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Analysis of Oregon Multi-Family Housing in Relation to COVID-19 Pandemic

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by

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ABSTRACT

The purpose of this paper is to examine notable metrics of multi-family housing markets before and since the COVID-19 pandemic. The primary locations for the analysis of this issue were Portland, Oregon and other cities located near Portland. This paper attempts to demonstrate the ways in which the COVID-19 pandemic has affected the landscape of multi-family housing options and affordability since the year 2020. A literature review was first conducted to obtain a better understanding of what the discourse community surrounding housing changes has stated about the pandemic's role in the housing market. After drawing conclusions from the prior literature, a data analysis was conducted on aggregate data from the year 2000 to the present in Portland, Oregon and other cities in the state. A descriptive statistical analysis was run to understand the data spread, then several t-tests were run on significant variables to determine if the time period of the pandemic had a significant statistical effect on said housing variables. The results of the statistical analysis corroborated the statements made in the literature review with regards to the pandemic's impact on housing. By agreeing with the literature review, this paper adds to the literature surrounding the ongoing housing dilemma that is connected to the duration and aftermath of the COVID-19 pandemic.

INTRODUCTION

The focus of this paper will be an examination of multi-family housing in Portland and several surrounding suburbs in the aftermath of the COVID-19 pandemic. Beginning in 2020, worldwide regulations were put in place by many governments in an effort to slow the spread of COVID-19. These measures caused the closure or downsizing of many businesses. In other words, many business dealings were put to a halt, including real estate. Over the course of the pandemic, housing affordability and availability have been pushed to the forefront of many residents' minds. While lending standards are certainly more regulated than prior to the 2008 Global Financial Crisis, this does not mean that declining availability should be dismissed. The primary foundational issue with the housing market is the lack of affordable rental options.

After discussing the discourse community surrounding housing in relation to the pandemic in the United States and global markets, this paper will transition to a discussion of variable differences in said data in relation to the 2020 pandemic. This paper will ultimately be focused on answering the question of in what ways the COVID-19 pandemic has impacted the discrepancy in multi-family housing supply and demand in the Portland metro area. Before examining the data and literature in more depth, there should be an understanding of the primary causes of current housing conditions as a result of the pandemic. The scope of this research was limited to the United States because much of the available research conducted prior to this paper focuses on the United States with some exceptions. The scope was also limited to the state of Oregon because an analysis of the entire country would be too broad for the focus of this paper. As such, this does limit the scope of the analysis since this is only factoring one state in a single country, with some cities in said state not being accounted for. This

does also allow for a focused discussion on the single-family housing market's impact on the demand for apartments, and how the shifts in supply and demand have played a role in the current housing situation.

It is generally understood that the shift to remote work and the closure of many businesses put a halt to production in many industries. This fact is also true for the housing market. This is especially true in large metro areas like Portland, where most potential buyers of single-family housing would look to less densely populated areas. In addition to the lower demand for large housing projects in densely-populated metro areas, there also is the relationship that landlords held to the pandemic. In order to keep up with a quickly shifting market, many landlords were put in a position where rent needed to be increased which complicated the living situations of many residents. The reopening of most remaining businesses allowed for employment rates to reach pre-pandemic levels which has somewhat alleviated these complications. The remaining dilemma from the prior situation is the higher demand for apartments and other rental options. Since home prices are quickly rising and the construction of new buildings is decreasing, many urban areas are forced to work with the space they already possess. Due to this combination of factors, many people are put in a position where their main option for housing is to rent. This fosters an environment where the demand for apartments naturally increases because housing is an important need and potential construction projects are either canceled or delayed. Since renting in urban areas has naturally increased when accounting for the previously-mentioned factors, rental rates are going to increase as is well-known in recent years.

