AN EMPIRICAL EXAMINATION OF HOUSING PREFERENCES FOR SAN FRANCISCO RESIDENTS: A HEDONIC ANALYSIS OF COST PROXIMITY TO THE GOLDEN GATE BRIDGE

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Abstract

This study investigates how a neighborhoods proximity to the Golden Gate Bridge impacts rental prices in San Francisco. This was done utilizing a hedonic pricing model and regression analysis. Using data from Craigslist listing posts from 2000 – 2018, the relationship between neighborhoods, property attributes, and rental costs were examined. The findings revealed that neighborhoods closer to the iconic bridge do result in higher rental prices, furthermore properties holding views of the bridge will have higher rental prices. The average of all properties showcased that there was a $28.16 decrease in rental price per additional incremental distance from the bridge. The average of all properties had a $1801.29 increase in price if the apartment had a view of the Golden Gate Bridge. Additionally, regional variations impact the influence of proximity to the bridge on rental prices, with the northern region exhibiting the most pronounced effect. The northern region above the bridge had a $139.07 decrease in price per additional incremental neighborhood distance. The northern region also had the highest price influence from having a view at a $2,774.80 increase. These insights provide valuable information for real estate professionals, residents, and policy makers thus highlighting the significance that landmarks and tourist attractions shape permanent residents housing. These findings can impact further development in the housing market as they provide more insight to the dynamics of housing preferences.

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TABLE OF CONTENTS

ABSTRACT
ACKNOWLEDGEMENTS

1 INTRODUCTION

2 LITERATURE REVIEW
2.1 Housing Preferences 8
2.2 San Francisco Housing Market..... 10
2.3 Golden Gate Bridge and Its Impact on Property Values 12
3 METHODOLOGY
3.1 Empirical Strategy 13
4 DATA
4.1 Background 17
4.2 Cleaning Data Process 17
4.3 Summary Statistics Table 18
4.4 Craigslist Data 20
4.5 Neighborhood Data..... 20
4.6 Bedroom Data 22
4.7 Square Footage Data 22
4.8 View Data 22
4.9 Omitted Variables 22
5 RESULTS
5.1 Model Summary 23
5.2 Regression Coefficients 24
5.3 Model Fit 26
5.4 Regression Interpretation 27
6 CONCLUSIONS

7 REFERENCES

Introduction

In a city where rent climbs higher than the iconic hills and home prices defy the norm; San Francisco's housing market is a world of its own. With costs soaring far above the national average, this is an investigation of relentless demand, breathtaking prices, and a frenzied race to secure a spot in the enchanting city by the bay. There are many factors that increase rent in cities, but the goal of this paper is to extrapolate if proximity to the Golden Gate Bridge, the iconic structure of San Francisco, is another factor that increases rent costs in the city.

Given the iconic status of the Golden Gate Bridge within the city, it's valuable to explore whether its presence contributes to rising rents in the surrounding compact urban area. Do people want to rent near the renowned bridge? The purpose of this paper is to determine if proximity to the Golden Gate bridge does positively correlate to the rental costs in San Francisco.

The Bay Area's robust economy, top-notch infrastructure, scenic beauty, and diverse culture attracts a large population. However, the area faces significant housing development challenges, including geography, regulations, and existing density, making increased density costly due to redevelopment and high-rise construction. In 2011, the San Francisco Bay Area had the highest rent of any major metropolitan area in the U.S (Barton, 2011). The median rent in all the U.S. metropolitan areas was 43 percent lower than the Bay Area rent (Barton, 2011). It is a simple issue of supply and demand, and the lack of buildable land causes San Francisco to have steep rent. Saiz (2010) has argued that San Francisco is one of the most geographically constrained housing markets in the U.S. Nearly three-quarters of the area within a 50-mile radius around downtown San

Francisco is undevelopable due to water and steep slopes. High rent in the Bay Area rental housing market results from a synergy between the attractive features that drive demand for living in the Bay Area and the limiting factors that restrict the availability of land suitable for multifamily housing development.

The Golden Gate Bridge is the iconic suspension bridge located in San Francisco, California, spanning the Golden Gate Strait, which connects San Francisco Bay to the Pacific Ocean. It is renowned for its distinctive orange-red color and is considered one of the most recognizable landmarks in the United States. Each year the Golden Gate Bridge attracts more than 10 million visitors (MacDonald & Nadel, 2013). People walk, bike, and drive on the bridge to take in its tremendous 746-foot-tall towers, sweeping main cables, signature International Orange color and Art Deco styling. The bridge is also the connection between San Francisco, California to Marin County, carrying both U.S. Route 101 and California State Route 1 across the strait, allowing more local and national connectivity.

