Condominiums

Does a property's market value change by Neighborhood?

How Market Value is determined for Properties in New York City and Why

How?

The Department of Finance of NYC, has a formula that makes use of the incomes and expenses of comparable properties that helps to determine the Market Value of a single property

Why

The Market Value can be used to determine the assessed value of the property which in turn can be used to determine the amount of taxes that property would have to pay

Uses of Market Value

The market value can also be used determine financing options and can be used to determine the market values of other properties

Assumptions

What independent variables I believe affects Market Value?

1. Comparables Net Operating Income has a high correlation with Full Market Value
2. The total number of units and area affects the Full Market Value
3. As expenses go up Full Market Value should go down

My Data

My data came from the Department of Finance and consisted of 28507 observations and 63 columns

- I had to transform the data so I could look at the full market values by neighborhood
- Utilized R and Python to clean the data and order the data into Neighborhoods rather than individual observations
- After cleaning my data was 287 observations for 21 columns
- Finally, I used R to perform the graphing and analysis of the data


```python
"""  Patterns Works
    Works in loop for all patterns
    r0 = re.compile("Gross SqFt.\d")
    gsqft = list(filter(r0.match, columns))
    print("Gross Sqft:", gsqft)
"""
```



```
R 4.2.3 · ~/GitHub/Quant_R_Python/
> cor(c_data[,c(-1, -9)], c_data$`Full Market Value`)
                         [,1]
Total Units              0.56482822
Gross SqFt               0.61743869
Estimated Gross Income   0.94612106
Gross Income per SqFt    0.58766065
Estimated Expense        0.79606506
Expense per SqFt         0.55344001
Net Operating Income     0.99493952
Market Value per SqFt    0.56766350
comp_avgstu              0.24230633
comp_avgsft              0.25456670
comp_avgginc             0.45254683
comp_avggips             0.58561298
comp_avgexp              0.29609690
comp_avgeps              0.58549783
comp_avgnet              0.56577811
comp_avgfmv              0.56511868
comp_avgmvps             0.55599245
GSqft_more_than_58k      0.50272188
Units_more_than_11       0.04208118
>
```
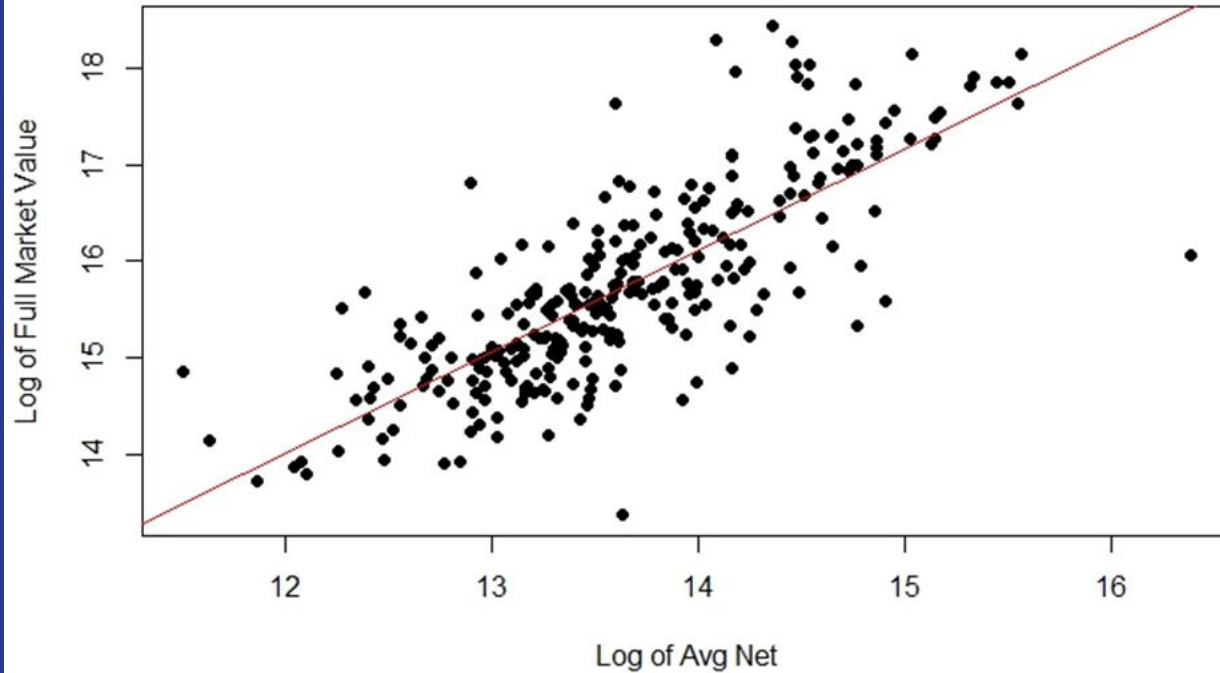
Plots
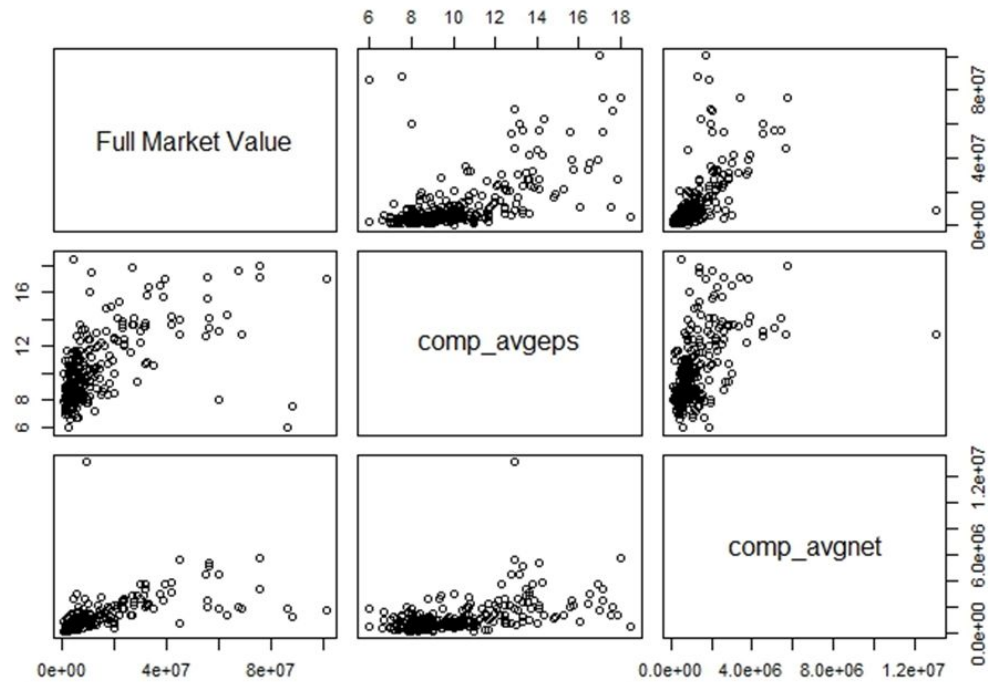
Plots