LITERATURE REVIEW

Before discussing the discourse community regarding single-family housing, the scope of the literature review should be established. The primary information source used was Business Source Premier, which was accessed through the Portland State Library Database and Articles function. The initial search terms were articles related to the United States, the pandemic, and housing. The scope of the research was set to the United States primarily because it would make the most sense to compare Portland to other American cities, though one article was still valuable despite talking about housing in a more global sense. If the article was able to outline how extraordinary circumstances like the pandemic can affect the state of single-family housing, it would be useful to the discussion. This research is valuable because housing crises often mean that many households have a small number of affordable options or general space for housing, especially when there is a disparity between urban and suburban areas.

Some authors involved in the discourse surrounding housing in relation to the pandemic were clear about the market's potential division in the near future. Barış Yörük centered their discussion around daily and weekly housing data in 100 metro areas in 2020. They define measures of housing market activity as change in new listings, total inventory, newly pending sales, median list price, web traffic to for-sale homes, and average number of days to pending sale status. Yörük concludes that the closure of businesses deemed non-essential was the primary factor for a decrease in new home listings. Based on the data provided, he found that said closures caused an up to 11 percent decrease in listings of single family housing, and a 3.5 percent inventory decrease when compared to 2019. (Yörük, 2022) It would be expected that the loss of essential businesses would have a larger impact on listings and inventory, but the closure of

businesses deemed non-essential was a larger catalyst. This is due to the fact that real estate agents were considered not to be essential workers, meaning that real estate transactions were arbitrarily prevented from engaging in the market. This dilemma also led to increased web traffic for listings after March 2020. The article goes on to associate school closures with a 5 to 9.1 percentage point decrease in the change of total inventory when compared to the same time period in 2019. However, He does also qualify this as only marginally significant to a statistical analysis. (Yörük, 2022) While Yörük used the available data to conclude that non-essential business closure were primarily responsible, Jim Lee took a different approach, instead pointing to spatial factors.

Lee factors in the geographical aspect of collecting the data where the focus is placed on population density and the distance from city centers as sort of a benchmark for what qualifies as a metro area. (Lee, 2022) Lee tries to re-center the understanding of the topic around individual choice rather than government policy. He mentions work from home being a notable factor as well since city centers are more likely to provide employment opportunities from home which would cater to the desire to live in suburban areas and easier access to amenities. In other words, there are simply less benefits for living in an urban area since there are less resources and the cost is generally higher. In relation to COVID-19 specifically, the desire to look to suburban areas would also mean a lower risk of contracting COVID-19. Based on Lee's regression analysis, neighborhoods with a greater capacity of jobs that allow for remote work were the most commonly viewed. (Lee, 2022) It would make sense that those with the resources to move away from areas that are less viable for employment would do so, meaning that Lee ultimately takes a pragmatic approach to the current housing dilemma. Arpit Gupta generally agrees with his approach when conducting research on housing inventory and demand.

Similarly to Lee, Gupta also makes it a point to mention the significance of work from home in the sort of urban flight that has been observed since 2020. Gupta uses more specific terminology when referring to the discrepancy between suburban and urban pricing, referring to the concept of the land price gradient, which is a tool for judging correlation between distance from city centers and house prices. It would normally be expected that house prices near large city centers to rise faster than those with more distance. However, the unique situation caused by the pandemic has reversed that pattern, similarly to what was discussed by Lee. Through Gupta's rent gradient, it can be seen that suburban houses had consistently fewer days on the market which would reflect the idea that suburban neighborhoods have a demonstrably higher demand. (Gupta, 2022) We can once again see that as time goes on, suburban locations have become more desirable to those with the means to afford them. As mentioned previously, the amenities that would come with living near a large city center are either not present or not worthwhile, and the cost of housing compared to suburban areas means that this kind of urban flight is not surprising. Stephen Malpezzi shifts the focus of the discussion slightly, with more of an emphasis on the effect of housing affordability on poverty in the United States.

