### RESEARCH FOUNDATION

# Affordability in Purpose-Built Student Housing

#### Abstract

From 2013-2020, real rent per bed for purpose-built student housing has increased by 24%, outpacing both income and tuition increases. We study the determinants of rents in the purpose-built student housing market, evaluating the relative roles of demand from enrollment increases and competition with the multifamily housing market. We find that purpose-built student housing and nearby student-competitive housing are highly integrated with local multifamily markets. As a result, the same factors increasing rents nationally have raised costs in the purpose-built student market.

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# About NMHC

Based in Washington, D.C., the National Multifamily Housing Council (NMHC) is the leadership of the apartment industry. We bring together the prominent owners, managers and developers who help create thriving communities by providing apartment homes for 38.9 million Americans, contributing \$3.4 trillion annually to the economy. NMHC provides a forum for insight, advocacy and action that enables both members and the communities they help build to thrive. For more information, contact NMHC at 202/974-2300, email the Council at info@nmhc.org, or visit NMHC's website at nmhc.org.

### About the NMHC Research Foundation

In 2016, NMHC formed a nonprofit (501(c)(3)) Research Foundation to produce research that will further support the apartment industry's business interests. The work supported by the NMHC Research Foundation raises the industry's standard of performance and encourage worldwide investment in the sector. The NMHC Research Foundation funds unique and original research on a wide range of topics, including issues related to development and redevelopment activity, affordable and workforce housing, demographics, tax policy, regulatory environment and zoning and land use, among others. In 2018, NMHC formed the Student Housing Research Fund as part of the NMHC Research Foundation to conduct research focused on the student housing industry to address the paucity and narrowness of research in the industry. For more information, visit <u>nmhc.org/research-foundation</u>.

# About the Authors

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# NMHC Foreword

#### By Chris Bruen, Senior Director, Research, NMHC

The purpose-built student housing market emerged in the 1990s as an alternative to university dorms and other traditional types of private market housing and has since become an increasingly important source of housing for university students.

Recently, public concerns over the rising costs of attending college (tuition, housing, etc.) have led to increased scrutiny on what role the emergence of the purpose-built student housing sector has played in those escalating costs. This first-of-its-kind study by authors Jack Liebersohn and Jason Lee examines the factors driving rent increases in the purpose-built student housing market.

Their research finds the rent increases observed over the past decade in purpose-built student housing are not due to something specific to the sector, such as changes in enrollment or tuition levels. Instead, they are related to overall rent increases in the broader U.S. rental market.

#### **Rising Costs of Purpose-built Student Housing**

Perceptions of rising costs are real. Student housing has become less affordable since 2013. Whether benchmarked against tuition or median incomes, housing costs have increased more in inflation-adjusted terms. But so has market-rate housing.

From 2013-2020, the effective rent per bed increased by about 25% higher for purpose-built student housing and 30% for student-competitive housing (defined as conventional apartments within three miles of a campus). Over the same period, U.S. median incomes increased by about 15%, and average in-state tuition increased by about 20%.

These increases vary significantly by region. Rents rose by over 20% on the West Coast and parts of the Northeast but hardly much in the South and Midwest.

#### Is Higher Education or General Housing Market Conditions Driving These Cost Increases?

Liebersohn and Lee research whether the purpose-built student housing market is integrated into the overall housing market and thus subject to the same factors affecting rental pricing in the broader market or whether it is a segmented market and rent increases are specific to student housing factors.

They conclude that the same affordability factors driving rents in the broader conventional market are driving rents in the student housing sector. In particular, they find little to no association between enrollment and rents. Their analysis finds that when enrollment levels increase, one new bed (on average) is built for each new student enrolled. *As a result, rents do not change.* 

However, they find a significant association between rent-per-bed in the student housing market and affordability measures in the broader market.

• Overall, a 10% increase in local rents is associated with an 8% rent increase in purpose-built student housing.

In other words, much of the rent increases in purpose-built student housing result from students competing with other residents for a limited housing supply in markets where housing prices are already increasing.

#### **Regional Factors Affecting Student (and Broader) Rents**

The authors explore two factors that affect rental rates, in general, to compare how they affect purpose-built student housing rents.

- **Changes in income growth**. Prior research has established that higher incomes raise rents in the general housing market. The authors conclude the same impact on student housing: a doubling of local incomes is associated with an approximate doubling of local rents in the purpose-built student market.
- Legal constraints/regulatory barriers to new construction. As in the broader housing market, greater regulatory barriers to construction are associated with higher rents for purpose-built student housing.

#### **Policy Implications**

This research suggests that the purpose-built student housing market is becoming increasingly unaffordable for the same reason that the broader conventional apartment market is becoming increasingly unaffordable: the U.S. has a severe undersupply of housing of all types and at all price points. *Therefore, policy interventions such as reducing enrollment levels will have little effect on affordability.* 

Liebersohn and Lee's findings also provide further evidence that regulatory barriers significantly restrict our nation's housing supply.

• They find moving from the most regulated to the least regulated rental market is associated with approximately 50% lower rents.

This finding reinforces the results of 2022 NMHC and the National Association of Home Builders <u>research</u> that regulations imposed by all levels of government account for an average of 40.6% of all multifamily development costs.

In short, this new research suggests that policies that make housing affordable in the general housing market will also improve housing affordability for students.

