depending on my chosen sample. The specification is as follows:

$$Med\_HP_{it} = \beta_0 + \beta_1 * Med_{Enroll it} + \beta_4 * Pop\_Controls_{it} + \gamma_n * Seasonal\_Dummies + \alpha_i + \varepsilon$$

where i = university and t = 5 year period from [2006, 2020], α_i is the fixed effect for universities and colleges. I also include seasonal binary 0/1 dummies to control for macroeconomic changes that impact housing price growth.

To address omitted variable bias and unobservable random differences between universities, the model requires and uses panel data in a fixed effects regression. In order to explain specifically variation by university expansion to rent and house price, the fixed effects controls for individual universities that are compared. This, in turn, removes any unobserved university variation. The model essentially sweeps out the fixed over time variations of universities to easier isolate the effects of expansion.

4.2 Campus Setting and Student Population

Besides looking at all universities and colleges in California, I run regressions for two main subsets of this population. First, I separate universities both in and are not in large cities with a student population of greater than 2000. Using the Census Bureau's classification of size and type of urban areas, the NCES specifies which universities lie within large cities (greater than 250,000 people). Since about 50 percent of universities have student populations of greater than 2000, I run regressions for larger universities who might have already had preexisting capacities to better adjust for enrollment growth and necessity for large housing building projects. Secondly, I look at universities with a median rent of greater than $1000 during the 2006 - 2020 period. A caveat behind this subset of my sample is that $1000 rent prices are not uniform across the sample, especially since cost of living varies from university to university. This delineation is rather to provide preliminary results and, if significant, prompt further analysis.

5 Results

This paper aims to to identify significant results using a fixed effects model to determine what the impact of each additional enrolled student at a 4 year college or university has on local house and rent prices. I expect that the median enrollment coefficients should be higher when predicting for house prices over rent prices. These predictive values are magnified by individual institution's change in student enrollment. If the values are significant, I determine whether significant results are impactful. I do a simple calculation of the largest change in student enrollment by the predictive coefficient to see how much prices increase or decrease in the presence of universities.

First, I perform regressions to analyze the overall effect of all four-year degree granting universities and colleges to their local markets. The results are presented in Table 2. Estimates for the effect of median enrollment on the change in house prices and rent are less than .5. When multiplying this coefficient value by the change in student enrollment, the magnitude of price change shows essentially no change in housing prices or rents. The results also show that the coefficients are also not significant for housing prices. However, adding controls increases the r-squared value from 0.02 to .4550 for house prices. Controlling for these characteristics explains much variation in the model as we expect, such as race, education and household income, which are all statistically significant.

Next, in Tables 3 and 4 we look more closely at universities and colleges located in both large cities, and non large cities with over 2000 students. Table 3 shows that for Large City Universities, median enrollment is not significant. Table 4 indicates a significant and positive effect of enrollment on house prices. Several universities, from 2006 - 2020, have expanded by over 10,000 students. With this coefficient, the magnitude of impact is roughly around $2000. Considering the magnitude of housing values, these estimates have no impact to local house and rent prices, particularly in large cities where house and rent prices trend higher.

Tables 5 and 6 yield similar conclusive results. These tables are for universities where the rent was greater than or less than \$1000 during the 2006 - 2010 period, respectively. Both subsets of universities, even if significant, yield likely no effect on their local real estate markets. Even with universities that have increased by over 10,000 students, the increase in price is negligible. Table 5 shows no significant or impactful results. Table 6, where initial populations have less than \$1000 rent prices, show a significant result for house price, but the magnitude is still too small to be impactful. If each additional student increases house prices by \$0.39, for up to an increase of 10,000 students, house prices would only increase by \$3900.

University expansion likely has no impact to the surrounding local house and rent prices. Even amongst different subsets of universities based on student enrollment and rent pricing, there is no clear results that indicate that additional students changes the real estate market.

Table 2: All California Universities

	(1) medprice	(2) medprice	(3) medrent	(4) medrent
medenroll	0.216	0.463	0.002	0.003
	(.451)	(0.382)	(.001)	(0.001)
s10	-21253.695***	-6757.47**	-104.49***	-70.173***
	(1569.82)	(1362.00)	(3.324)	(2.925)
s15	-36520.498***	-23327.259***	-47.993***	-8.328***
	(1558.006)	(1727.722)	(-3.293)	(3.714)
white		13.901***		-0.000850**
		(.995)		(-2.86)
black		10.339***		-0.000429
		(1.382)		(-0.87)
hispanic		-21.00***		-0.000419
		(1.823)		(-1.17)
marriedchildrenhh		9.857		0.00180**
		(2.528)		(3.05)
medhhincome		3.144***		0.00000438***
		(0.035)		(31.47)
nohsedu		-13.826*		-0.00510***
		(5.399)		(-4.80)
hsedu		-35.507***		-0.00000711
		(3.543)		(-0.01)
colledu		-18.21***		0.00277***
		(1.909)***		(5.38)
nocitizen		-19.976***		-0.00556***
		(2.885)***		(-0.12)
_cons	281102.52***	113721.99***	994***	629.366***
	(2805.112)	(3552.946)	(6.012)	(7.612)
N	35175	35175	35175	35175
R^2	0.02	0.4550	0.03	0.329

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Non - Large City Universities (2000 students)