This paper investigates the impact of proximity to the Golden Gate Bridge on housing preferences and costs for residents in San Francisco from 2013-2018. Specifically, the study aims to understand how the historical bridge's proximity influences housing choices, property values, and rent in the city. The objectives are to assess the relationship between proximity to the Golden Gate Bridge and rental rates. The analysis will make contributions to the literature because, to our knowledge, this is the first study to investigate if proximity to the Golden Gate Bridge influences rent in San Francisco.

It is important to determine if the Golden Gate Bridge affects rent prices in the city for three main reasons. First, Urban Planning and Development: Understanding housing preferences in a high-demand urban area like San Francisco is crucial for urban planners and developers. The findings can guide decisions on where and how to build housing developments, considering resident preferences, and potentially reducing urban sprawl. The second reason is Real Estate Market Insights: Real estate professionals, including agents, brokers, and investors, can benefit from insights into what factors drive housing choices in San Francisco. This knowledge can help them make informed decisions about property investments and market strategies. Lastly, for Affordability and Access: The analysis of housing preferences related to cost and proximity to the Golden Gate Bridge can shed light on issues of affordability and accessibility. This is important for addressing housing challenges in San Francisco.

The research methodology will be using a hedonic analysis, which is a statistical method used to assess the impact of various attributes on the value of home prices. The data being used is publicly available and collected from historic Craigslist rents; this is done by scraping posts archived by the Wayback Machine for the Bay Area from 2000 - 2018. The data is organized and coded by Kate Pennington, a research economist at the US Census Bureau (Pennington, 2021). This data will be organized into a multiple regression model and that model will identify how the changing coefficients affect the dependent variable: rent. The estimates reflect the impact distance, region, square footage, bedrooms, and view has on rent in this timeframe.

The study revealed key findings between proximity to the Golden Gate Bridge and rental prices, with noteworthy variations across different regions. Primarily, a clear

correlation was identified: the closer a property is to the Golden Gate Bridge, the higher the rent tends to be in San Francisco. Moreover, for each incremental increase in distance from the Golden Gate Bridge, there is a corresponding decrease in price by $28.16. Additionally, there are regional disparities in the effect of proximity and price: the southern region experienced a decrease of $29.51, the eastern region $14.25, and the northern region $139.07. The north region having the most dramatic effects. Additionally, the presence of a view of the Golden Gate Bridge significantly impacts rental prices, leading to a substantial increase in price compared to properties lacking a view. Properties with a view had an average $1801.29 increase in price across all regions. Regionally, a view increased price in the south by $1135.01, east by $1691.32 and north by $2774.8. There is the most significant price difference from the average in the northern region in both distance and view. These findings underscore the importance of location and scenic attributes in determining rental values in San Francisco. These findings are discussed further in the results section.

This paper proceeds as follows. The next section contains reviews of existing studies and literature on past hedonic models and San Francisco. This is followed by sections describing the data and empirical strategy respectively. In the next section, the estimations are presented for how the Golden Gate Bridge affects rent in San Francisco, while the final section concludes.

Literature Review

Housing Preferences

The hedonic pricing model, which is widely utilized in prior research, evaluates the positive influence of neighborhood services, property attributes, and associated

amenities on land and property values (Aziz et al. 2023). This model is a useful way to determine the most impactful attributes on a property. Location has been researched as one of the more impactful aspects of property values; Several research studies demonstrate a positive and strong relationship between property values and neighborhood characteristics (Meng et al, 2023). Property values are significantly related to its surrounding support facilities and community location (Liang et al, 2018). Proximity to bodies of water is also a known factor to sway or hinder property values (Cohen et al, 2015). It has been researched that households are willing to pay more for apartments with a sea view and better air (Hui et al, 2007). Furthermore, hedonic analysis of home prices in the Twin Cities, Minnesota, found that a shoreline location increased property value by $111000 and even being within 200 ft of a lake added $61000 to a property's value (Baker & Newman, 2013). There are heterogeneous impacts of neighborhood services on property values due to different spatial and temporal effects. However, locational attributes are the influential factors determining the value and prices of a property (Aziz et al. 2023). The choice of house and property is a varying phenomenon because of different social, economic, and environmental factors, which can be changed from region to region and country to country.

Typically, urban allure is fueled by the myriad of economic opportunities embedded within cities. Location theory, also known as location analysis or spatial economics, is a branch of economic and geographical theory that focuses on understanding why economic activities are located where they are and how the location of economic activities affects economic outcomes. In essence, spatial economics poses the pivotal question: "What is where, and why—and, consequently, so what?" (Hoover &

Giarratani, 2020). Economic activities could be a financial district or a visitor spending attraction (Mayer & Vogt, 2016). According to Edgar M. Hoover and Frank Giarratani location theory, and why people are drawn to specific areas is based upon three principals: (1) natural-resource advantages, (2) economies of concentration, and (3) costs of transport and communication (2020). San Francisco, with its concentrated urban landscape nestled by the waterfront, epitomizes these principles, rendering it a compelling and sought-after urban city. Thus, understandably, rent in such cities are steep.