Malpezzi wrote about the state of housing in the middle of the pandemic, though he recognizes that this kind of writing is open to error due to the scope of the pandemic. His research is useful for the fact that it gives a useful discussion when considering variables from both the supply and demand side. From the demand side, they discuss how, as income rises, budget shares decrease as is consistent with inelastic demand. What this means is that housing is always going to be a necessity from the demand side because the income elasticity of demand will be less than one. (Malpezzi, 2022) This finding makes sense when looking at it from the basic principle of demand. Since housing is always going to be needed, this should be taken into account when discussing the data.

From the supply side, Malpezzi notes a common issue with discussions of affordable housing being the near-exclusive focus on the pricing and composition of new projects. While new construction is typically a significant piece of media narratives with regards to single-family housing, new projects make up less than 3% of the total stock annually. (Malpezzi, 2022) Knowing this fact, it would make sense not to place a great emphasis on new building projects, but only with regards to single-family housing during the pandemic. This distinction should be made since the data that will be analyzed is based on multi-family housing. Malpezzi also outlines the process of "filtering" where households are set up based on factors like income, price, and quantity depending on the age of the home. The input of the discourse community surrounding housing affordability in the pandemic will be useful as this paper transitions to an examination of data from Portland and other suburbs. The literature review was useful for bridging the gap between assumptions about the discrepancy between urban and suburban housing because it helped establish logical causes for why it is the case. While it is useful to understand that there is a dilemma in single-family housing, the literature surrounding it was useful for pinpointing the most important causes for it.

DATA ANALYSIS OUTLINE

As mentioned previously, the data that will be examined is divided into multi-family properties in Portland and Oregon suburbs. The data was sourced from CoStar Group, a property information provider for the United States and several other countries in Europe and North America, and it is one of the most commonly used services for property data. The data covers seven areas of downtown Portland, these include: Downtown, North, East, Northeast Portland, Northwest Portland, Central Northeast Portland, Southwest, and Southeast. The suburban areas featured in the data set include: Aloha, Beaverton, Clackamas County, Clark County, Columbia County, Damascus, Hillsboro, Lake Oswego, Oregon City, Outlying Washington County, Sherwood and Tualatin, Skamania County, Tigard, Troutdale and Gresham, Vancouver, Wilsonville, and Yamhill County. All properties included in the data set fall under CBSA code 38900. All properties are also base case forecast scenarios and are submarket properties.

This data is relevant to the discussion relating to housing amid the pandemic since there is a large set of data covering Portland, a large city center, and the surrounding suburbs. With regards to supply and demand as was discussed in the literature review, the data will be weighed against supply and demand variables like occupancy rate, vacancy rate, under construction units, demand units, and sold units. All of these variables reflect the relationship between supply and demand as it pertains to the housing market and understanding issues with affordability in Portland. First, a descriptive statistics analysis was run on the previously mentioned variables with the results being displayed in a separate sheet. The descriptive statistics tables included all property data from Q1 of 2000 to the present. Then, a two sample t-test assuming unequal variances was run on the same set of variables. The separating factor between the two sets of variables was the

year 2020. The first range included all properties from Q1 of 2000 to Q4 of 2019, while the second range only included properties from Q1 of 2020 to Q3 of 2022. While this method of conducting the t-test does provide more data for pre-2020 properties, the current housing dilemma is still ongoing, so there should be more current data to work with in the future.

DATA ANALYSIS FINDINGS

When analyzing the data, it was first important to conduct a descriptive statistical analysis for each of the variables that the data is being weighed against. The entire data set of 2,275 properties were factored in without any division based on time period or location.

Mean	6382.027034
Standard Error	122.9958433
Median	3877.741943
Mode	N/A
Standard Deviation	5866.527826
Sample Variance	34416148.73
Kurtosis	1.737779492
Skewness	1.362510571
Range	31862.00906
Minimum	35.99679947
Maximum	31898.00586
Sum	14519111.5
Count	2275

Figure 1: Descriptive Statistics Results of Demand Units

First, the mean center of Demand Units was approximately 6,382. This could have been the case because of the number of demand units being very skewed towards the top of the data set, with a small portion of listings having upwards of 10,000 units. Demand Units had one of the highest rangest as well, with a minimum of 36 and a maximum of 31,898.

