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Analysis of Rent Prices in Colorado



Rent Prices and P/R Ratios in Colorado

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## **Introduction**

Over the years, rent prices have been increasing. Many people are finding it difficult to find affordable housing, particularly in higher rent areas of Colorado. Many individuals also struggle to determine the appropriate times to rent or buy a property. Using the price-to-rent ratio, known as the P/R Ratio, it can be determined if a property should be rented or purchased. Using data from the Colorado Information Marketplace (“Census Counties in Colorado 2015”, 2017), the P/R Ratio will be found for each county in Colorado. This paper will analyze the P/R ratios for Colorado counties and compare the findings with other states as well as with the national average.

## **Literature Review**

When researching the rent price variation across the U.S., many articles explore the variables that affect rent price. Articles also establish the appropriate times that consumers should rent or buy. In pursuit of finding affordable housing in Colorado counties, based on Median Gross Rent and the Median Home Value, readers need to understand the overall economic factors that contribute to rent prices. A common complaint is that rent prices are too high, and therefore unaffordable. In the article, “Variation in Local House Price-Rent Ratios,” Katherine Pancak (2017) analyses 163 Connecticut towns, and makes the argument that P/R ratios are an essential benchmark to determine whether it is a good time for a consumer to buy or rent a property. In the article, Pancak identifies what a P/R ratio is, and elaborates on its strengths and weaknesses. A P/R ratio is calculated by dividing the actual cost of a house by what it could be rented for monthly, multiplied by 12 (House Price/(Monthly Rent Price \* 12 months)) (Pancak, 2017). This analysis can help buyers determine whether a property is overpriced or underpriced, as well as detecting housing bubbles. A lower P/R ratio indicates

that a consumer should buy a property rather than renting. Equally so, a higher P/R ratio infers that a consumer should rent rather than buying (Pancak, 2017). Pancak found that rental properties (properties that are not for sale, but for renting purposes only) are not of the same quality as a property that would be purchased for a home. Another weakness in using the P/R ratio is there are additional amenities at a rental property that may drive up the price versus a home property. When using the P/R ratio, it is important to identify the benchmarks to understand if you are getting a deal, or if there is a housing bubble present. Pancak claims that a historical average best determines whether a P/R ratio is high or low, but the national average is at a 16 (2017). This means that buyers are willing to pay an equivalent of 16 years of rent when purchasing a property.

P/R ratios are a reasonable place to start when determining whether to buy or rent a property. Recent trends show that the demand for rent is high in Colorado, and the P/R ratio could be affected by this demand. This information can be deemed helpful in identifying if rent prices in Colorado counties are in line with market equilibriums or skewed.

### **Data**

The data set utilized was retrieved from the Colorado Information Marketplace (“Census Counties in Colorado 2015”, 2017), that uses data from the 2010 Census. The dataset included demographic information for each Colorado County such as population, ages, children ages, as well as housing information such as median gross rent, median household income, and other variables. The P/R ratio was calculated for each county in Colorado by using the equation:

$$\text{P/R Ratio} = (\text{House Price} / (\text{Monthly Rent Price} * 12))$$

The table containing the P/R Ratio for each county is located in Appendix A. The summary statistics were also found for Colorado’s P/R ratios:

**Table 1:** Summary Statistics of Colorado’s P/R Ratios.

Colorado P/R Ratio	
Mean	20.57171875
Standard Error	0.829874117
Median	19.39
Mode	19.4
Standard Deviation	6.638992932
Range	32.79
Minimum	7.68
Maximum	40.47
Count	64

This information will be utilized when analyzing Colorado’s P/R Ratios and comparing them to the national averages.

**Results**

The general thresholds for the P/R ratios were established in the article “Rent-to-Price Ratio Definition” by Marshall Hargrave.