# Introduction

The purpose-built student housing market consists of private market multifamily housing that is built specifically to serve the needs of college students. It has comprised an increasing share of the student housing market since the early 2000s. At the same time that purpose-built student housing has expanded, college costs have increased, leading to widespread public concern. Therefore, the determinants of purpose-built student housing affordability, which is a large component of college costs, are of key policy interest. To shed light on this topic, this report studies trends in the cost of purpose-built student housing over the past decade.

We find that costs have increased substantially in the purpose-built student market. We use data from RealPage Analytics to track average effective rents per bed for purpose-built student housing and to track the number of net beds by region. Average effective rents for purpose-built student housing rose by about 25% in real terms from 2013-2020, as compared to about 20% for average tuition and 15% for median incomes.<sup>1</sup> Rents rose by over 20% on the West Coast and parts of the Northeast and hardly at all in much of the South and Midwest. These patterns are similar to regional patterns in the housing market more generally.

We use a supply-and-demand framework to explain changes in housing costs. Our research builds on a large academic literature studying supply and demand in the housing market. On the supply side, recent papers have pointed to the role of supply constraints coming from regulation as well as natural barriers to housing construction (Molloy, 2020; Saiz, 2010). On the demand side, papers have pointed to the role of employment growth, demographic changes and financing constraints (Howard and Liebersohn, 2021; Greenwald, 2017; Eichholtz and Lindenthal, 2014). Innovative research combines these factors in general equilibrium models that seek to simultaneously explain the cost of housing, the location of new construction and population flows.

The purpose-built student housing market is distinct from other types of housing because it is built with a particular population in mind — university students. Therefore, a natural explanation for rising housing costs is rising demand from university students in particular. This explanation would seem to fit the fact that student housing has become less affordable at precisely the time that university enrollments have increased. However, a problem with this view is that students might compete with the general population for housing, and students are only a small part of the population *in general.* If student housing and general rental housing rising costs. Instead, supply and demand in the general housing market might spill over into the market for purpose-built student housing.

Therefore, a central question is whether the purpose-built student housing market is integrated with the general housing market or whether the two markets are highly segmented. We answer this question by studying the relation between prices in the purpose-built student housing market and demand shocks for student housing and for general housing. Our results associate enrollment changes at universities to rents at nearby purpose-built student housing. We show there is essentially no relationship. When universities increase their enrollment, more purpose-built student housing is built, but rents do not change.

We also show that changes in the general rental market are associated with changes in rent for purpose-built student housing. When rents in a city rise for other types of housing, rents for purpose-built student housing rise nearly one-forone. Greater regulatory barriers to construction and higher regional incomes are also both associated with higher rents for purpose-built student housing.

Our findings are most consistent with the idea that purpose-built student housing is highly integrated with the broader housing market. Demand shocks for housing in general will affect student housing. This means that the rent increases

<sup>1</sup>Results are similar when comparing tuition to purpose-built rents at the same university.

observed over the past decade are not due to student-specific factors but instead are related to the overall increase in rents in the United States. Similarly, we would expect that demand shocks affecting the rental market in general, such as changes in credit conditions, interest rate movements or regulatory changes, will have spillover effects on the student housing market.

The findings in this paper contribute to a small literature about affordability in student housing. While there is a lot of research about housing market affordability in general, relatively little has been written about the student housing market in particular. Ong, Petrova and Spieler (2013) study the determinants of students' housing demand. Levy and Tucker (2006) assess the business cycle vulnerability of student housing. Newell and Marzuki (2018) study the characteristics of student housing from a portfolio perspective.

In addition to the novel analysis, a second contribution of this report is the addition of high-quality data on the student housing market. A limitation to past research on student housing is the lack of high-quality rental data. Previous studies have had to use particular types of housing investments (such as REITs) or conduct surveys of students at particular universities. These limitations mean that the type of cross-regional, nationally representative survey we perform here has been impossible.

### Data Sources

The goal of this report is to understand the economic background of the student housing market. Therefore, our analysis requires detailed information not only on the general real estate market but also specific to the student housing market. Our main data source on student housing comes from RealPage Analytics, a data vendor specialized in the real estate sector. The specific data we use comes from the RealPage Market Analytics product, specifically, the Student Housing software platform.<sup>2</sup> The dataset includes average rents of purpose-built student housing for more than 800 universities in the United States from 2013 to 2021. Some properties may serve multiple universities. Therefore, to avoid double-counting properties, we keep only properties matched to the largest university in each county.

Characteristics of universities are collected from the Integrated Postsecondary Education Data System (IPEDS). IPEDS is a collection of surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). We merge IPEDS data with RealPage by matching university names. Key characteristics include tuition rates, enrollment statistics and types of institution. In addition, we supplement the data with a few other datasets in order to understand the interaction between student housing markets and trends in the local economies. First, we use general housing market data from Zillow Research. Zillow provides a time-series of home values and market-rate rents across regions, known as the Zillow Home Value Index (ZHVI) and Zillow Observed Rent Index (ZORI). While the rent index ZORI is more directly comparable to the student housing rents, the coverage is less extensive than the housing price index ZHVI. Therefore, we use both indices to assure the robustness of our analysis. ZHVI is at a more granular county-level than ZORI at CBSA-level.

We also include data sources that capture the demand and supply factors in the purpose-built market. Local demand factors consist of ZIP Code-level average income from IRS Statistics of Income and the natural amenities scale provided by USDA Economic Research Service. To measure local housing supply constraints, we use the Wharton Regulatory Land Use Restriction Index (WRLURI) from Gyourko et al., (2008) to capture the regulatory constraints.

The final panel dataset spans from year 2013 to 2020 and includes 707 universities in 308 CBSAs (core-based statistical areas).