	(1) medprice	(2) medrent
medenroll	0.315	0
	(0.749)	(0.001)
white	12.555	0.01*
	(3.195)	(0.005)
black	2.584	0.004
	(3.966)	(0.006)
hispanic	-25.15***	-0.016
	(5.315)	(0.008)
marriedchildrenhh	23.565***	-0.04***
	(7.847)	(0.012)
medhhincome	3.814***	0.007***
	(0.101)	(0)
nohsedu	-5.326	-0.166***
	(15.914)	(0.025)
hsedu	-51.74***	-0.052***
	(13.407)	(0.021)
colledu	-10.181	0.012
	(4.914)	(0.008)
nocitizen	33.288***	.099***
	(7.977)	(0.012)
s10	-27,671.993***	-91.585***
	(4,478.03)	(7.109)
s15	-40,632.36***	-8.129
	(5,603.64)	(8.129)
_cons	191,796.4***	720.114***
	(11,388.84)	(18.031)
N	5685	5685
R^2	0.459	0.352

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Non - Large City Universities (2000 students)

	(1) medprice	(2) medrent
medenroll	0.219***	0.005***
	(0.385)	(0.001)
white	13.225***	0.009***
	(0.953)	(0.003)
black	11.144 ***	0.025 ***
	(1.414)	(0.005)
hispanic	-11.335	0
	(1.9)	(0.006)
marriedchildrenhh	8.521	-0.006
	(2.484)	(0.008)
medhhincome	2.478***	0.006***
	(0.038)	(0)
nohsedu	-17.031**	-0.042**
	(5.541)	(0.018)
hsedu	-37.524**	-0.051**
	(3.385)	(0.011)
colledu	-1.864	0
	(2.38)	(0.008)
nocitizen	12.482	.008
	(2.98)	(0.01)
s10	10,721.55***	-57.88***
	(1409.39)	(4.564)
s15	-15,076.78	-10.206
	(1,748.44)	(5.663)
_cons	89,428.61***	608.238***
	(4,134.51)	(13.419)
N	14763	14763
R^2	0.459	0.352

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Expensive Rent Universities

	(1) medprice	(2) medrent
medenroll	-0.466	0.002
	(1.006)	(0.002)
white	8.735***	-0.006
	(2.409)	(0.004)
black	7.516 *	-0.008
	(3.834)	(0.007)
hispanic	-30.505***	-0.026***
	(4.598)	(0.008)
marriedchildrenhh	39.813***	0.025**
	(5.692)	(0.01)
medhhincome	3.596***	0.006***
	(0.07)	(0)
nohsedu	-39.853***	-0.112***
	(16.024)	(0.029)
hsedu	-25.835**	-0.068***
	(10.559)	(0.019)
colledu	-34.595***	0.01
	(3.928)	(0.007)
nocitizen	38.89***	.046***
	(6.516)	(0.012)
s10	-33,061.44***	-120.181***
	(3669.244)	(6.815)
s15	-51,714.69***	-32.618***
	(4034.41)	(7.473)
_cons	240,964.67***	1061.32***
	(10,570.64)	(19.565)
N	10,023	10,023
R^2	0.354	0.316

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Non Expensive City Universities

	(1) medprice	(2) medrent
medenroll	0.392*	0.001
	(0.272)	(0.001)
white	10.706***	0.001
	(.747)	(0.001)
black	2.606 ***	0.003
	(0.961)	(0.002)
hispanic	-15.033***	0.004***
	(1.35)	(0.003)
marriedchildrenhh	-6.46***	-0.022**
	(1.988)	(0.004)
medhhincome	1.781***	0.003***
	(0.037)	(0)
nohsedu	-12.402***	-0.062***
	(3.60)	(0.007)
hsedu	-28.961***	0.007***
	(2.363)	(0.005)
colledu	29.029***	0.021
	(1.858)	(0.004)
nocitizen	15.958***	0.04***
	(2.348)	(0.004)
s10	7,481.867***	-25.26***
	(922.151)	(1.799)
s15	-5,618.37***	4.134***
	(1280.125)	(2.499)
_cons	79,452.458***	584.938***
	(2,438.56)	(4.736)
N	19,623	19,623
R^2	0.358	0.169

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6 Conclusion

Education has been one of the most important forms of developing human capital. While the United States population has increased by only 10% from 2006 - 2020, the population of college and university students has dramatically increased by approximately 85%. Student populations are growing faster than the population growth. Either by commuting, living on campus, or seeking out housing in the local neighborhood, students must find housing close enough to their institution to attend. In this paper, I seek to understand the possible impacts universities have on housing and rental prices. I use a university fixed effect regression model in order to examine the relationship between increased enrollment and median housing prices. I find no significant impact of a university on their local housing market. Any significant predictive values of enrollment to prices are not large enough to have an impact, and is largely correlative.

This study does not aim to detract from individual cases of universities. Luxury housing projects and rising rents near University of Southern California is undoubtedly necessitated by increasing student demand. Expensive house and rent prices near Columbia University push students away from housing areas like West Village and into less expensive neighborhoods like West Harlem. The college town hosting Indiana University Bloomington reports the highest rent prices in the state, but still maintains lower rent and house prices in tracts directly outlining the university. The relationship a university has to its real estate market is complex. There are a myriad of factors and interactions universities have that create each individual market. Further analysis may be spent on modeling student choice in response to different university characteristics. Discrete choice modeling could reveal how low-income neighborhoods or large city presences affect the type of housing students may choose.