**Table 2:** P/R Ratio Benchmarks

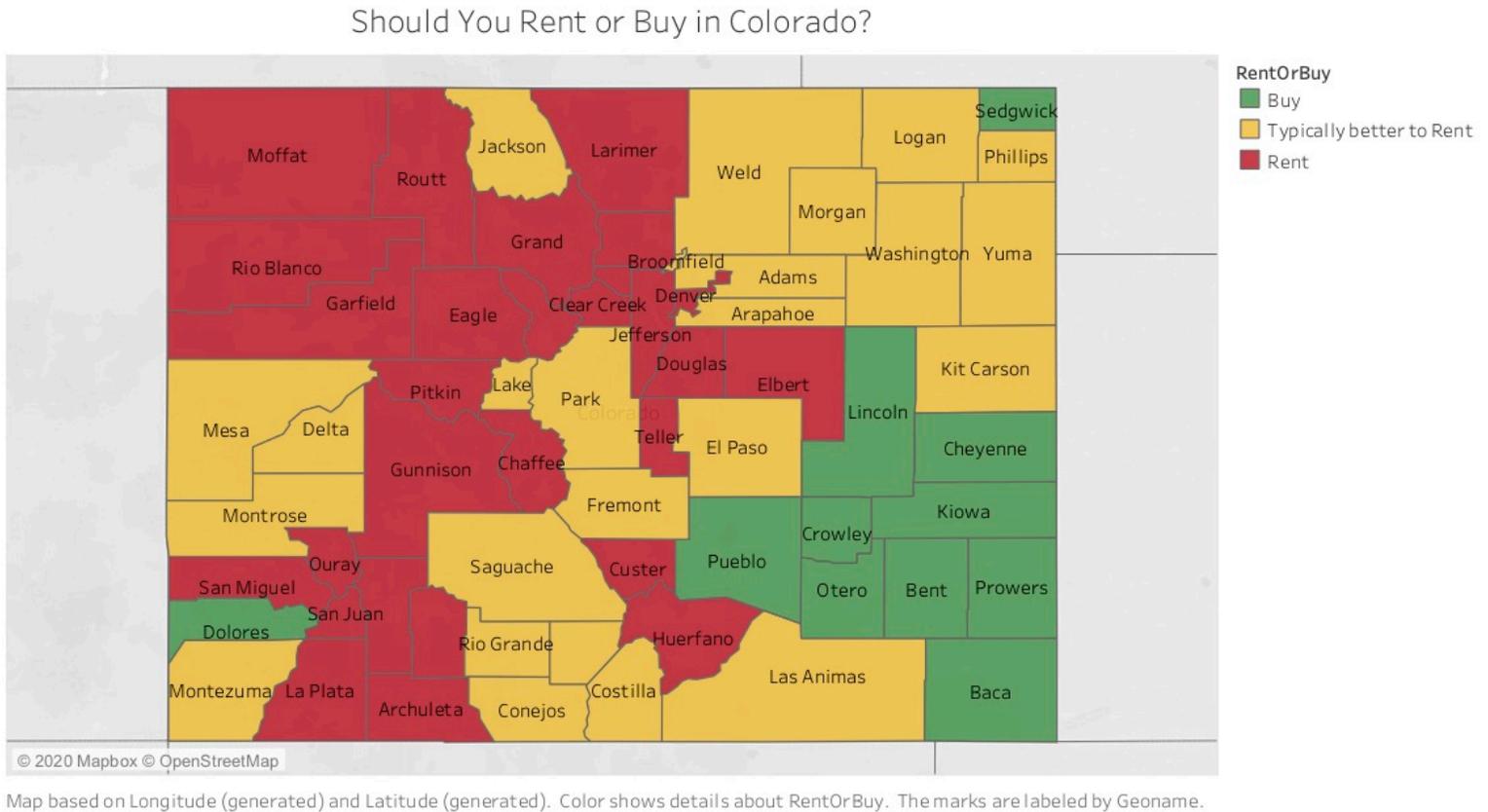
P/R Ratio	Rent or Buy
1-15	Much better to buy than rent
16-20	Typically better to rent than buy
21+	Much better to rent than buy

As seen in Table 1, the average P/R ratio is 20.57, whereas the national average is at 16 (Pancak, 2017). This P/R Ratio of 20.57 explains that generally the house prices in Colorado are much higher, and it is financially a better idea to rent than buy. 11 of the 64 Colorado counties have a P/R ratio of 15 or below; falling in the category of a location being better to buy than rent, indicating that there are lower house prices, and higher rent prices. The remaining 53 counties

have a P/R ratio of 16 or higher which specifies that the housing prices are higher, and the rent prices are lower, therefore it is wise to rent, rather than buy.