However, all rental pricing is not black and white. Rent control shifts the capitalistic and mathematical justification of rent prices. Rent control is a set of regulations and policies implemented by governments at various levels to limit the increases in rental prices for residential properties, primarily in high-demand urban areas. These regulations do not allow a full Laissez-faire free market to occur. Most of San Francisco's rental units are subject to "rent control"; The number of rent-controlled units is more than double the number of rental units not under rent control (Rahaim, 2018). The fundamental goal of rent control is to provide housing stability and affordability for tenants while ensuring landlords can maintain a reasonable return on their investments.

San Francisco Housing Market

There are a few common factors that influence housing choices in big cities. Affordability: San Francisco is notorious for its high cost of living, and housing affordability is a significant concern (Garcia, 2015). The price of housing, both for purchasing and renting, plays a pivotal role in determining where individuals and families can live within the city. Location and Commute: Proximity to workplaces and

transportation options heavily influences housing choices (Redmond & Mokhtarian, 2001). Commute times and convenience to employment centers often dictate where people decide to live. Lastly, Neighborhood Characteristics: San Francisco boasts a diverse array of neighborhoods, each with its own character, amenities, and community. Individuals may choose housing based on factors such as neighborhood safety, access to parks, schools, and cultural attractions (Chang & Lin, 2012; Hui, 2007). A study by Reid (2013) recorded various elements influencing housing preferences, namely the relative price of ownership over rent, fortune, salary, credit constraints, destination, household features, house category, cost, and distance from service and product facilities, accessibility, and open space. Overall, many factors influence living arrangements in big cities, but goal of this paper is to namely focus on location.

A significant majority of San Francisco's households (65%) rent their place of residence; a much higher share than the region overall (45%) (Rahaim, 2018). According to the United States Census Bureau the median gross rent in San Francisco, 2017-2021 was $2,130 (Gross rent is the contract rent plus the estimated average monthly cost of utilities) (United States Census Bureau, 2021). Residential rent is among the highest in the United States, and an analysis of data from several sources demonstrates that high rent cannot be accounted for by higher quality, higher operating costs, or higher construction costs (Barton, 2011). At least one-third of the total rent paid is land rent (Barton, 2011). This means that San Francisco's high rent prices are primarily due to high demand and lack of supply. Again, this is a result of San Francisco being one of the most geographically constrained housing markets in the U.S (Barton, 2011).

In San Francisco, median asking rent had been roughly $3,000 per month in 2012 and grew by 50% to $4,500 in 2015 (Rahaim, 2018). In 2016, the San Francisco rental market cooled but in 2017 and in early 2018, the high-priced markets came back. Rents have appreciated even more extremely than home prices in San Francisco and, of course, renters get no advantages from low interest rates, multiple tax deductions and advantages, or home-price appreciation over time. Ideally, the household income needed to afford the median asking rent in San Francisco is $180,000, if a household would spend no more than 30% of income on rent (Rahaim, 2018). However, one-third of Bay Area tenants (340,000 households) pay more than 40 percent of their income in gross rent and one-quarter (250,000 households) pay over half of their income (Barton, 2011). These tenants with high rent burdens are mostly very-low-income tenants with incomes below 50 percent of the area median (Barton, 2011). The Median household income in SF (in 2021 dollars), from 2017-2021 was $126,187 (United States Census Bureau, 2021).

Golden Gate Bridge and Its Impact on Property Values

Considered the most iconic bridge in the United States, the Golden Gate Bridge stands at the entrance to California's San Francisco Bay as a symbol of American ingenuity and resolve, having been constructed during the era of the Great Depression (MacDonald & Nadel, 2013). Today, this beloved international icon and true engineering marvel carries about 40 million vehicles a year and serves not only as a vital transportation link but also as a major travel destination for millions of visitors from around the world (Carr, 2016). Its construction provided employment and stimulated the

local economy, while its distinctive design, vibrant color, and cultural influence have made it a globally recognized symbol of human achievement, innovation, and progress.

The profound impact of the Golden Gate Bridge extends far beyond its iconic presence in the San Francisco and Marin County landscapes. Serving as a pivotal transport link, the bridge has significantly enhanced accessibility between these regions, fostering not only ease of travel but also contributing to the substantial residential and economic growth witnessed in the surrounding neighborhoods. Beyond its utilitarian function, the Golden Gate Bridge holds immense cultural significance, standing as a symbol of architectural achievement and historical importance. As a premier tourist attraction, the bridge draws visitors from around the world, consequently injecting vitality into local businesses and shaping the character of the communities it connects. The interplay of its practical role as a transportation conduit and its cultural and touristic prominence highlights the multifaceted ways in which the Golden Gate Bridge has become an integral part of the social and economic fabric of San Francisco and Marin County. While no studies have been done before about how the view of the bridge quantitively impacted real estate, it has been found that “a room with a view” significantly affects a home's value (Bond et al. 2002).