<sup>&</sup>lt;sup>2</sup> For more details, see https://www.realpage.com/student/asset-optimization/market-analytics-section.

### Trends in Purpose-Built Student Housing: Timing, Location, Costs

#### Student Housing and the Millennial Generation

College students living independently have traditionally chosen between two types of housing: on-campus dormitories and privately owned housing near campus. Beginning in the mid-1990s, purpose-built student housing emerged as an alternative to traditional types of private market housing. Purpose-built student housing shares some features with dormitories — it is built with students' needs in mind and rooms are generally shared. But unlike dormitories, it is supplied by the private market rather than by universities. Different from traditional private market housing, however, purpose-built student housing is rented by the bed. Its quality varies but often includes higher-quality amenities.

Why did purpose-built student housing take off in the 1990s? The likely reason is the rise in the number of college students that began in the late 1990s and continued to the late 2010s. The baby boomer population surge is echoed in their children, who make up the millennial generation. Millennials are typically defined as people born in the early 1980s and ending in the late 1990s. They began attending college in the late 1990s and ending in the mid-2010s, leading to a surge in college enrollments during this time.

Purpose-built student housing emerged as an asset class that served the needs of millennial college students. Figure 1 shows the number of Americans ages 16-24 from 1995 to 2021. The millennial generation is clearly visible in this figure: The number of young Americans increased beginning in the late 1990s and peaked in about 2013. The rise in the number of young people led to an increase in college enrollment. In addition to the population increase, college attendance rates were higher because of greater demand for college degrees from employers and higher rates of college attendance by women, relative to previous decades. All these forces combined to create a record amount of college attendance. The demand created by having more college students was satisfied in part by the purpose-built student housing market.

During the years of greatest student housing demand, four REITs emerged to focus on purpose-built housing. GMH Communities was the first of these to go public, in 2004, followed by American Campus Communities (ACC) also in 2004 and EdR in 2005. Finally, Campus Crest Communities (CCC) went public in 2010. However, the rise of student housing REITs was short-lived. As of 2022, all four public REITs have been acquired by other firms.



#### Figure 1: United States Population Ages 16-24, millions. Source: Current Population Survey and FRED.

#### The Location of Student Housing

The growth of purpose-built student housing has been uneven across regions and type of university. Figure 2 shows the number of beds by university type. Universities are classified as "large" and "small" (depending on whether they have more or fewer than 10,000 students) and public or private. The y-axis of the figure shows the number of beds in thousands. The figure shows the number of beds from 2013-2020, when the data are available.

Figure 2 Panel A shows that nearly all student housing serves students at large public universities. There has been a substantial increase in the number of beds since 2013, even though the number of young Americans began to decline in the latter half of the decade. The increase in beds has been nearly entirely at this category of university.

Panel B of Figure 2 shows the number of beds by public university size, limited to four-year public universities. Overall, about one-quarter of all beds are located at the largest public university in each state. About half are located at the top three campuses. These are roughly proportional to the number of students in each university type. Purpose-built student housing is present beyond the flagship university of each state, including smaller state campuses. But there is essentially no presence at community colleges or two-year campuses.



#### Figure 2: Number of Beds by University Type, 2013-2020.

Series are stacked. "Large" universities are those with above 10,000 students. Source: Authors' calculations from IPEDS and RealPage Analytics data.

The concentration of purpose-built student housing at large public universities is likely related to two factors. The first is the type of housing that universities provide. Private universities, especially smaller ones, set policies that encourage students to remain in on-campus dormitories. As a result, there is less demand for off-campus housing. A few private universities do have purpose-built student housing, but these tend to be in larger cities where dormitory construction is more constrained. The second factor is related to the assessment of enrollment risk by property owners. Decreases in college demand will have a greater effect on total enrollment at community colleges and two-year or small universities as compared to larger campuses. Furthermore, these types of institutions also have a higher share of low-income students,

who are perceived as being more vulnerable to economic risks. Providers of purpose-built student housing therefore prefer to operate near large public universities. These factors matter less to operators of student-competitive housing, which is more easily rented to nearby residents that are not students.

#### Trends in Student Housing Affordability

Figure 3 shows how costs have changed in purpose-built student housing. Panel A shows the real (i.e., inflation-adjusted) average effective rent per bed in 2013 dollars. The series in green shows the average effective rent per bed for student-competitive housing, and the blue line shows the average effective rent per bed for purpose-built student housing. We calculate the raw average across all universities, weighting each university by the total number of beds. Panel B shows growth of effective rents per bed for both purpose-built housing and student-competitive housing, indexed to 2013 dollars. We are interested in understanding how affordability for purpose-built student housing has changed over time. Therefore, we also include series showing average in-state tuition, out-of-state tuition and median household income in the United States, all adjusted for inflation. We calculate the average tuition levels for the same set of universities as rents per bed, weighted in the same way.

Two main facts stand out in Figure 3. First, student housing has become less affordable since 2013. Whether we benchmark housing costs against tuition or median incomes, housing costs have increased by more in inflation-adjusted terms. The effective rent per bed is about 25% higher for purpose-built student housing and nearly 30% higher for student-competitive housing. Over this time, U.S. median incomes increased by about 15%, and average in-state tuition increased by about 20%. The fact that housing costs and costs per bed both rose substantially faster than median incomes means that college affordability was much lower in 2020 than in 2013. The second main takeaway from Figure 3 is that the cost increases are similar for student-competitive housing as for purpose-built student housing. The fact that we see a similar pattern for both series — including a sudden increase for both at the same points in time — suggests that this trend is not driven by something *specific* to the purpose-built student market, such as changes in quality of that type of housing.

