


 [viiiiiiiiii](#) / [Flatiron\\_Phase2\\_Final\\_Vi\\_Bui](#) Public

Phase 2 Project - Jupyter Notebook and Presentation

☆ 0 stars     0 forks



 Star

 Unwatch ▾



-  Code
-  Issues
-  Pull requests
-  Actions
-  Projects
-  Wiki
-  Security


 main ▾



 [viiiiiiiiii](#) Update README.md ... now  23

[View code](#)

 README.md 



King County, WA, U.S.A.

# Housing Guidance for King County, WA, U.S.A

---

## Overview

---

**Client:** New WA state home buyers needing consultation on WA real estate market and expectations (price, size, location)

**Data, Methodology, and Analysis:** Using King County (WA, U.S.A.) housing data from 2014-2015, linear regression models were built to understand the relationship between price and all other variables in the data (square feet, bedrooms, bathrooms, zipcodes, year built, year renovated, waterfront views)

**Results & Recommendations:** After analyzing data and building linear regression models assessing relationships between price and square feet; price and bedrooms; and price to zip code, the expectations for price range were modeled depending on square feet of living space, grade, condition, and renovation status

## RESULTS - FINAL MODEL

---

**\*\* Final Model includes:**

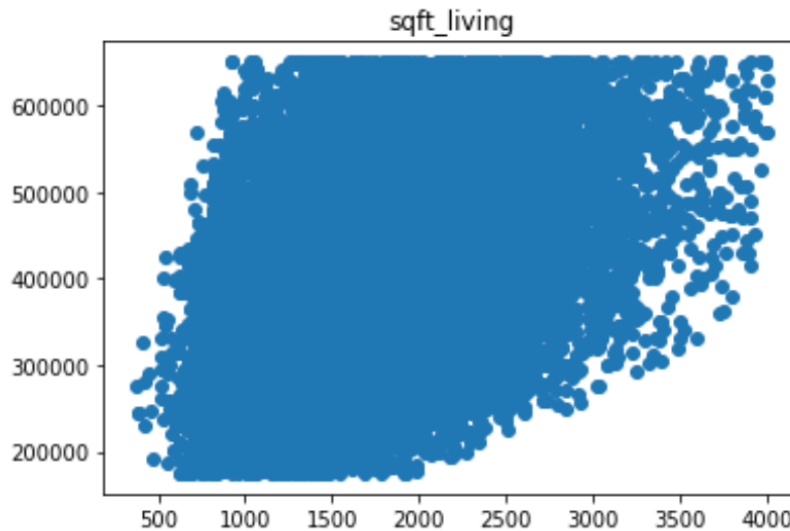
1. Bedrooms
2. Bathrooms
3. Square Feet Living
4. Floors
5. Waterfront
6. Condition
7. Grade
8. Renovation Status
9. Basement Present
10. All Zipcodes

Excluding zipcodes, **Square Feet Living, Grade, and Condition are the strongest determinants of price**

Model:	OLS	Adj. R-squared:	0.740
Dependent Variable:	price	AIC:	297876.8343
Date:	2021-11-07 12:33	BIC:	298453.0513
No. Observations:	11937	Log-Likelihood:	-1.4886e+05
Df Model:	77	F-statistic:	442.0
Df Residuals:	11859	Prob (F-statistic):	0.00
R-squared:	0.742	Scale:	4.0005e+09

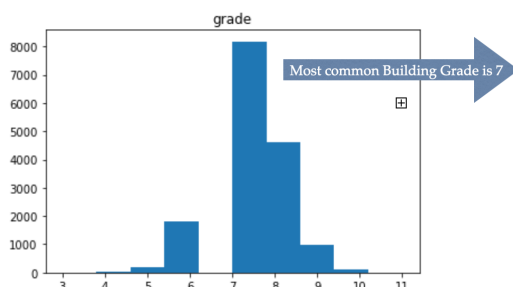
	Coef.	Std.Err.	t	P> t	[0.025	0.975]
<b>const</b>	273461.5916	4044.2866	67.6168	0.0000	265534.1265	281389.0568
<b>bedrooms</b>	-3777.9235	766.3772	-4.9296	0.0000	-5280.1485	-2275.6984
<b>bathrooms</b>	4006.3214	919.1677	4.3586	0.0000	2204.6018	5808.0409
<b>sqft_living</b>	57514.2433	1008.2400	57.0442	0.0000	55537.9275	59490.5591
<b>floors</b>	-7602.7410	836.6282	-9.0874	0.0000	-9242.6695	-5962.8125
<b>waterfront</b>	5088.3292	600.9064	8.4678	0.0000	3910.4541	6266.2043
<b>condition</b>	9541.0686	629.4496	15.1578	0.0000	8307.2442	10774.8930
<b>grade</b>	26074.4898	818.0044	31.8757	0.0000	24471.0669	27677.9126
<b>renovated</b>	1469.4406	585.5021	2.5097	0.0121	321.7605	2617.1207

- Of the variables tested, the strongest predictor of price is square footage
- **The expected cost per square feet of a house in King County is \$94 per square feet**  
(could increase to \$200 per square feet in densest part of county)



**Source:** King County Housing Data, 2014-2015

- The grade of a home (grades 1-13) is a strong determinant of price
- **Every grade increase costs approximately \$31,571**