Mean	146.8113832
Standard Error	4.892195547
Median	72
Mode	10
Standard Deviation	190.1673875
Sample Variance	36163.63526
Kurtosis	9.746779751
Skewness	2.668639017
Range	1584
Minimum	0
Maximum	1584
Sum	221832
Count	1511

Figure 2: Descriptive Statistics Results of Sold Units

With regards to the Sold Units, the mean of center was approximately 147. In a similar situation to the demand units, this figure is affected by the number of listings with either 0 sold units despite the range being 1,584. The spread for Sold Units was once again skewed towards the top, with the total sum of Sold Units being 221,832 despite a large number of listings with 0 units.

Mean	212.4852747
Standard Error	8.279856421
Median	23
Mode	0
Standard Deviation	394.9239811
Sample Variance	155964.9509
Kurtosis	10.68598879
Skewness	3.003243298
Range	3016
Minimum	0
Maximum	3016
Sum	483404
Count	2275

Figure 3: Descriptive Statistics Results of Under Construction Units

Furthermore, the Under Construction Units had a more notable spread. Since some listings also had 0 units under construction, the range was 3,016, with a total sum of 483,404, and a mean of 212. The pattern exhibited by these variables on an initial

observation was a numerical imbalance towards the most active listings for units with a noticeable portion of data having either 0 or a single digit number of units.

Mean	1095.236959
Standard Error	5.396669251
Median	1041
Mode	913.7142944
Standard Deviation	257.4047178
Sample Variance	66257.18875
Kurtosis	-0.308563707
Skewness	0.648084181
Range	1295.927979
Minimum	687.3531494
Maximum	1983.281128
Sum	2491664.082
Count	2275

Figure 4: Descriptive Statistics Results of Market Asking Rent Per Unit

The Market Asking Rent Per Unit had a large spread as well, with a range of approximately 1,296 due to the wide variance in rates with a minimum of 687, and a maximum of 1,983. This wide data spread could also be due to the factoring of data since the year 2000. The mean value of approximately 1,095 is relatively consistent when looking at asking rent per unit before the year 2020.

Mean	94.729%
Standard Error	0.000446247
Median	95.103%
Mode	92.801%
Standard Deviation	2.128%
Sample Variance	0.000453035
Kurtosis	5.784719611
Skewness	-1.656225264
Range	0.216888249
Minimum	77.337%
Maximum	99.025%
Sum	2155.087387
Count	2275

Figure 5: Descriptive Statistics Results of Occupancy Rate

While not as significant on the surface, the discrepancy in occupancy rate was initially one of the more notable findings. Due to certain properties having an occupancy rate of less than 80%, the mean center of the occupancy rate was 94.729%, though many listings did have an occupancy rate of virtually 100%. As mentioned previously, the range of occupancy rate was large, with the maximum occupancy being 99.025%, while the minimum was as low as 77.337%.

Mean	5.271%
Standard Error	0.000446247
Median	0.048972726
Mode	N/A
Standard Deviation	0.021284629
Sample Variance	0.000453035
Kurtosis	5.784720628
Skewness	1.656225412
Range	21.689%
Minimum	0.975%
Maximum	22.663%
Sum	119.9126128
Count	2275

Figure 6: Descriptive Statistics Results of Vacancy Rate

In a similar situation to the occupancy rate, the vacancy rate had a large range of .975% to 21.689%, though in the case of this variable, the mean of 5.271% is a more accurate representation. This mean value is due some properties having a vacancy rate of more than 20%.