Average national trends may hide substantial local heterogeneity in terms of changing costs. Figure 4 shows how affordability has changed at a sample of some of the twenty largest campuses. The figure shows changes from 2013 to 2020 in inflation-adjusted in-state tuition and inflation-adjusted costs per bed for purpose-built student housing. Figure 4 shows that there is a great deal of heterogeneity in terms of in-state tuition changes. Of the 20 universities shown in the figure, eight have real tuition decreases during this time. The tuition increases, when they do occur, vary a lot. On the other hand, the increases in effective rent per bed are somewhat more uniformly positive. There is still variation in rent increases, but most are between 10% and 20%. There is no discernible relationship between changes in tuition and changes in cost. The overall degree of "affordability" depends on both tuition costs and the cost of housing. A lot of the cross-university variation comes from differences in how much university tuition has changed. For public universities (like most of the ones shown here), tuition is a political choice; understanding the determinants of tuition levels is beyond the scope of this report. Instead, the next section will focus on the question of what determines housing costs at purpose-built student housing.



Real changes from 2013-2020 calculated by deflating series by CPI. Tuition and student housing costs calculated as averages across all universities with student housing. Time-series average calculated weighting universities by the sum of student housing beds and student-competitive beds. Source: Authors' calculations from IPEDS RealPage Analytics data. Median income and CPI are from FRED.

Figure 4: Student Housing Rent Changes and In-State Tuition Changes, Select Universities, 2013-2020.



Universities included are the top 20 by total beds (student-competitive plus purpose-built student). Real changes from 2013-2020 calculated by deflating series by CPI. Source: Authors' calculations from IPEDS and RealPage Analytics data. Deflated using CPI from FRED.

### Demand and Supply Factors in the Purpose-Built Market

#### Supply and Demand for Purpose-Built Housing

This section will study possible explanations for rising costs in the purpose-built student housing market. Economics research on housing markets interprets price and quantity changes through a *supply and demand* framework, and we will do the same here. Such a framework jointly considers the reasons that rising demand might raise house prices and how low supply (or high construction costs) could affect prices as well. On the one hand, economics research has studied many factors affecting housing demand, including changes in household credit constraints (Greenwald, 2017), changes in monetary policy (Glaeser, Gottlieb and Gyourko, 2012) and the demand to move for particular jobs (Howard and Liebersohn, 2021). On the other hand, prices might rise if the supply of housing becomes more constrained. Recent research has studied natural barriers to new construction reducing supply as well as changes in regulation (Molloy, Nathanson and Paciorek, 2022).

We begin with the observation that the purpose-built student housing market is small relative to the overall housing market. If the purpose-built market is well integrated with the broader multifamily market, then we would expect the same factors that raise rents or housing prices in general to affect the purpose-built housing market. The market is "well integrated" if students compete for housing with the general population of a region — for example, if students compete with nearby households for the types of housing rented in the student-competitive market. In this type of situation, an increase in demand for nearby housing will affect the general housing market and push up rents for both students and the general population. For example, an increase in local wages may attract workers to a region, raising rents for everyone, including students. In this scenario, an increase in local enrollments may raise the number of purpose-built student housing units that are constructed but will have only a small effect on prices.

The main alternative to an integrated housing market is that the student housing market is segmented from the general housing market. This might be the case if students live in particular areas (e.g., near a university) that are not attractive to the general population, so students do not compete for housing with other residents. If this is the case, then increases in the attractiveness of an area will not have large effects on the student housing market. Instead, changes in rents for purpose-built student housing will be affected by demand coming *specifically from students*. For example, we would expect increases in nearby university enrollment to increase rents at nearby student housing.

The goal of this analysis is not to explain which particular demand and supply factors are affecting the purpose-built student housing market, such as monetary policy, job mobility, and so on. Instead, we will try to answer whether the student housing market is integrated, and therefore the same factors are affecting student housing as the broader housing market; or whether the market is segmented, and therefore it is due to factors specific to student housing. Of course, the same answer need not apply to all regions of the country. The heterogeneity shown in Figure 4 means that it would be wrong to imagine that all student housing markets are the same. We might expect some student housing markets to be well integrated with the broader market, for example, at large urban campuses; whereas others might be fully segmented, such as in smaller college towns. Therefore, it will be important to consider heterogeneity across the types of housing markets.

The methodology in this section will approach this question by analyzing the reasons that cost increases have been different at different universities and in different regions of the U.S. We begin by establishing that there are large and systematic differences in costs across the U.S. These differences could be explained by differences in the supply of

housing or by the different types of demand shocks. We show that effective rents in the purpose-built student market and the student-competitive market are responsive to similar demand factors that have been previously considered in the economics literature. Overall, the evidence will point to a high degree of market integration.

Understanding the degree of integration or segmentation is important for predicting the effects of policies that might affect student rents. For example, if the market is well integrated, reductions in enrollment might not have much of an effect, but policies that reduce housing costs for multifamily housing in general will reduce costs for students as well. On the other hand, if the student housing market is segmented, then students might not benefit from policies that reduce costs for other types of housing.