A map of the Colorado counties was created to display the P/R ratios across the state:

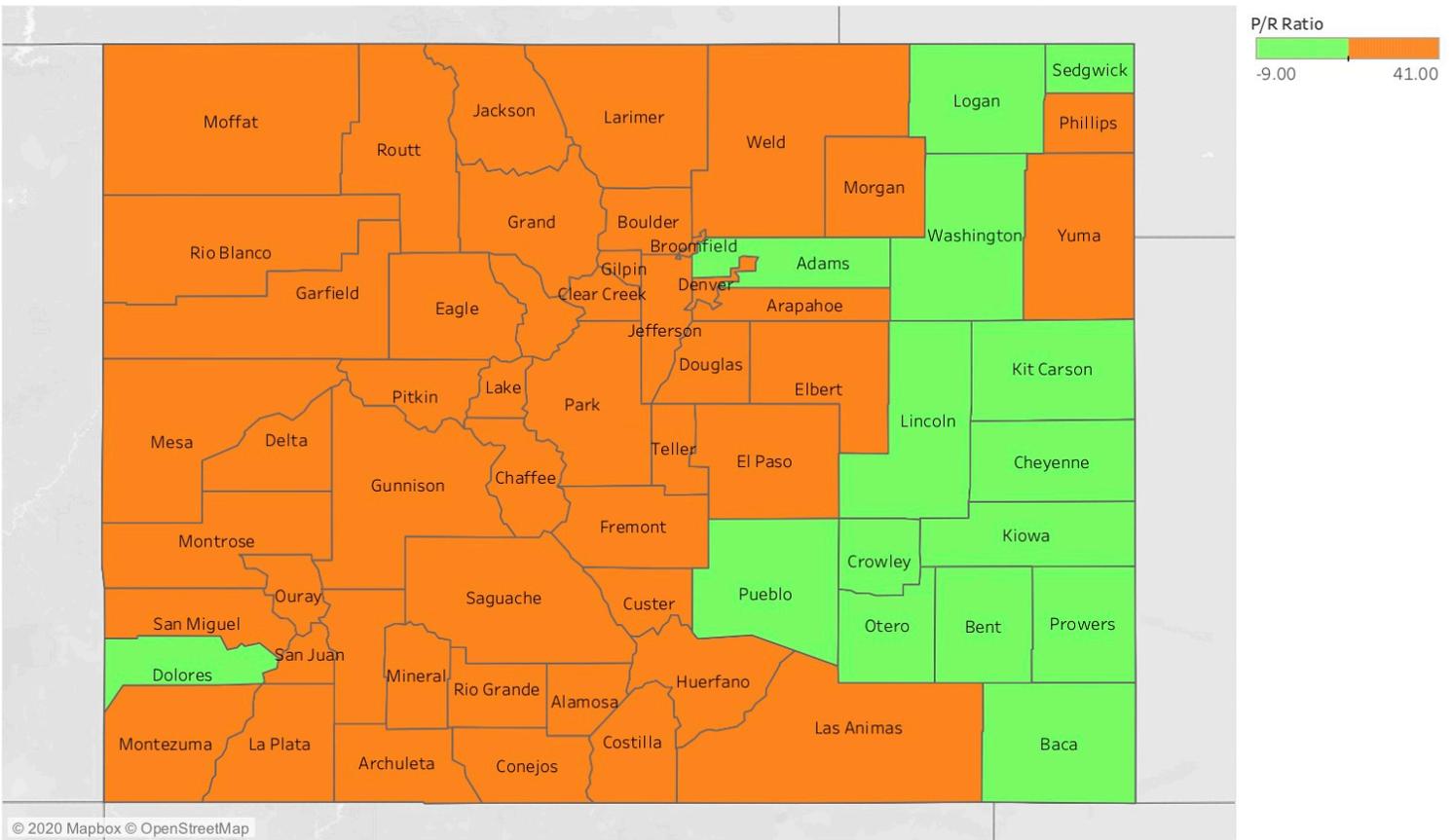
**Graph 1:** Colorado Counties and the P/R Ratios



Graph 1 demonstrates the average P/R ratio for every county in Colorado. As seen in the map, the majority of the counties have a P/R ratio above 15, therefore indicating that the housing prices are higher in those areas. A P/R ratio above 15 means that an individual would have to pay over 15 years’ worth of rent in order to pay off the property. A map of Colorado’s P/R ratios compared to the national average was created as well:

**Graph 2:** Colorado’s P/R Ratios versus the National Average

P/R Ratios compared to the National Average



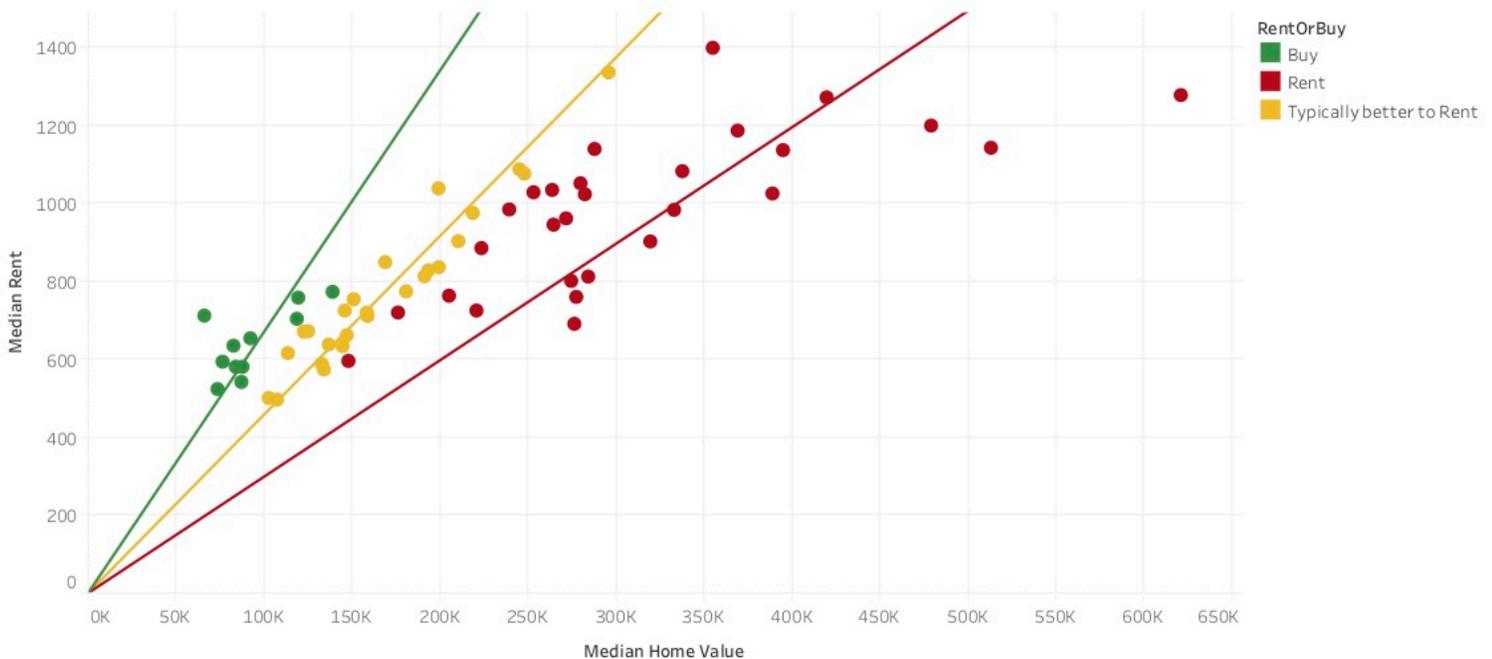
Map based on Longitude (generated) and Latitude (generated). Color shows details about P/R Ratio. The marks are labeled by County. Details are shown for County, Median Gross Rent, Median Home Value, Number of Records and P/R Ratio.

The counties in orange indicate that the P/R ratio is greater than the national average of 16. All of the green counties indicate that they are below the P/R value of 16. As seen in the visualization, the majority of the counties in Colorado have a higher P/R ratio, some ratios getting into the high 20's.

Another visualization was created to display the median rent price versus the median house value, and where the P/R ratios lie between the two.

**Graph 3: Median Rent Price vs Median House Value**

Rent Or Buy Areas



Med Hm Val vs. Med G Rent. Color shows details about RentOrBuy. Details are shown for Geoname.

Graph 2 represents the appropriate times to rent or buy a property based on the median home value and the median rent price. As the median home value increases, so does the P/R ratio, and therefore makes it ideal to rent rather than buy.

## Conclusion

Using the P/R ratio can be very valuable to individuals struggling with deciding if they should rent or buy a property. The ratio helps establish if a property is overpriced or underpriced, just by utilizing the median home value and the rent price. The P/R ratio can also be a valuable tool in detecting housing bubbles, as right before the housing crash of 2007, the P/R ratio rose to 24.7 (Hargrave, 2020). When observing the P/R ratios in Colorado, it is discovered that the majority of the counties have a P/R ratio higher than the national average of 16. This indicates that the housing prices in Colorado are quite high, and it would take over 16 years of rent to pay off a purchased property.

**References**

Census Counties in Colorado 2015: Colorado Information Marketplace. (2017, March 9).