After running a descriptive statistical analysis, a two-sample t-test was conducted assuming unequal variances on the same variables with the separating variable being the year 2020 due to the pandemic beginning in the first quarter of that year. The mean values of each variable, one-tail and two-tail p-values, and one-tail and two-tail t Critical values were considered when confirming the statistical significance of the mean difference of each weighted variable, separated by the year 2020. Since the data collected before the pandemic consists of listings from the year 2000 to 2019, there were 2,000

observations for the first set of data, and 275 for the data collected for 2020 and onward. While this approach does mean that there is a smaller field to consider with more recent years, these effects could still be observed in the future, and the conclusions drawn from this test could be subject to change. After conducting the t-test, it was found that for several of the variables, there was a significant difference between the mean values of each variable when separating them by the pandemic time period. The first of these was the demand units.

	Demand Units (Pre-2020)	Demand Units (2020-Present)
Mean	6165.0736	7959.8698
Variance	31761082.64	51069867.86
Observations	2000	275
Hypothesized Mean Difference	0	
df	323	
t Stat	-3.9974	
P(T<=t) one-tail	0.000039695	
t Critical one-tail	1.6496	
P(T<=t) two-tail	0.000079389	
t Critical two-tail	1.9673	

Figure 7: t-Test: Two-Sample Assuming Unequal Variances Results of Demand Units

The mean demand units was approximately 6,165 before the year 2020, with the current mean displaying as 7,959. Both p values were much lower than .05, meaning that the null hypothesis should be rejected. This fact is further proven by the critical values of 1.65 and 1.97. Since the critical values are significantly higher than 0, there is more

confidence in rejecting the null hypothesis. This makes sense as there is a mean difference of nearly 2,000 units when separating the variable by the year 2020. This fact is also reflected with the difference in under construction units.

	Under Construction Units (Pre-2020)	Under Construction Units (2020-Present)
Mean	193.8120	348.2909
Variance	143018.4059	229931.5720
Observations	2000	275
Hypothesized Mean Difference	0	
df	323	
t Stat	-5.1276	
P(T<=t) one-tail	0.00000025332	
t Critical one-tail	1.6496	
P(T<=t) two-tail	0.0000005066	
t Critical two-tail	1.9673	

Figure 8: t-Test: Two-Sample Assuming Unequal Variances Results of Under Construction Units

The mean Under Construction Units before 2020 was approximately 194, while the current mean was approximately 348. Similarly to the demand units, p values for Under Construction Units were significantly less than .05, and the t critical values were 1.65 and 1.97 once again, meaning that the null hypothesis can confidently be rejected. The exception to this pattern was the Sold Units.

	Sold Units (Pre-2020)	Sold Units (2020-Present)
Mean	145	155
Variance	33669.7442	50932.4472
Observations	1291	220
Hypothesized Mean Difference	0	
df	271	
t Stat	-0.6250	
P(T<=t) one-tail	0.2663	
t Critical one-tail	1.6505	
P(T<=t) two-tail	0.5325	
t Critical two-tail	1.9688	

Figure 9: t-Test: Two-Sample Assuming Unequal Variances Results of Sold Units

The Sold Units of multifamily properties had means of approximately 145 before the year 2020, and 155 after the year 2020. The p-values were larger than .05 at .267 and .532, meaning that there is no significant difference between the sold units. The similar critical values to the other unit variables of 1.65 and 1.97 means that we can confidently accept the null hypothesis with regards to Sold Units.

	Market Asking Rent/Unit (Pre-2020)	Market Asking Rent/Unit (2020-Present)
Mean	1048.178087	1437.483299
Variance	51871.47734	37727.13804
Observations	2000	275
Hypothesized Mean Difference	0	
df	323	
t Stat	-3.9974	
P(T<=t) one-tail	0.000039695	
t Critical one-tail	1.6496	
P(T<=t) two-tail	0.000079389	
t Critical two-tail	1.9673	

Figure 9: t-Test: Two-Sample Assuming Unequal Variances Results of Market Asking Rent Per Unit

The mean market asking rent per unit had a significant difference between the period before 2020 and after 2020, increasing from an average of 1,048 to 1,437. Due to the p-values being less than .05, at .00004 and .00008, and the critical values of 1.65 and 1.97, it can be assumed that there is a significant difference in the market asking rent per unit.