We proceed with the analysis in three parts. In subsection 4.2, we conduct an exploratory analysis showing variation in the cost and quantity of purpose-built student housing in different parts of the United States. We learn from this analysis that there are large regional differences in both the quantity of new construction and the cost of student housing. Next, subsection 4.3 considers the effects of enrollment changes on the student housing market. If the student housing market is highly segmented from the rest of the housing market, we expect enrollment increases to raise student housing costs; the fact that we do not see this suggests that the market is integrated. Finally, subsection 4.4 shows that regional factors play an important role for purpose-built student housing, further supporting the view that the market is integrated.



Figure 5: Map of U.S. Census Divisions.

Source: U.S. Census Bureau.

#### Location of Student Housing Supply

The U.S. Census Bureau divides the United States into nine regional census "divisions". Figure 5 shows the nine divisions on a map of the United States. There are differences across these divisions, both in terms of housing markets and in terms of the structure of economic activity more generally. For example, the Pacific and Middle Atlantic divisions contain cities with highly constrained housing markets but booming job growth since the early 2010s; the resulting demand for housing has raised rents without a large increase in new construction. Housing markets in the West South Central and South

Atlantic divisions are, on average, relatively deregulated. Job growth in large cities such as Houston and Atlanta has led to population booms in these areas without rent increases as large as in the West and Northeast. Finally, midwestern regions such as the East North Central census division have had relatively stagnant economies. The resulting low housing demand has kept both population and rents low.

There are big differences by region in terms of where student housing and student-competitive housing are built. Figures 6 and 7 show the annual net change in the number of purpose-built and student-competitive housing by year and census region. Overall, the amount of net new student-competitive beds is larger than the new purpose-built beds. For example, the West South Central census division has about 15,000 net new beds during the years with the most construction (2014, 2015, 2017 and 2019). The number of net new student-competitive beds was around 30,000 for each of those years. The number of net new student-competitive beds was similarly 2-3 times as large as the number of net new purpose-built beds for the other census divisions as well.

Figure 6: Change in Net New Beds By Year and Census Division for Purpose-Built Student Housing, in Thousands of Net New Beds.



Change in net new beds is calculated as year-on-year change in beds by division beginning in 2014. Source: Authors' calculations from RealPage Analytics Data.

The development of net new beds varies by region. We can see that most of the new construction in each year has taken place in the South Atlantic region, which includes Florida, Georgia, the Carolinas, West Virginia, Virginia and Maryland. There is also an increase in net new beds for this region during the early 2010s, a time when there is little student-competitive construction in the region. Also important for the purpose-built student market are the East North Central and West South Central divisions. The Pacific division (which consists mostly of California) has relatively little new housing despite a large number of students. New England and the Mid-Atlantic region have very small numbers of new purpose-built beds and slightly more student-competitive beds.





Change in net new beds is calculated as year-on-year change in beds by division beginning in 2014. Source: Authors' calculations from RealPage Analytics Data.

Figure 8 shows that price changes also vary a lot by region. The figure shows the price level and price changes by census division. For ease of reading, note that the axis showing price changes does not start at 0. The largest increase in prices occurred in particular regions — especially the Mountain, Pacific and East South Central regions. By contrast, the West North Central and West South Central divisions (including parts of the Midwest and South) hardly have any price changes. This means that, even though affordability is a problem in general, it is highly region-specific: Affordability has decreased greatly in some parts of the country and hardly at all in others. Later, we will see that there appears to be a correlation between regions where market rents increased and where rents for student housing increased. For example, market rents rose the most in the Pacific and Mountain regions, two of the areas where student housing rents increased the most.





Source: Student housing costs are authors' calculations from RealPage Analytics data.



Nominal changes in rent per bed for the purpose-built and student-competitive housing markets from 2014-2020, against percent changes in the nearby rental market and nearby housing market. Small towns are defined as those where the CBSA (core-based statistical area) has below 100,000 residents. Source: Student housing costs are authors' calculations from RealPage Analytics data. Enrollment changes are calculated from IPEDS data. Weighted by 2013 total beds (purpose-built student plus student-competitive).

### Effect of Enrollment on Student Housing

#### Effect of Enrollment on Rents per Bed

We explore the relationship between enrollment and changes in student housing costs in Figure 9. Each circle in the figure represents a single university, and the size of each circle is proportional to the number of total beds (student-competitive plus purpose-built) at the university as of 2013. Panel A, on the left, shows the relationship between enrollments and rents for purpose-built housing. The x-axis shows the percent change in enrollment at each university. The y-axis shows the percent nominal change in effective rents per unit for purpose-built student housing (in Panels A and C) and in student-

competitive housing (in Panels B and D). Both changes are calculated over the time period 2013-2020. Panels A and B use data from all universities in the sample. Panels C and D use data from universities located in towns with below 100,000 residents. Considering the overall correlation between rent growth and enrollment changes, there is a positive association, but overall it is extremely weak. The same is true when we limit the data to small towns. Overall, the evidence in Figure 9 suggests little to no association between enrollments and rents.

In Tables 1 and 2 of the Appendix, we investigate the relationship between enrollment and rents in greater depth. Using a linear regression allows us to adjust for the role of multiple demand factors at once to assess how robust the relationship in Figure 9 is. The dependent variables in Tables 1 and 2 are the percent change in effective rent for purpose-built student and student-competitive housing, respectively. The independent variables that are used to explain this are the log university enrollment growth, plus a variety of local explanatory variables that could potentially affect rents and may need to be adjusted for. The local explanatory variables are the growth and level of local incomes, and the growth and level in the number of local households, both measured at the county level. Column 1 shows the relationship between rents and enrollment remains small after adjustment and not statistically distinguishable from zero. Columns 3-4 repeat the estimation in Columns 1-2 but limited to large universities where changes in the number of students might have a larger effect on local rents. The coefficient remains close to zero and not statistically significant.

