Bulletin

YardiᴹMatrix

June 2021

Contacts

Jeff Adler
*Vice President & General
Manager of Yardi Matrix*
Jeff.Adler@Yardi.com
(303) 615-3676

Jack Kern
*Director of Research and
Publications*
Jack.Kern@Yardi.com
(800) 866-1124 x2444

Chris Nebenzahl
Editorial Director
Chris.Nebenzahl@Yardi.com
(800) 866-1124 x2200

Ben Bruckner
Senior Research Analyst
Ben.Bruckner@Yardi.com
(800) 866-1124 x2387

Andrew Semmes
Senior Research Analyst
Andrew.Semmes@Yardi.com
(800) 866-1124 x2092

The Relationship Between Pandemic Rent Growth and Educational Attainment

Rental rate growth during the pandemic has been widely divergent. Expensive, coastal urban markets have seen sharp rent declines, while more affordable suburban markets located in the Sun Belt, West and Midwest have recorded modest and sometimes robust year-over-year (YoY) rent growth. However, not every market fits this narrative. February data showed flat to declining YoY rents in Western and Sun Belt markets such as North Dallas (0.7%), Denver (0.3%), Nashville (-0.2%) and Austin (-2.1%). Is something besides an aversion to dense and largely deactivated urban environments driving the behavior of rental rates during the coronavirus pandemic?

The analysis examines one possible explanation for bifurcated multifamily rent growth: educational attainment. More specifically, the proportion of employed persons that have a bachelor's or post-graduate degree at an individual property. Data from the 2019 U.S. Census Bureau American Communities Survey and the Yardi Matrix Rent Survey is used to create a simple and straightforward ordinary least squares (OLS) regression model that estimates changes in YoY rent as a function of educational attainment.

Results suggest that a negative, sizeable and statistically significant relationship exists between levels of higher education and YoY rent growth during the pandemic. Multifamily properties where a large proportion of tenants held a bachelor's or post-graduate degree exhibited much weaker rent growth during the pandemic compared to properties with a less highly educated tenant base.

The effect is estimated to be as large as a 10.06 to 17.12 percentage point reduction in YoY rent growth for properties where 100% of the over-25 age population held a bachelor's or post-graduate degree, compared to properties where the over-25 age population contained no college graduates.

Work From Anywhere

During the pandemic, many renters sought alternative housing arrangements. Without the daily commute, work-from-home policies allowed employees not just to work from home but to work from anywhere. Suddenly, that hackneyed real estate mantra "location, location, location" lost all meaning. Or did it? Not all jobs can be performed remotely. For some individuals, work from anywhere is a real possibility; for others, location still matters very much. Moving out of the crowded, expensive city is dependent on the ability to work from home, which is highly correlated with educational attainment.

In May 2020, the BLS reported that 37.4% of all employed persons worked from home. For those with a high school degree, only 15.3% worked from home, while for persons with a bachelor's degree or higher the proportion was nearly four times greater at 59.6%. Overall, persons with a bachelor's degree or higher made up 72.5% of all persons who worked from home in May 2020.

By April 2021, the BLS reported that the percentage of employed persons who worked from home fell to 19.8%. Work from home fell across all levels of educational attainment compared to May 2020. Educational attainment, however, continued to be highly correlated with remote work. Of the 26.3 million persons who worked from home in April 2021, 76.0% held a bachelor's degree or higher.

May 2020

	Total Employed ('000s)	Persons Who Worked From Home ('000s)	Percent of Total Employed	Percent of Persons Who Worked From Home
Total employed	123,109	45,989	37.4	100
Less than high school	6,887	355	5.2	0.8
High school–no college	28,708	4,379	15.3	9.5
Some college	31,581	7,928	25.1	17.2
Bachelor's degree and higher	55,933	33,327	59.6	72.5
Bachelor's degree	33,778	18,069	53.5	39.3
Advanced degree	22,155	15,258	68.9	33.2

Source: Bureau of Labor Statistics–Current Population Survey–May 2020

April 2021

	Total Employed ('000s)	Persons Who Worked From Home ('000s)	Percent of Total Employed	Percent of Persons Who Worked From Home
Total employed	133,034	26,299	19.8	100
Less than high school	8,205	193	2.4	0.7
High school–no college	32,451	2,007	6.2	8.5
Some college	33,622	4,112	12.2	15.6
Bachelor's degree and higher	58,757	19,987	34	76
Bachelor's degree	35,952	10,736	29.9	40.8
Advanced degree	22,805	9,250	40.6	35.2

Source: Bureau of Labor Statistics–Current Population Survey–March 2021

A Simple OLS Model

Clearly, higher education is well correlated with an individual's ability to work from home. If work from home for some proportion of employees really means work from anywhere, then one would expect rental properties with high concentrations of highly educated individuals to experience higher turnover during the pandemic and therefore weaker YoY rent growth compared to properties with a low proportion of college-educated tenants.