Methodology

Empirical Strategy

The methodology for this study employs data collected from Bay Area Craigslist posts spanning the years 2000 to 2018 (Pennington, 2018). The dataset encompasses a total of 26,116 observations, each characterized by variables such as their unique identifier, date, neighborhood, price, square footage, number of bedrooms, address,

latitude, longitude, description, title, details, and year. The use of raw data from Craigslist offers a valuable snapshot of the dynamic housing market in the Bay Area over 2000 - 2018, allowing for a comprehensive analysis of the factors influencing rental property prices. The inclusion of such variables provides a robust foundation for the subsequent statistical analysis and interpretation of results.

The empirical strategy examines how proximity to the Golden Gate Bridge, along with various factors such as square footage, bedrooms, and views, influences rent in the San Francisco area from 2000 to 2018, with rent serving as the dependent variable. We use the equation below, a multiple linear regression model, to determine how these factors correlate.

$$Rent_t = \alpha + Neighborhood_t + Squarefoot_t + Bedroom_t + View_t + \varepsilon \qquad \text{Equation 1}$$

Rent is the dependent variable this paper is seeking to determine as described by neighborhood, square foot, bedroom, view, and region. Rent is the payment for the use of a property over an agreed upon time. Rent is greatly affected by these independent factors and is a continuous variable. By estimating the coefficients for the other variables, it can be determined how they affect rent. *Neighborhood* is a categorical variable that reflects the neighborhood and proximity of the property to the Golden Gate Bridge. The coefficient associated with *Neighborhood* measures the impact of different neighborhoods on the rent prices. It allows estimates on how living in different neighborhoods affects rent prices, holding other variables constant. The coefficient for *Neighborhood* will indicate how much rent prices differ between different neighborhoods. *Square foot* represents the square footage of the property, which is a continuous variable. The coefficient associated with *Square foot* measures how changes

in square footage influence rent prices. Similarly, *Bedroom* represents the number of bedrooms in the property. Like square footage, it is a continuous variable, and the coefficient associated with *Bedroom* indicates how the number of bedrooms impacts rent prices. The last variable considering *View* represents whether the property has a view of the Golden Gate Bridge, which is a binary variable (e.g., 1 for "has a view" and 0 for "does not have a view"). The coefficient associated with *View* measures how the presence of a view affects rent prices. The error term (ε) in the regression model represents the unexplained or random variation in the dependent variable that is not accounted for by the independent variables included in the model.

Additional regression models are used to determine how these same factors correlate in different regions. The variables *Southern, Eastern*, and *Northern* were created binary regional variables that observe if the neighborhood is north of the Golden Gate Bridge, east of the Golden Gate Bridge, or south of the Golden Gate bridge. In this binary context, a value of 1 signifies being within the region, while a value of 0 indicates being outside of it. All observations are categorized under the Southern, Eastern, or Northern variables. The "if" command is utilized to specifically run regressions for each desired region. Equation 2 focuses on the Southern region; Equation 3 focuses on the Eastern region and Equation 4 focuses on the Northern region.

$$Rent_t = \alpha + Neighborhood_t + Squarefoot_t + Bedroom_t + View_t + \varepsilon \text{ if } Southern == 1$$

Equation 2

$$Rent_t = \alpha + Neighborhood_t + Squarefoot_t + Bedroom_t + View_t + \varepsilon \text{ if } Eastern == 1$$

Equation 3

$$Rent_t = \alpha + Neighborhood_t + Squarefoot_t + Bedroom_t + View_t + \varepsilon \text{ if } Northern == 1$$

Equation 4

The equations are a hedonic pricing model, which are used to understand how various attributes or characteristics of a property, such as its neighborhood, size, number of bedrooms, and view, contribute to its rent price. The hedonic pricing model is commonly used to estimate the extent to which different factors affect the market price of a property. The coefficient neighborhood will be specifically informative when calculating rental prices.

While acknowledging the potential influence of various factors on rental property value, it is crucial to note that this study intentionally focuses on specific determinants to maintain analytical clarity. The literature review identifies factors such as proximity to amenities, local income levels, homeless populations, safety, drug usage, education outcomes, and nearby schools as relevant considerations. It is essential to emphasize that the inclusion of these factors has been contemplated, mitigating concerns of inherent omitted variable bias. Moreover, given the inherent characteristics of major cities, such as San Francisco, which naturally exhibit these attributes to some degree, their exclusion is a deliberate choice to isolate and scrutinize the primary determinants. Additionally, San Francisco's consistently elevated income levels across neighborhoods render any potential minimal variation from these factors negligible, subsuming it within the broader context of the error term. This deliberate and transparent approach aims to mitigate concerns related to omitted variable bias and ensures a focused examination of the key determinants under investigation.