	Occupancy Rate (Pre-2020)	Occupancy Rate (2020-Present)
Mean	94.7358%	94.6803%
Variance	0.000369976	0.001060383
Observations	2000	275
Hypothesized Mean Difference	0	
df	301	
t Stat	0.2764	
P(T<=t) one-tail	0.3912	
t Critical one-tail	1.6499	
P(T<=t) two-tail	0.7824	
t Critical two-tail	1.9679	

Figure 10: t-Test: Two-Sample Assuming Unequal Variances Results of Occupancy Rate

The mean Occupancy Rate difference was only marginal between the two time periods, with a rate of 94.74% before 2020, and 94.68% from 2020 onward. The p-values were far higher than .05, at 3.912 and 7.824, indicating that there was no significant statistical difference. This fact corroborates the initial observation of the mean rates since the difference is less than 1%. Thus, there was no significant difference between the Occupancy Rate of units when separating the variables by time period. This is most likely due to the fact that data from both urban and suburban areas was considered, and since housing is an essential need, the rates remained largely the same.

	Vacancy Rate (Pre-2020)	Vacancy Rate (2020-Present)
Mean	5.2642%	5.3197%
Variance	0.000369976	0.001060383
Observations	2000	275
Hypothesized Mean Difference	0	
df	301	
t Stat	-0.2764	
P(T<=t) one-tail	0.3912	
t Critical one-tail	1.6499	
P(T<=t) two-tail	0.7824	
t Critical two-tail	1.9679	

Figure 11: t-Test: Two-Sample Assuming Unequal Variances Results of Vacancy Rate

The Vacancy Rate mirrors the lack of significant difference seen with the Occupancy Rate. The mean rates were 5.26% and 5.32%, respectively. Both p-values were higher than .05 at .39 and .78, meaning that the null hypothesis should be rejected for the Vacancy Rate as well. This makes sense because Occupancy Rate and Vacancy Rate are directly connected.

Based on the results of the two sample t-tests as discussed above, there was a significant increase in demand units, under construction units, and rental rates. These results suggest that the increase in newly constructed units cannot match the increase in demand for housing, which leads to higher asking rental rates. The significant difference in market asking rent per unit shows that the demand for renting could also be indicative of a lack of supply even with the significant increase in construction projects. This could possibly be due to the emphasis on building luxury apartments which will not be

affordable for most households. As mentioned previously, the aggregate data used for this test is skewed towards data from before 2020, though the results of variables like demand and rental rates have already increased significantly over approximately three years, so there are enough results to make a reasonable assumption about the relationship between housing supply and demand since 2020.

CONCLUSION

In summary, the unique situation concerning the COVID-19 pandemic has certainly complicated the living situations of many people. Based on the results of the statistical analyses provided in the findings section of this paper, the year 2020 began a shift in the demand and asking rate of multi-family housing. A pattern of increasing demand for units led to a larger need for the construction of new multi-family units, which in turn led to a higher asking rate per unit. The increase in building projects has allowed for more opportunities for multi-family housing since 2020, meaning that the pandemic has been in some ways a net positive for housing options. However, the affordability crisis is still ongoing since while the number of new construction projects has increased, many of them are not affordable for the average household. The new environment created since 2020 has also led to increasing rental rates, meaning that while the potential issue of supply has improved since the pandemic, there is still work to be done to solve an affordability crisis. The scope of this research did limit what conclusions could be drawn since the data used was centered around a single American state, and does not necessarily reflect the state of housing worldwide. These findings could be built upon by an analysis of other states and by a global analysis. This broader analysis could be achieved through a larger research team at a major university or research institute. A more thorough and broad analysis of single-family and multi-family housing could be

useful for the purpose of understanding what steps can be taken by institutions in the future.

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