To test this hypothesis, a simple OLS model with the following specification was estimated using data available in Yardi Matrix's multifamily database:

$$\%\Delta Rent_i = \beta_1 + \beta_2 \, Location \, Class_i + \beta_3 \, Bachelor's_i + \beta_4 \, Advanced_i + \varepsilon_i$$

(Note: To measure tenant-level educational attainment, measures of educational status within a one-mile radius of an individual property were used as a proxy.)

■ *%ΔRent$_i$*: The percentage YoY change in average rent for an individual property. Data was calculated for February 2020 to estimate the pre-pandemic effect and February 2021 to estimate the pandemic effect.

■ *LocationClass$_i$*: Categorical variable that identifies an individual property's location class. Either urban or suburban. Suburban is the reference class. *Source: National Center for Education Statistics*

■ *Bachelor's$_i$*: The percentage of the over-25 age population within a one-mile radius of an individual property that has a bachelor's degree. *Source: U.S. Census Bureau American Communities Survey–2019*

■ *Advanced$_i$*: The percentage of the over-25 age population within a one-mile radius of an individual property that has a post-

graduate degree. *Source: U.S. Census Bureau American Communities Survey–2019*

There are 52,860 properties in the Yardi Matrix database where:

1. The location class can be identified.

2. The percentage of college graduates within a one-mile radius can be calculated.

3. The YoY change in average rent in February 2020 and February 2021 can be calculated.

Pre-Pandemic Results

Our analysis first estimated the February 2020 YoY change in rent as the dependent variable. The following estimated coefficients, their p-value and regression adjusted r-squared, f-statistic and probability are summarized in the table below:

February 2020—YoY Percent Change in Rent

	Coefficient	P-Value
Intercept	0.0491	0.000
Urban	0.001	0.104
Bachelor's	-0.039	0.000
Advanced	-0.0245	0.000
Regression Model	Adjusted r-squared	0.008
	f-statistic	143.1
	Prob f	0.000

Source: Yardi Matrix

Prior to the pandemic, urban properties had a slight and weakly statistically significant rent premium compared to suburban properties. Additionally, both measures of education had a negative and statistically significant association with rent growth. Using the above results, an estimate for the YoY change in rent for an urban property where 50% of the above-25 age population within a one-mile radius held a bachelor's

degree and 25% of the above-25 age population held a post-graduate degree is as follows:

$$\%\Delta Rent = .0491 + 0010 - (.0390)^*(.50)(.0245)^*(.25)$$
$$\%\Delta Rent = .0491 + 0010 - .0196 - .0061$$
$$\%\Delta Rent = .0244$$
$$= 2.44\%$$

The overall regression model's f-statistic suggests the model is statistically significant, but an adjusted r-squared of .008 also suggests that educational status explains an extremely low level (less than 1%) of the variation in YoY changes in rent prior to the pandemic.

Pandemic Results

Estimating the same regression with the February 2021 YoY change in rent as the dependent variable yields the following results:

February 2021—YoY Percent Change in Rent

	Coefficient	P-Value
Intercept	0.0783	0.000
Urban	-0.0166	0.000
Bachelor's	-0.1006	0.000
Advanced	-0.1712	0.000
Regression Model	Adjusted r-squared	0.122
	f-statistic	2,440
	Prob f	0.000

Source: Yardi Matrix

Several notable changes occur:

1. The coefficient for urban properties turns negative and becomes highly significant, supportive of the general idea that pandemic suburban rents have outperformed urban rents.

2. The percent bachelor's degree coefficient becomes significantly more negative.

3. The percent post-graduate coefficient becomes dramatically more negative.

4. Adjusted r-squared increases to .122.

Pandemic work-from-home policies have clearly played a role in driving negative rent growth in many markets. Properties located in areas where a large proportion of the population has a bachelor's degree or better exhibited a strongly negative relationship with rent growth during the pandemic.