Data

Background

The explanatory variables in the data set are based on observations from Craigslist rents by scraping historic posts (Pennington, 2018). The independent variables: neighborhood, square foot, bedroom, and view, directly impact the dependent rent. San Francisco doesn't directly track rents, so this data was pulled together by Kate Pennington a research economist at the US Census Bureau in the Center for Economic Studies (Pennington, 2018). The dataset used for this paper is comprised of 200,796 observations.

Cleaning Data Process

This dataset represents a compilation of two distinct datasets Pennington gathered. The initial dataset, spanning from 2000 to 2012, contained 167,090 observations, and consisted of date, title, and neighborhood. The title for this data set often encompassed details about the price and bedrooms. In the combined cleaned version this data was separated and put into individual columns. The second set was from 2013 – 2018, this data was more comprehensive including: date, neighborhood, price, square footage, number of bedrooms, address, latitude, longitude, description, title, details, and year. This set has 58,551 observations. The combined version used provides the most clarity to the rental market of San Francisco with the most available information. The next step was to clean the data further by removing any observations with missing values for square footage or bedrooms. Additionally, any observations lacking a distinct neighborhood designation but identified simply as "SF Bay Area" or "San Francisco" were excluded from the

dataset. This decision was made because these labels do not denote a specific area and thus would not contribute meaningful information to the analysis. Observations located more than an hour away from the Golden Gate Bridge were also eliminated from the dataset. This left the data set with 26,116 observations.

Table One:

Summary Statistics Table

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Year	26,116	2013.35	2.54	2001	2018
Price	26,116	3092.38	1903.32	270	30000
Beds	26,116	1.91	1.07	0	8
Square Ft	26,116	1153.20	781.21	80	57013
View	26,116	0.001	0.33	0	1
Neighborhood Ranking	26,116	52.43	27.20	0	94
If Southern	16,530	35.98	19.88	1	64
If Eastern	6,635	80.43	9.25	65	94
If Northern	2,949	81.64	3.20	77	86

Source: Pennington, K. (2021). *Bay Area Craigslist Posts, 2000 - 2018*. Kate Pennington. Retrieved 10 25, 2023, from https://www.katepennington.org

Summary Statistics Table

The table shown above, Table One, shows the number of observations, the means of the observations and the minimum and maximum values observed. As expressed above a total of 26,116 observations were used in the regression. The price variable had a mean of $3092.38 which denotes the average cost of rent in the region for one month for an apartment. There is a standard deviation of $1903.32 which notes that the prices of rent in the region vary significantly from the average. It is important to understand pronounced fluctuations in rent within a relatively condensed urban area. This is why understand standing the other independent variables such as

Beds, Square Footage, and View is necessary. For the independent variable Beds, there is an average of 1.91 and the mean Square Footage of the apartments is 1153.20. Both these variables fluctuate and have standard deviations of 1.07 and 781.21 respectively. These fluctuations are part of the reason price varies so greatly. The View variable is binary and 1 represented view and 0 represented no view so a mean of 0.001 expresses that a small number of apartments in this dataset had views of the Golden Gate Bridge. Ideally, there would be more observations that included a view, yet this also shows the rarity and exclusiveness of having a view of the Golden Gate Bridge. Neighborhood Ranking, which is the ranking system of all the neighborhoods does not demonstrate anything of importance within the summary statistic table. However, Neighborhood Ranking is necessary to understand the following variables in the summary statistic table. The Neighborhood Ranking is all the included neighborhoods listed numerically via proximity to the Golden Gate Bridge, Southern represents the neighborhoods that are south of the bridge and the mean 0.6329 demonstrates that 63% of the included observations are below the bridge on the southern side. This is a majority of the observations. Eastern represents the neighborhoods that are east of the bridge and the mean 0.25 demonstrates that 25% of the included observations are right of the bridge on the eastern side. Finally Northern represents the neighborhoods that are north of the bridge and the mean 0.11 demonstrates that 11% of the included observations are above the bridge on the northern side. This is the lowest percentage with only 2,949 observations. The variation in the number of observations across regions does not alter statistical

significance but proves useful in understanding the distribution of apartment listings and, consequently, the predominant areas of residence for the population.

Craigslist Data

Craigslist is a major platform to connect sellers and buyers for almost any commodity in the United States including real estate (Craigslist, 2024). The website connects possible tenants with landlords who post listings containing information such as price, bedrooms, square footage, photos, and descriptions. The listings expire, but many of them have been digitally archived by the Wayback Machine, a non-profit that maintains a library of past internet content.

Neighborhood Data

The data found for neighborhood was originally described by the sellers of the apartment listings and then saved as such in the database or the data point was cleaned and created. Sometimes the seller was vague or too specific and Kate Pennington grouped the raw vague or specific data points into regions. She also noted in her methodology that sometimes it was not possible to tell locations apart. For example, if someone imputed "telegraph" this could refer to areas in both San Francisco's downtown and in Berkeley. In these cases, she set the neighborhood as "sf bay area." Unfortunately, all data that was denoted as such was removed for the clarity of this study. To make the categorical variables each neighborhood was organized by region and within that subsection their distance to the bridge. So, neighborhood number 1 would be the closest to the bridge and south of the Golden Gate Bridge. By integrating neighborhood ranking there is a more incremental understanding of how location and regional characteristics influence housing prices.