We will favor an interpretation of Figure 9 that the student housing market is integrated with the broader housing market. Taken in isolation, however, this figure admits a second interpretation: that student housing is located in cities where new housing is quickly and easily built (i.e., a highly elastic housing supply). If the housing supply is elastic, then demand from high enrollments might be accommodated with new housing, with little price impact. However, this interpretation would also mean that other sources of demand from the broader housing market, such as due to higher wages, will have little impact on student housing rents. Second 4.4 will test that prediction and show that local wage increases are in fact associated with higher student housing rents. Taken together, these results will favor the interpretation of high market integration.

Next, we study how changes in enrollments affect the number of new beds. As long as housing market supply is somewhat elastic, greater enrollment will lead to the construction of new beds. Therefore, we expect a positive relationship. This holds regardless of how integrated the purpose-built student market is with the broader rental market.

Figure 10 shows the relationship of student housing beds to university enrollment.



Nominal changes in rent per bed for the purpose-built and student-competitive housing markets from 2014-2020, against percent changes in the nearby rental market and nearby housing market. Source: Student housing costs are authors' calculations from RealPage Analytics data. Enrollment changes are calculated from IPEDS data. Weighted by 2013 total beds (purpose-built student plus student-competitive).

Panel A shows the relationship between enrollment changes and the number of purpose-built student housing beds as well as the best-fit line. The slope of the line is positive and close to one. The relationship is statistically significant but not very tight. Overall, this figure provides evidence that approximately one new bed is constructed on average for each new student enrolled. At the same time, there is large variance around the best-fit line, implying that there are many other factors affecting the number of purpose-built beds. We view this as evidence (but not very strong evidence) that the number of beds corresponds to the enrollment over the time frame we consider.

Panel B of Figure 10 shows the relationship between enrollments and the net percentage change in student-competitive beds by university. The best-fit line shows that the relationship is negative. This is surprising, since there is no theoretical reason that greater enrollment should be associated with fewer beds. On the one hand, the negative relationship may be statistical noise. On the other hand, it is possible to find speculative reasons that greater enrollments lead to fewer student-competitive beds. For example, it could be that university expansions are also associated with an increase in the number of non-student employees who compete with students in the competitive housing market.

Tables 3 and 4 of the Appendix explore the effects of enrollment on the number of beds while adjusting for regional factors, similar to Tables 1 and 2 of the Appendix. Once again, the linear regression allows us to adjust for the role of multiple demand factors at once. The dependent variables considered in these two tables are the percent change number of beds for student and student-competitive housing, respectively, from 2014-2020. The independent variables are the same ones used to explain changes in the number of beds in Tables 1 and 2 of the Appendix: log university enrollment growth, the growth and level of local incomes, and the growth and level in the number of local households. Column 1 shows the effect of enrollment on beds without the covariates, and Column 2 adds them. Columns 3-4 show results with a sample limited to large universities. The coefficient on local enrollment is positive and statistically significant regardless of covariates when we study purpose-built student housing, in Table 3. The estimates in Tables 3 and 4 of the Appendix show that the relationship in Figure 10 is very similar when adjusting for various local factors that could plausibly affect the number of beds.

#### **Relationship to General Market**

The last section studied how university-specific demand affected the purpose-built student housing market. Specifically, it showed that increases in demand coming from higher enrollment lead to the construction of more net beds without affecting prices. In this section, we explore the relationship to the broader housing market. We begin by showing that there is a very strong correlation between rent per bed in the student housing market and affordability measures in the broader rental or housing market. This relationship holds whether we look at purpose-built student rents or student-competitive rents, and whether we measure broader affordability using changing market rents or changing prices.

Figure 11 shows scatter plots relating the percent changes in nominal effective rent per bed for student housing to percent changes in housing market costs more broadly. We measure changes in costs from 2014-2020. Panel A shows purposebuilt student costs against CBSA-level rent changes from Zillow, and panel B shows purpose-built student costs against county-level house price changes from Zillow. Both relationships are very strong and statistically distinguishable from zero. Overall, a 10% increase in local rents is associated with about an 8% increase in rents for purpose-built student housing. A 10% increase in local house prices is associated with a 6% increase in rents for purpose-built student housing. Panels C and D show the same relationships but using effective rent per bed for student-competitive housing rather than purposebuilt student housing. Again, the relationship is strong and statistically significant. The coefficients are very similar for student-competitive housing as for purpose-built student housing. The correlation between student housing rents and broader housing market affordability provides further evidence that these markets are integrated. In other words, a close relationship is exactly what we would expect if students compete with other residents for housing.



#### Figure 11: Student Housing Rents and Nearby Housing Markets, Percent Changes 2014-2020.

Nominal changes in rent per bed for the purpose-built and student-competitive housing markets from 2014-2020, against percent changes in the nearby rental market and nearby housing market. Source: Student housing costs are authors' calculations from RealPage Analytics data. Nearby rents are calculated from CBSA rent index from Zillow. Nearby prices are calculated from county-level price index from Zillow. Weighted by 2013 total beds (purpose-built student plus student-competitive). Figure 12: Student Housing Rents and Nearby Housing Markets.



Each data point represents a university and the circles are scaled according to the total number of beds. Nominal rents in 2020 are shown on the y axis on a logarithmic scale. The x axis in Panel A is the average household income in the local county. The x axis in Panel B is the Wharton Regulatory Land Use Restriction Index (WRLURI), which measures regulatory constraints to new construction. Source: Student housing costs are authors' calculations from RealPage Analytics data. Incomes are from the U.S. Census Bureau. WRLURI is from Gyourko et al., (2008). Weighted by 2020 total beds (purpose-built student plus student-competitive).