Market Value to Comparable Expense per Sqft
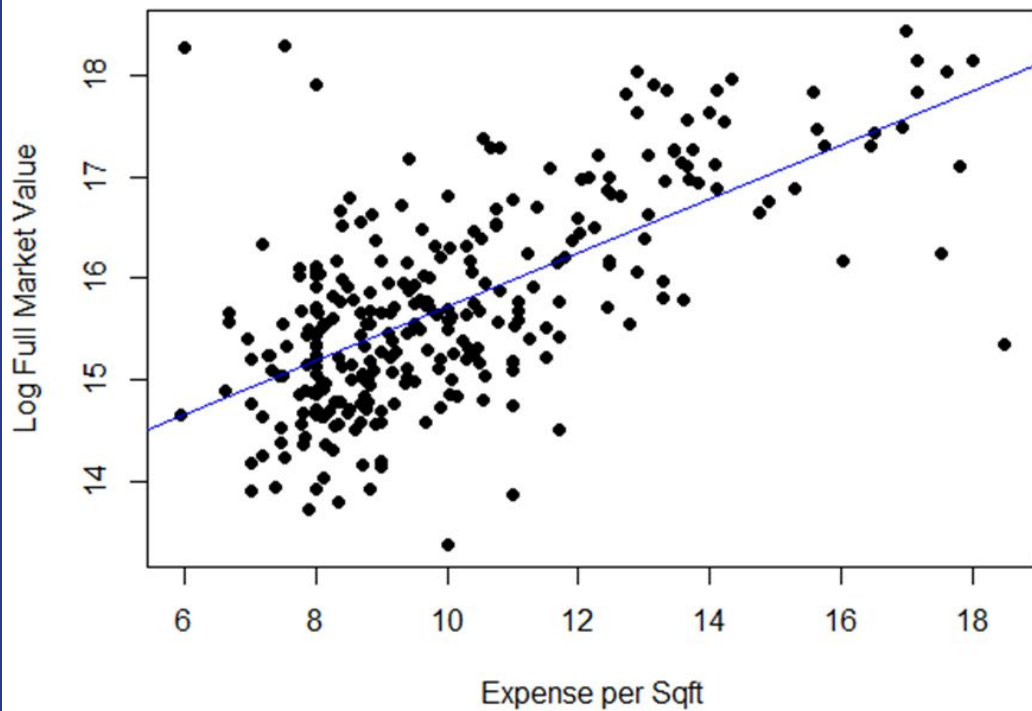
Plots