Neighborhood ranking is given the variable name Nranking. After the neighborhood rankings were created and ran through Stata, the statistical software, it was found that neighborhoods 2, 48, 74 and 83 were listed as conjoined neighborhoods e.g. blank/blank because they were so close to each other. For these cases the neighborhood is given the preceding value so Marina District/ Cow Hollow equals ranking 1.

Table Two:

All Included Neighborhood Rankings (Nranking)

Ranking	**Neighborhood**	**Ranking cont.**	**Neighborhood Continued**	**Ranking cont.**	**Neighborhood Continued**
1.	Marina District	33.	West Portal	64.	Pescadero
2.	Cow Hollow	34.	Parkside	65.	Treasure Island
3.	Presidio Heights	35.	Lakeshore	66.	Emeryville
4.	Inner Richmond	36.	Ingleside	67.	Berkeley
5.	Sea Cliff	37.	CCSF	68.	North Berkeley
6.	South Bay	38.	Excelsior	69.	Downtown Berkeley
7.	Outer Richmond	39.	Glen Park	70.	Southside Berkeley
8.	Anza Vista	40.	Bernal Heights	71.	El Cerrito
9.	Lower Pacific Heights	41.	Portola	72.	Alameda
10.	Pacific Heights	42.	Bayview	73.	San Leandro
11.	Russian Hill	43.	Hunters Point	74.	Castro Valley
12.	North Beach	44.	Visitation Valley	75.	Hayward
13.	Western Addition	45.	Candlestick Point	76.	Richmond
14.	Nob Hill	46.	Lower height	77.	Tiburon
15.	Financial District	47.	Atherton	78.	Sausalito
16.	SoMa	48.	Outer Mission	79.	Marin city
17.	Tenderloin	49.	Daly City	80.	Mill valley
18.	Downtown	50.	Brisbane	81.	Corte Madera
19.	Civic Center	51.	Colma	82.	Larkspur
20.	Hayes Valley	52.	San Bruno	83.	Kentfield
21.	Alamo Square	53.	Pacifica	84.	Ross
22.	Nopa	54.	Millbrae	85.	San Rafael
23.	Haight-Ashbury	55.	Hillsborough Blvd	86.	San Anselmo
24.	Cole Valley	56.	San Mateo	87.	Union City
25.	Inner Sunset	57.	Foster City	88.	Oakland West
26.	Outer Sunset	58.	Redwood Shores	89.	Oakland North
27.	Potrero Hill	59	Belmont	90.	Oakland Lake
28.	Mission District	60.	Redwood City	91.	Oakland South
29.	Castro	61.	Half Moon Bay	92.	Oakland Hills north
30.	Twin Peaks	62.	Woodside	93.	Oakland East
31.	Noe Valley	63.	Palo Alto	94.	Oakland
32.	Diamond Heights				

Source: Pennington, K. (2021). *Bay Area Craigslist Posts, 2000 - 2018*. Kate Pennington. Retrieved 10 25, 2023, from https://www.katepennington.org

Bedroom Data

Like square footage the number of bedrooms was described by the seller on the original craigslist post. The number of bedrooms in an apartment will also have an effect of the price of rent. This is not a one-to-one ratio, nor linear it depends on a multitude of factors. It is important to take bedrooms into account as they are a primary factor in rental decisions.

Square Footage Data

The square foot data is referring to the size of the apartments in square feet which was inputted on Craigslist by the seller. The number of square feet in an apartment will have a direct impact on rent as bigger apartments will likely ask for more rent. This is a necessary factor to consider when doing a hedonic analysis. However, two apartments with the same square footage will not necessarily have the same rent.

View Data

When able to see the bridge from the apartment, the sellers mentioned "Golden Gate Bridge Views" as a selling point in their property titles or descriptions to attract potential buyers. Using Excel's find feature, I identified properties with such views and assigned them a value of 1. Properties lacking this feature were assigned a value of 0.

Omitted Variables

This study would benefit from including, as expressed in the literature review and methodology variables including proximity to amenities, local income levels,

homeless populations, safety, drug usage, education outcomes, and nearby schools. Unfortunately, due to constraints within the timeframe of this paper, these data points were not available for inclusion. Future research would benefit from integrating more factors, which would increase the analysis and provide a more comprehensive understanding of housing in San Francisco.

Results

Model Summary

The regression analysis aimed to predict the price of rent based on several independent variables including the number of beds, square footage, view, neighborhood ranking, and geographic location. This results section summarizes the key findings from the regression coefficients, model fit statistics, and their interpretations. In this study, regression analysis was performed using Stata 17.0 (StataCorp, 2021).