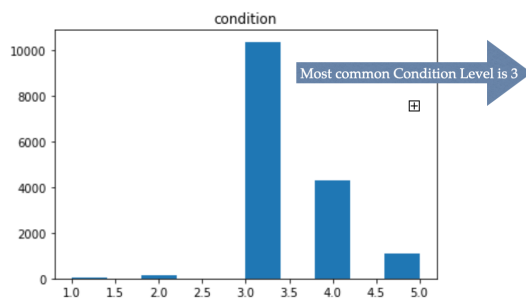


**Source:** King County Housing Data, 2014-2015

#### Residential Building Grades

Grades 1 - 3	Falls short of minimum building standards. Normally cabin or inferior structure.
Grade 4	Generally older low quality construction. Does not meet code.
Grade 5	Lower construction costs and workmanship. Small, simple design.
Grade 6	Lowest grade currently meeting building codes. Low quality materials, simple designs.
Grade 7	Average grade of construction and design. Commonly seen in plats and older subdivisions.
Grade 8	Just above average in construction and design. Usually better materials in both the exterior and interior finishes.
Grade 9	Better architectural design, with extra exterior and interior design and quality.
Grade 10	Homes of this quality generally have high quality features. Finish work is better, and more design quality is seen in the floor plans and larger square footage.
Grade 11	Custom design and higher quality finish work, with added amenities of solid woods, bathroom fixtures and more luxurious options.
Grade 12	Custom design and excellent builders. All materials are of the highest quality and all conveniences are present.
Grade 13	Generally custom designed and built. Approaching the Mansion level. Large amount of highest quality cabinet work, wood trim and marble; large entries.

- The condition (level 1-5) is also a strong determinant of price
- **Every condition level increase costs approximately \$15,007**



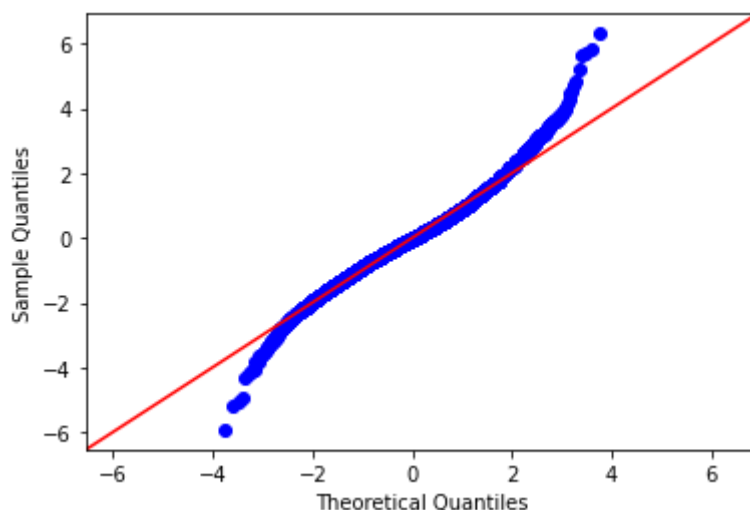
#### Condition: Relative to Age and Grade

- |              |  |
|--------------|--|
| 1= Poor      | Many repairs needed. Showing serious deterioration.  |
| 2= Fair      | Some repairs needed immediately. Much deferred maintenance.  |
| 3= Average   | Depending upon age of improvement; normal amount of upkeep for the age of the home.                              |
| 4= Good      | Condition above the norm for the age of the home. Indicates extra attention and care has been taken to maintain. |
| 5= Very Good | Excellent maintenance and updating on home. Not a total renovation.  |

Source: King County Housing Data, 2014-2015

## Check for Linearity and Residual Normality using Q-Q Plot

- There are some tails but overall residuals appear normal



## Check for Homoskedasticity

- Durbin-Watson: range of 1.5 to 2.5 is relatively normal
- Model's Durbin-Watson is 2.024

## Check for Over-fitting

- Check expected vs. predicted errors of Train Test sets
- Train and Test data are within range of each other
- The average expected error (mean absolute error) of the Train data is \$47,496 while the average expected error of the Test data is \$48,684

# Evaluation and Conclusions

---

After building models to evaluate the relationship between price and several factors, we can offer guidance to new home buyers in WA State about the expectation of price relative to square feet of living, waterfront views, condition, and grade.

\*\*\*\* Important note: the results are best suited for home buyers seeking homes with a maximum of 6 bedrooms, 4000 square feet, and a budget ranging from \ \$175,000 to \ \$650,000

## Conclusions

- The average price for a home in King County, WA is approximately \ \$400,358
- The most important factors in our model, besides zipcode, are: Square Feet Living, Grade, and Condition
- Every additional square feet of space costs approximately \ \$94. Note: other models showed this cost could be up to \$200 per square feet in the densest zipcodes
- The grade of a home (1-13) is a strong determinant of price. Every grade increase costs approximately \ \$31,571
- The condition (1-5) is also a strong determinant; Every condition level increase costs approximately \ \$15,007
- If the home has been renovated, the price is expected to be approximately \ \$9812 more

# Future Work

---

## Future work:

- Refine existing models and expand dataset for different types of home buyers
- Explore relationship of price to zip code
- Build models for Suburbs (Medina, WA) vs. City (Seattle, WA)
- Build more comprehensive models considering other factors such as location, renovations, waterfront view

# Repository Structure

---

- images

- README.me
- Vi\_Bui\_Phase2\_Final\_Project\_Presentation.pdf
- Vi\_Bui\_Phase2\_Project\_FinalFinal - Jupyter Notebook.pdf
- Vi\_Bui\_Phase2\_Project\_FinalFinal.ipynb

## Releases

No releases published

[Create a new release](#)

---

## Packages

No packages published

[Publish your first package](#)

---

## Languages

● **Jupyter Notebook** 100.0%