Market Value to Comparables Avg Net

```
Call:
lm(formula = log(`Full Market Value`) ~ log(comp_avgnet) + comp_avgeps +
    Units_more_than_11 + GSqft_more_than_58k, data = c_data)

Residuals:
     Min       1Q   Median       3Q      Max
-1.84914 -0.28042 -0.00515  0.27368  2.28011

Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)          5.04895    0.80962   6.236 1.63e-09 ***
log(comp_avgnet)     0.51309    0.05266   9.744  < 2e-16 ***
comp_avgeps          0.13230    0.01362   9.711  < 2e-16 ***
Units_more_than_11   1.98202    0.47497   4.173 4.01e-05 ***
GSqft_more_than_58k  0.76093    0.06881  11.058  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '

Residual standard error: 0.4729 on 282 degrees of freedom
Multiple R-squared:  0.7881,     Adjusted R-squared:  0.785
F-statistic: 262.1 on 4 and 282 DF,  p-value: < 2.2e-16

>
```

```
> confint(l.model4, level = 0.95)
                         2.5 %    97.5 %
(Intercept)          3.4552869 6.6426038
log(comp_avgnet)     0.4094423 0.6167472
comp_avgeps          0.1054845 0.1591220
Units_more_than_11   1.0470884 2.9169473
GSqft_more_than_58k  0.6254776 0.8963757
>


Breusch Pagan Test for Heteroskedasticity
-----------------------------------------
Ho: the variance is constant
Ha: the variance is not constant

                         Data
-----------------------------------------------------
Response : log(`Full Market Value`)
Variables: fitted values of log(`Full Market Value`)

          Test Summary
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DF            =    1
Chi2          =    9.946291
Prob > Chi2   =    0.001611738
> ols_vif_tol(l.model4)
          Variables Tolerance      VIF
1   log(comp_avgnet) 0.4840517 2.065895
2        comp_avgeps 0.6708800 1.490580
3 Units_more_than_11 0.9947901 1.005237
4 GSqft_more_than_58k 0.6582711 1.519131
>
```

Analysis

Conclusions

What can we determine?

1. As the Comparable Expense per Sqft increases it actually has a positive effect on Market Value
2. When Net Income of Properties in a neighborhood increases it would lead to an increase of Market Value but it's not as a big of change as I hoped
3. Total Units and Area are both important to Market Value!!!

Any Questions?