Table 3:

Regression Results

	(1)	(2)	(3)	(4)
Price	All	Southern	Eastern	Northern
Beds	522.29	741.74	157.97	-125.66
	(10.57)	(13.62)	(14.03)	(35.04)
Square Foot	0.89	0.7	0.74	2.43
	(0.01)	(0.01)	(0.02)	(0.04)
View	1801.29	1135.01	1691.32	2774.8
	(255.76)	(335.29)	(425.26)	(518.18)
Nranking	-28.16	-29.51	-14.25	-139.07
	(0.51)	(0.57)	(1.13)	(7.28)
Constants	1714.86	2291.08	2183.77	11896.91
	(972.63)	(29.82)	(92.17)	(598.40)
Observations	26,116	16,530	6,635	2,949
R^2	0.47	0.44	0.34	0.71

Note: Standard errors account for potential spatial correlation in the error terms and appear in parentheses.
Source: Pennington, K. (2021). *Bay Area Craigslist Posts, 2000 - 2018*. Kate Pennington. Retrieved 10 25, 2023, from https://www.katepennington.org

Regression Coefficients

Column One in Table Three reports results from the estimate of Equation (1) for San Francisco rent when the dependent variable is price. In Column One, when all regions are included, the coefficients for Beds, Square Foot, View, and Nranking are statistically significant with P-values near 0. When all regions are included each additional bedroom in the apartment is associated with an increase of $522.29 in the rental price. Similarly, the variable square footage found that an additional square footage is associated with an increase of $0.89 in the rental price. When considering the presence of a view across all geographic regions, there is a $1801.29 increase in the price of the rental. This increase is binary; it occurs if there is a view of the Golden Gate Bridge. The variable 'Nranking' represents the proximity of neighborhoods to the Golden Gate Bridge, with lower values indicating closer proximity. For each unit increase in Nranking, which signifies neighborhoods farther from the bridge, the rent price decreases by $28.16. This negative coefficient implies that as neighborhood ranking increases (indicating greater distance from the bridge), rent prices tend to decrease. Neighborhoods were ranked numerically based on their distance from the bridge, with a ranking of 1 representing the closest and 94 the furthest.

Column Two in Table Three reports results from the estimate of Equation (2) for San Francisco rent when the dependent variable is price if south of the Golden Gate Bridge. This data is comprised of 16,530 observations and each coefficient

found was statistically significant with a P-value at or below 0.001. Beds in the southern region has a $741.74 impact on price, which is higher than the overall bedroom price when including all regions. This is likely because the southern area of the bridge is the more demanding and popular area of San Francisco. The square footage in the southern side has a $0.70 increase for each square footage. View is only impacted by $1135.01 which is significantly less than in other regions, but this is possibly because more properties have a view of the bridge in the southern region. A view of the Golden Gate bridge though is still a valuable commodity and does drastically impact price. Nranking shows a -$29.51 impact on price so as neighborhood ranking rises (proximity away from the bridge) the price of rent falls. This is only including southern neighborhoods ranked 1 – 64. This aligns with the hypothesis that proximity to the bridge positively aligns with the price of rent.

Column Three in Table Three reports results from the estimate of Equation (3) for San Francisco rent when the dependent variable is price if east of the Golden Gate Bridge. This data set is comprised of 6,635 observations and each coefficient found was statistically significant with a P-value below 0.001. Beds is less impacted on the eastern side of the bridge and has only a $157.97 effect. This is significantly less than the average of all the regions. There is a $0.74 impact on additional square footage. It is interesting to note that view holds a greater value, east of the bridge at $1691.32. This is possibly because there are less properties with a view of the Golden Gate Bridge to the east, so it is deemed a higher commodity. The Nranking value is less than the average (-$28.16) at -$14.25. This indicates a consistent negative correlation between neighborhood proximity to the Golden Gate Bridge and

rental prices. The neighborhoods included in the east are 65-76 and 87-94. In other words, the farther a neighborhood is from the bridge, the lower the rental costs.

Column Four in Table Three reports results from the estimate of Equation (4) for San Francisco rent when the dependent variable is price if north of the Golden Gate Bridge. This data set is comprised of 2,949 observations and each coefficient found was statistically significant with a P-value below 0.001. Surprisingly beds had a negative coefficient and each additional bedroom decreased price by -$125.66. This is the only region to have such effect. Furthermore, square footage had an extremely large positive effect of $2.43 per square foot. Taken together, these findings suggest that the amount of living space holds greater appeal than the number of occupants within an apartment. This finding was not identified in either of the other two regions. The variable view also had a significant impact in the north region, almost $1,000 more than the average, at $2774.8. This means a view in the northern region is extremely valuable and has the greatest impact on price out of all the regions. Additionally, there is also the most extreme Nranking effect found north of the bridge: there is a -$139.07 effect per increase in neighborhood. This negative coefficient implies that as neighborhood ranking increases (for north neighborhoods 77-86.), rent prices tend to decrease. This aligns with the ideology that proximity to the bridge has an impact on the price of rent. The coefficients for the four variables in the north deviate the most from the average coefficients observed across all regions.