#### What Regional Factors Affect Student Rents?

The economics literature has considered a variety of factors that affect demand in the general housing market. A particularly important one is changes in incomes: When incomes increase, people respond by migrating to a region. Unless the housing supply is highly elastic (such as in rural areas), the increase in housing demand will raise rents (Howard and Liebersohn, 2021). Therefore, the first regional factor we study will be local incomes. Specifically, we ask whether higher incomes raise rents in the purpose-built student market, just as previous research has established it does in the general housing market. Second, the economics literature has shown that constrained housing supply raises rents. In areas where construction is difficult for natural or legal reasons, costs are higher. Therefore, the second regional factor we consider will be legal constraints to new construction. Previously, we showed how changes in local factors cause *changes* in student housing rents. But we do not think that there are large changes in regulation over the short time frame we consider. Therefore, we now switch to showing how the *level* of rents is associated with relevant regional factors.

In Panel A, we show how nominal effective rent per bed is related to local incomes. As in the other scatter plots, each point represents a university. The x axis is the average local income in each county as of 2020. The y axis is the local rent. Both axes are once again logged, so the slope of the fit line can be interpreted as a percent. Doubling local incomes is associated with an approximate doubling of local rents in the purpose-built student market. For example, an average household income increase from \$50,000 to \$100,000 is associated with an average nominal effective rent increase on average from \$500 per month for one bed to \$1,000 per month.

Panel B shows the relationship between nominal effective rent per bed and local constraints to new construction. The measure of constraints we use is the Wharton Regulatory Land Use Restriction Index (WRLURI), originally developed in a paper by Gyourko et al., (2008). Higher values of the WRLURI mean that new construction is more tightly regulated. The relationship between rents and WRLURI is strong and highly statistically significant. Moving from the most regulated to the least regulated rental market is associated with approximately 50% lower rents. An important caveat to this finding is that we cannot eliminate a role for other local factors, besides the ones considered here.

Panels A and B of Figure 12 show that local factors affecting the entire housing market affect the rental market as well. In order to tease out the role of local factors more carefully, we confirm this relationship using a linear regression that simultaneously considers multiple explanatory variables at once. The purpose of this is to see how the estimates change once we adjust for different plausible explanatory variables at once. For example, this will tell us whether the effects of regulation remain once we adjust for the fact that some areas have higher natural amenities (mountains, lakes, etc.) than other regions. We study the effect of local factors on the log rent for three types of rents: general rents for the entire housing market from Zillow; purpose-built student rents at all housing markets; and purpose-built rents at large universities only. The explanatory variables we consider are the amount of land unavailable for construction, which may raise prices; the number of natural amenities, from the USDA; average incomes; the number of households; and regulation. Regulation data is unavailable for many regions, so we show results including the regulation index as well as without the regulation index in order to maximize the amount of data used.

Linear regression results are shown in Table 1. Columns 1-2 show the association between the regional factors and log rents in the overall market. Areas with higher incomes and more amenities have higher rents. Greater regulation is also associated with higher rent. Adjusting for these factors, the amount of unavailable land and the local population are not associated with higher rents. Columns 3-4 show equivalent results for log effective rents in the student housing market. Many of the most important factors are the same: As noted before, higher incomes and greater regulation are associated with higher rents. And as for general rents, the amount of unavailable land is irrelevant. However, when we look at student housing rents, greater amenities are associated with *lower* rents, and higher populations are associated with higher rents. A possible reason for this is that student housing is of lower quality in the most in-demand cities. This shows that while most of the explanatory factors are the same, there are still some differences relative to the housing market in general. Finally, Columns 5-6 show results limited to large universities only. The estimates are very similar whether we look at all universities or only large universities.

	(1)	(2)	(3)	(4)	(5)	(6)
	All Rents	All Rents	Purpose-Built	Purpose-Built	Purpose-Built	Purpose-Built
			All	All	Large	Large
Unavailable land	0.0079	0.23*	0.089	0.17	-0.016	0.16
	(0.14)	(0.13)	(0.13)	(0.17)	(0.23)	(0.26)
Natural amenities	0.074***	0.046***	-0.012	-0.039***	-0.018	-0.043***
	(0.0069)	(0.010)	(0.0081)	(0.012)	(0.012)	(0.015)
Households	-0.027*	-0.035	0.092***	0.092***	0.094***	0.10**
	(0.015)	(0.022)	(0.018)	(0.029)	(0.024)	(0.039)
Average income	1.29***	1.21***	0.56***	0.34***	0.62***	0.51***
	(0.11)	(0.12)	(0.15)	(0.13)	(0.19)	(0.17)
Regulation index		0.095***		0.12**		0.16**
		(0.032)		(0.048)		(0.067)
Observations	1546	553	1553	559	590	198
R2	0.767	0.773	0.445	0.460	0.470	0.582

#### Table 1: The Effect of Regional Factors On Student and All Other Rents.

This table presents weighted estimates showing the relationship between regional factors and rents in the general housing market and the purpose-built student market. Data sources: RealPage Analytics, IPEDS, IRS Statistics of Income, Gyourko et al., (2008). P-values significant at the 10% levels are indicated with \*, p-values significant at 5% are indicated with \*\* and p-values significant at 1% are indicated with \*\*\*.