The results suggest one could expect, on average, the YoY percentage change in rent to be lower by 10.06 percentage points for a property where 100% of the over-25 age population held a bachelor's degree compared to a property where the over-25 age population contains no college graduates. For a property where 100% of the over-25 age population held a post-graduate degree, the effect increases to a negative 17.12 percentage points.

Although the adjusted r-squared of .122 is relatively low, it has dramatically increased in the pandemic model compared to the pre-pandemic model. Educational attainment prior to the pandemic was a poor predictor of overall rent growth. During the pandemic, its explanatory power has increased considerably and has a high statistical significance.

Returning to the example of an urban property where 50% of the above-25 age population within a one-mile radius held a bachelor's degree and 25% of the above-25 age population held a post-graduate degree, the estimated pandemic YoY change in rent turns negative:

$$\%\Delta Rent = .0783 - .0166 - (.1006)^*(.50) - (.1712)^*(.25)$$
$$\%\Delta Rent = .0783 - .0166 - .0503 - .0428$$
$$\%\Delta Rent = -.0314$$
$$= -3.14\%$$

Individual Markets

Segmenting the data into individual markets and re-estimating the model allows for a closer examination of locations where the relationship is strongest. Fewer observations in each individual market data set required the educational attainment data to be combined into one variable. This generally did not change results.

Of the 133 unique Yardi Matrix markets in the overall dataset, 44 have an adjusted r-squared greater than .04. Coastal gateway markets dominated the top 15, but many smaller Sun Belt and Western markets often considered "pandemic winners" also exhibit a negative relationship between educational attainment and pandemic rent growth. Many of these Western and Sun Belt markets (Atlanta, Austin, Charlotte, Dallas, Denver, Kansas City, Minneapolis, Nashville, Phoenix, Portland, San Diego) have successfully developed their knowledge-based economies in recent years and are now considered established technology hubs. For all the markets where adjusted r-squared was .04 or higher, the education coefficient was negative and highly significant.

Forty-one markets have an adjusted r-squared between .01 and .04. Universally for these markets, the education coefficient is negative, and for a majority it is also statistically significant at a 95% confidence level or better. Established or emerging technology hubs such as Orlando, Colorado Springs and Indianapolis have highly significant education coefficients. Other markets usually associated with manufacturing (Detroit, Buffalo, Cleveland-Akron) have education coefficients that are not statistically significant.

The remaining 48 markets have an adjusted r-squared below .01. For many of these markets, the effect of education on rent is small or statistically insignificant. Interestingly, Boise, Hunts-

Top 15 Markets by Adjusted R-Squared

| Market	Adjusted R-Squared
Brooklyn	0.47
Seattle	0.44
Northern Virginia	0.43
Washington DC–Sub Maryland	0.32
Philadelphia–Urban	0.24
Chicago–Urban	0.22
San Francisco–Peninsula	0.19
Northern New Jersey	0.19
Houston	0.18
Atlanta–Urban	0.17
Boston	0.17
Bay Area–South Bay	0.17
Queens	0.15
Bay Area–East Bay	0.13
Nashville	0.13

Source: Yardi Matrix

ville and Raleigh–Durham show up here, three markets that have a reputation as established or rapidly establishing technology hubs.

A two-way scatter plot with the proportion of the over-25 age population with a bachelor's degree or better on the x axis and the pandemic YoY change in rent on the y axis helps illustrate the relationship.

For tech heavyweights Seattle and San Francisco, the effect is obvious:

San Francisco - Peninsula
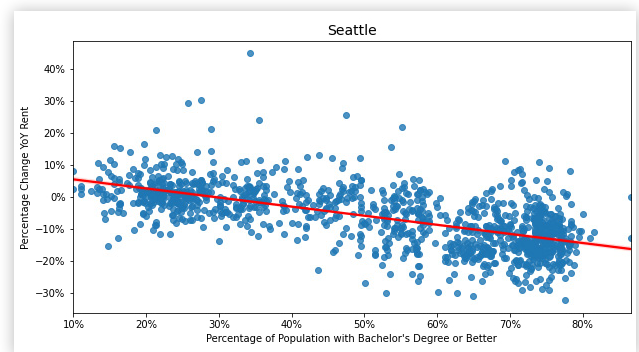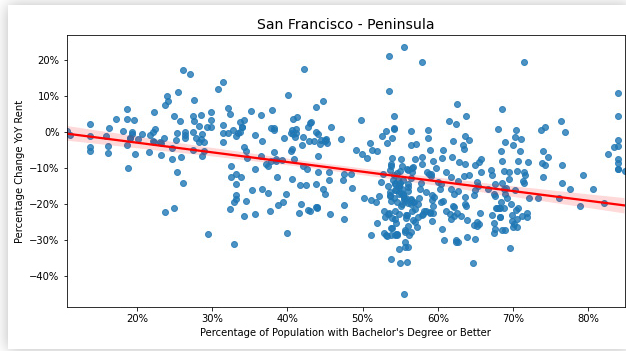
Austin has become a top destination for tech workers leaving California during the pandemic. Although the relationship is not as obviously strong as for Seattle or San Francisco, robust in-migration has not spared Austin rents from the effects of remote work.

Austin
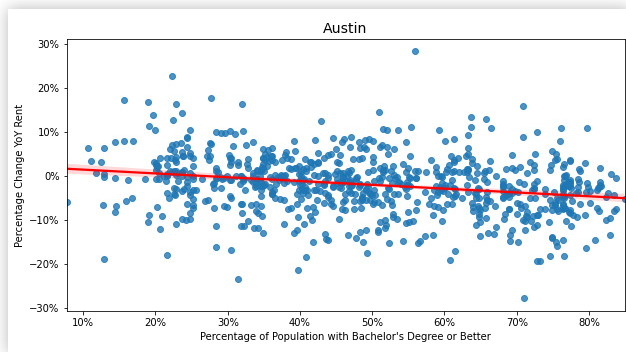
At 7.0%, Phoenix's February 2021 YoY change in rent was near the top of metro markets tracked by Yardi Matrix. Still, the relationship holds true in Phoenix, as well.

Phoenix
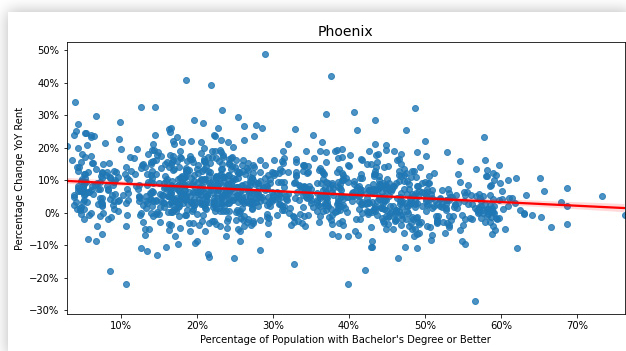
Conclusion

Whether it was to find a little more space, buy a home, fully embrace #VanLife or ditch that annoying roommate who never washes the dishes, many tenants sought new living arrangements during the pandemic. The ability to do so was not evenly distributed. Pandemic-related remote work was overwhelmingly concentrated among the college-educated segment of the workforce. A relatively simple OLS regression confirms this phenomenon is associated with relatively weaker rental growth compared to properties or markets with a less-educated tenant base.

Unquestionably, there are many different drivers to rental rate growth, and remote work was but one driver during the pandemic. As the economy rapidly normalizes, the question for remote work is whether it will become a durable trend or fade out as life normalizes—and whether it will continue to affect multi-family rent growth as it did during the pandemic.

Many (though not all) remote employees enjoy their newfound workplace flexibility, and many employers (also not all) are looking at solutions to accommodate them in the future. Undoubtedly, cities and offices will reopen. The social dynamism and collaboration opportunities they afford are too strong to ignore. However, if some proportion—even a small one—of pre-pandemic demand has permanently left these assets, the results presented here suggest rental rate recovery may take longer than many are currently expecting.

—Ben Bruckner, Senior Research Analyst, and
Andrew Semmes, Senior Research Analyst

IM Yardi Matrix

Disclaimer

Although every effort is made to ensure the accuracy, timeliness and completeness of the information provided in this publication, the information is provided "AS IS" and Yardi Matrix does not guarantee, warrant, represent or undertake that the information provided is correct, accurate, current or complete. Yardi Matrix is not liable for any loss, claim, or demand arising directly or indirectly from any use or reliance upon the information contained herein.

Copyright Notice