Model Fit

The model's goodness of fit was assessed using an F-test, yielding a significant result ($p < 0.001$), indicating that the model was statistically significant in explaining

the variance in rent prices for all four columns. For all regions, the model explained 47% of the variance in rent prices, as indicated by the R-squared value (R-squared = 0.4779). For the southern region, the model explained 44% of the variance in rent prices, as indicated by the R-squared value (R-squared = 0.4480). For the eastern region, the model explained 34% of the variance in rent prices, as indicated by the R-squared value (R-squared = 0.3487). For the northern region, the model explained 71% of the variance in rent prices, as indicated by the R-squared value (R-squared = 0.7117). While each of these are significant, this means that other factors besides ones included do have an effect of variance in rent prices. Incorporating additional factors: proximity to amenities, local income levels, homeless populations, safety, drug usage, education outcomes, and nearby schools', could enhance the model's explanatory power. Therefore, while the analysis sheds light on the impact of proximity to the Golden Gate Bridge on rent prices, further research is needed to capture the full range of factors shaping the housing dynamics in San Francisco.

Regression Interpretation

The results of this section are conclusive with the hypothesis set: that proximity to the Golden Gate Bridge does impact price of rent in San Francisco. In Column One of Table Three, it's observed that for each unit increase in Nranking, signifying neighborhoods farther from the bridge, the rent price decreases by $28.16. This negative coefficient implies that when there is more distance from the bridge rent prices tend to decrease, accepting the hypothesis. Furthermore, it's found that the impact of Nranking varies across different regions. For example, in Column Four, which focuses on the region north of the Golden Gate Bridge, the Nranking effect is

particularly pronounced, with a decrease in rent price by $139.07 per increase in neighborhood ranking. This suggests that the impacts of proximity and rent prices differs across regions, with the north experiencing the most substantial effect compared to other regions.

The view variable also gave legitimacy to the theory that having a view of the Golden Gate Bridge would influence price. It's evident that having a view resulted in a significant increase in rental price, with an additional average of $1801.29 attributed to properties with such a view. This increase is binary, occurring only when there is a view of the Golden Gate Bridge. This finding underscores the value placed on scenic outlooks in the housing market, especially iconic landmarks like the Golden Gate Bridge.

The purpose of this paper was to determine if proximity to the Golden Gate bridge does positively correlate to the rental costs in San Francisco, and it was proven via the independent variables that a positive correlation does exist.

Conclusion

While the housing market remains in the limelight of research over past decades, there is little literature regarding the impact of landmarks on rental prices in urban areas. In this paper, this literature gap is addressed by investigating the influence of the Golden Gate Bridge on rental costs in San Francisco. Using the hedonic pricing model and regression analysis using data collected from Bay Area Craigslist postings spanning nearly two decades, there is empirical evidence to support the hypothesis that proximity to the Golden Gate Bridge positively correlates with rental costs in the city.

The results reveal significant associations between the independent variables and rental prices, with proximity to the Golden Gate Bridge emerging as a significant factor. Specifically, it was found that rental properties closer to the bridge will have higher rents, with each unit increase in neighborhood ranking, signifying greater distance from the bridge, corresponding to a decrease in rent prices. Additionally, properties with views of the Golden Gate Bridge experience substantial increases in rental prices, underscoring the value placed on scenic outlooks in the housing market.

Furthermore, the regression results showcased regional variations of the impact of proximity to the bridge on rental prices, with the northern region exhibiting the most pronounced effect. These findings hold useful implications for urban planners, real estate professionals, policymakers, and residents. By recognizing the role of iconic landmarks like the Golden Gate Bridge, stakeholders can make more informed decisions regarding housing development, investment strategies, and policy interventions aimed at promoting equity in San Francisco.

Policy implications may include sustainable development initiatives in areas surrounding iconic landmarks to capitalize on their economic value while ensuring affordable housing options for residents. This could involve urban planning strategies that promote mixed-income housing developments. Additionally, regulatory measures or incentivizing the construction of affordable housing units in areas with high rental prices due to their proximity to landmarks may help address affordability challenges. This could include developing properties that accept Section 8 vouchers, which is when eligible participants receive vouchers that can be used to rent housing in the private market.

Although this research contributes insights into the relationship between proximity to iconic landmarks and rental prices, further research is warranted to explore additional factors that may influence housing dynamics in urban areas. Extensions to this paper should include more diverse data sources to gain a better perspective to the urban market. Ultimately, by understanding the housing market more deeply and the factors that influence pricing, strides can be made towards a more communal and equitable future.

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