# Conclusion

The purpose-built student housing market has become an increasingly important source of housing for university students since the early 2000s, especially for students at large public universities. We show that rents have increased for this housing over the past decade relative to tuition and median incomes. As a result, purpose-built student housing has become less affordable.

Our evidence suggests that the purpose-built student housing market is highly integrated with the nearby general rental market for each university. A key piece of evidence is that the rent increases in the purpose-built student housing market are similar to rent increases for student-competitive housing. Furthermore, they closely track rent increases in the cities where the properties are located. In contrast, they are hardly affected by changes in local university tuition, even when we study the largest universities.

We also show that purpose-built rents are strongly related to local incomes. Even though rents have increased faster than incomes on average, there is a one-to-one linear relationship between income growth and rent growth across cities. This provides additional evidence that purpose-built rents are closely related to housing demand and suggests that local employment opportunities may help ameliorate high housing costs for local students.

Our findings imply that policies that make housing affordable in the general market will also improve affordability for students. High integration means that reducing university enrollments will have little effect on affordability. Research has shown that supply constraints affect the rental market and that this is expected to continue in the future (Molloy et al., 2022). Based on our results, this is expected to affect the student housing market as well.

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# Appendix

	(1)	(2)	(3)	(4)
	Purpose-Built All	Purpose-Built All	Purpose-Built Large	Purpose-Built Large
Enrollment growth	0.014	0.065	-0.052	-0.024
	(0.11)	(0.12)	(0.11)	(0.12)
House Price Growth	0.75***	0.73***	0.69***	0.63***
	(0.15)	(0.17)	(0.14)	(0.15)
County income growth		48.4***		39.0*
		(17.9)		(19.3)
County income level		-1.53		-3.18
		(10.3)		(12.1)
County household growth		-40.0		-17.0
		(26.8)		(23.7)
County household level		0.055		0.26
		(2.03)		(2.18)
Observations	74	74	44	44
$R^2$	0.396	0.439	0.443	.0486

#### Table 1: The Effect of Enrollment Growth On Rents-Per Bed for Purpose-Built Student Housing.

This table presents weighted estimates showing the relationship between university-level enrollment growth and rent per bed for purposebuilt student housing. Weighted by 2013 total beds (purpose-built student plus student-competitive). Robust standard errors. Data sources: RealPage Analytics, IPEDS, IRS Statistics of Income.

	(1)	(2)	(3)	(4)
	Competitive All	Competitive All	Competitive Large	Competitive Large
Enrollment growth	0.014	0.23**	0.065	0.25*
	(0.11)	(0.11)	(0.12)	(0.14)
House Price Growth	0.75***	0.55***	0.73***	0.49***
	(0.15)	(0.13)	(0.17)	(0.13)
County income growth			48.4***	-1.70
			(17.9)	(20.3)
County income level			-1.53	0.39
			(10.3)	(11.4)
County household growth			-40.0	35.9
			(26.8)	(27.0)
County household level			0.055	-1.54
			(2.03)	(1.86)
Observations	74	44	74	44
$R^2$	0.396	0.414	0.439	0.479

Table 2: The Effect of Log Enrollment Growth on Log Rents for Student-Competitive Housing.

This table presents weighted estimates showing the relationship between university-level enrollment growth and rent per bed for studentcompetitive housing. Weighted by 2013 total beds (purpose-built student plus student-competitive). Robust standard errors. Data sources: RealPage Analytics, IPEDS, IRS Statistics of Income.

	(1)	(2)	(3)	(4)
	Purpose-Built All	Purpose-Built Large	Purpose-Built All	Purpose-Built Large
Enrollment growth	0.56**	0.68**	0.67***	1.03***
	(0.26)	(0.29)	(0.24)	(0.32)
County income growth		-48.5		-10.4
		(43.2)		(59.2)
County income level		21.8		25.8
		(21.9)		(29.1)
County household growth		-10.7		-30.2
		(19.1)		(55.3)
County household level		-3.38		-9.08**
		(3.32)		(3.54)
Observations	93	93	43	43
$R^2$	0.089	0.123	0.164	0.311

Table 3: The Effect of Log Enrollment Growth on Log Number Beds for Purpose-Built Student Housing.

This table presents weighted estimates showing the relationship between university-level enrollment growth and growth in the number of beds for purpose-built student housing. Weighted by 2013 total beds (purpose-built student plus student-competitive). Robust standard errors. Data sources: RealPage Analytics, IPEDS, IRS Statistics of Income.

Table 4:	The Effect of	<sup>F</sup> Enrollment	Growth on	Growth i	n Number	of Beds f	for Student-	Competitive	Housina
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	(1)	(2)	(3)	(4)
	Competitive All	Competitive Large	Competitive All	Competitive Large
Enrollment growth	-0.46*	-0.43	-0.64***	-0.45*
	(0.25)	(0.30)	(0.23)	(0.25)
County income growth			46.8	15.3
			(62.0)	(89.5)
County income level			19.0	21.4
			(23.7)	(24.9)
County household growth			-42.0	-202.3**
			(36.5)	(75.8)
County household level			5.69*	7.45**
			(3.12)	(2.97)
Observations	93	43	93	43
$R^2$	0.059	0.053	0.204	0.410

This table presents weighted estimates showing the relationship between university-level enrollment growth and growth in the number of beds for student-competitive housing. Weighted by 2013 total beds (purpose-built student plus student-competitive). Robust standard errors. Data sources: RealPage Analytics, IPEDS, IRS Statistics of Income.