Retrieved April 10, 2020, from <https://data.colorado.gov/Demographics/Census-Counties-in-Colorado-2015/5yyk-mqmn>

Gilderbloom, J. I., Pan, Z., Lehman, T., & Roosa, S. A. (2002). Inter-city Rent Prices in the Larger U.S. Market 1990-2000. Sustainable Urban Neighborhoods. Retrieved from [https://www.researchgate.net/profile/John\\_Gilderbloom2/publication/242691295\\_Inter-city\\_Rent\\_Prices\\_in\\_the\\_Larger\\_US\\_Market\\_1990-2000/links/547b30310cf2a961e489c163.pdf](https://www.researchgate.net/profile/John_Gilderbloom2/publication/242691295_Inter-city_Rent_Prices_in_the_Larger_US_Market_1990-2000/links/547b30310cf2a961e489c163.pdf)

Griffith, K. (2019, September 20). Q2 Report: Apartment rents up, but less than previous years. Retrieved from <https://daniels.du.edu/blog/q2-report-apartment-rents-up-but-less-than-previous-years/>

Hargrave, M. (2020, February 5). How to Use the Price-to-Rent Ratio. Retrieved April 28, 2020, from <https://www.investopedia.com/terms/p/price-to-rent-ratio.asp>

Pancak, K. (2017). Variation in Local House Price–Rent Ratios. *Journal of Housing Research*, 26(1), 79-94. doi:10.2307/26393462

**Appendices****Appendix A: P/R Ratios for Colorado Counties**

<b>County</b>	<b>Median Gross Rent</b>	<b>Median Home Value</b>	<b>P/R Ratio</b>
Adams	\$1,039	\$198,800	15.94
Alamosa	\$635	\$144,300	18.94
Arapahoe	\$1,077	\$247,600	19.16
Archuleta	\$946	\$264,200	23.27
Baca	\$525	\$73,200	11.62
Bent	\$713	\$65,700	7.68
Boulder	\$1,187	\$368,800	25.89
Broomfield	\$1,336	\$295,500	18.43
Chaffee	\$802	\$274,200	28.49
Cheyenne	\$636	\$82,300	10.78
Clear Creek	\$813	\$283,900	29.1
Conejos	\$498	\$107,100	17.92
Costilla	\$502	\$102,300	16.98
Crowley	\$595	\$76,100	10.66
Custer	\$726	\$220,400	25.3
Delta	\$829	\$193,000	19.4
Denver	\$962	\$271,300	23.5
Dolores	\$759	\$119,100	13.08
Douglas	\$1,399	\$354,700	21.13
Eagle	\$1,272	\$419,400	27.48
El Paso	\$976	\$218,300	18.64
Elbert	\$1,083	\$337,400	25.96
Fremont	\$712	\$158,500	18.55
Garfield	\$1,140	\$287,500	21.02
Gilpin	\$1,029	\$252,800	20.47
Grand	\$1,024	\$282,000	22.95
Gunnison	\$903	\$319,200	29.46
Hinsdale	\$692	\$276,000	33.24
Huerfano	\$597	\$147,600	20.6
Jackson	\$721	\$158,000	18.26
Jefferson	\$1,052	\$279,500	22.14
Kiowa	\$582	\$83,600	11.97
Kit Carson	\$672	\$122,300	15.17
La Plata	\$984	\$332,700	28.18

Lake	\$850	\$168,500	16.52
Larimer	\$1,035	\$263,400	21.21
Las Animas	\$755	\$150,600	16.62
Lincoln	\$705	\$118,300	13.98
Logan	\$673	\$124,700	15.44
Mesa	\$837	\$199,000	19.81
Mineral	\$761	\$277,100	30.34
Moffat	\$721	\$175,800	20.32
Montezuma	\$775	\$180,400	19.4
Montrose	\$814	\$190,900	19.54
Morgan	\$726	\$145,500	16.7
Otero	\$655	\$91,900	11.69
Ouray	\$1,026	\$388,600	31.56
Park	\$1,088	\$244,800	18.75
Phillips	\$589	\$132,500	18.75
Pitkin	\$1,278	\$620,700	40.47
Prowers	\$582	\$87,400	12.51
Pueblo	\$774	\$138,600	14.92
Rio Blanco	\$764	\$204,800	22.34
Rio Grande	\$575	\$133,700	19.38
Routt	\$1,137	\$394,600	28.92
Saguache	\$663	\$146,700	18.44
San Juan	\$886	\$223,200	20.99
San Miguel	\$1,143	\$512,800	37.39
Sedgwick	\$543	\$86,800	13.32
Summit	\$1,200	\$478,800	33.25
Teller	\$985	\$239,000	20.22
Washington	\$617	\$113,200	15.29
Weld	\$904	\$210,100	19.37
Yuma	\$639	\$136,400	17.79