Real Estate in NYC

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Overview

While looking at homes and potential areas to settle, I wanted to analyze the buying market across the five boroughs and to build a model that will project the asking price of homes, by borough. By understanding this, I can see how much housing values will rise, in each borough, over a set amount of years.

Process

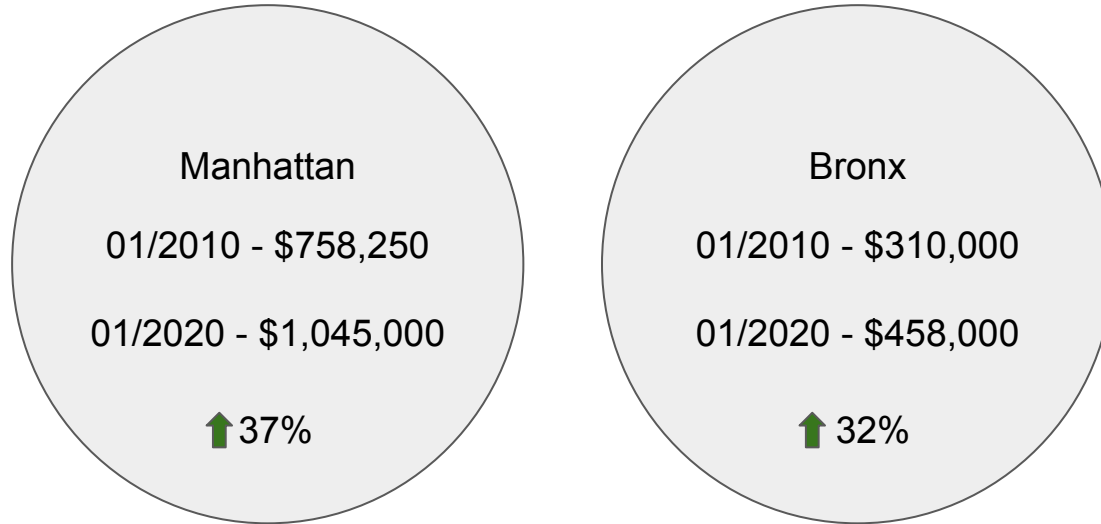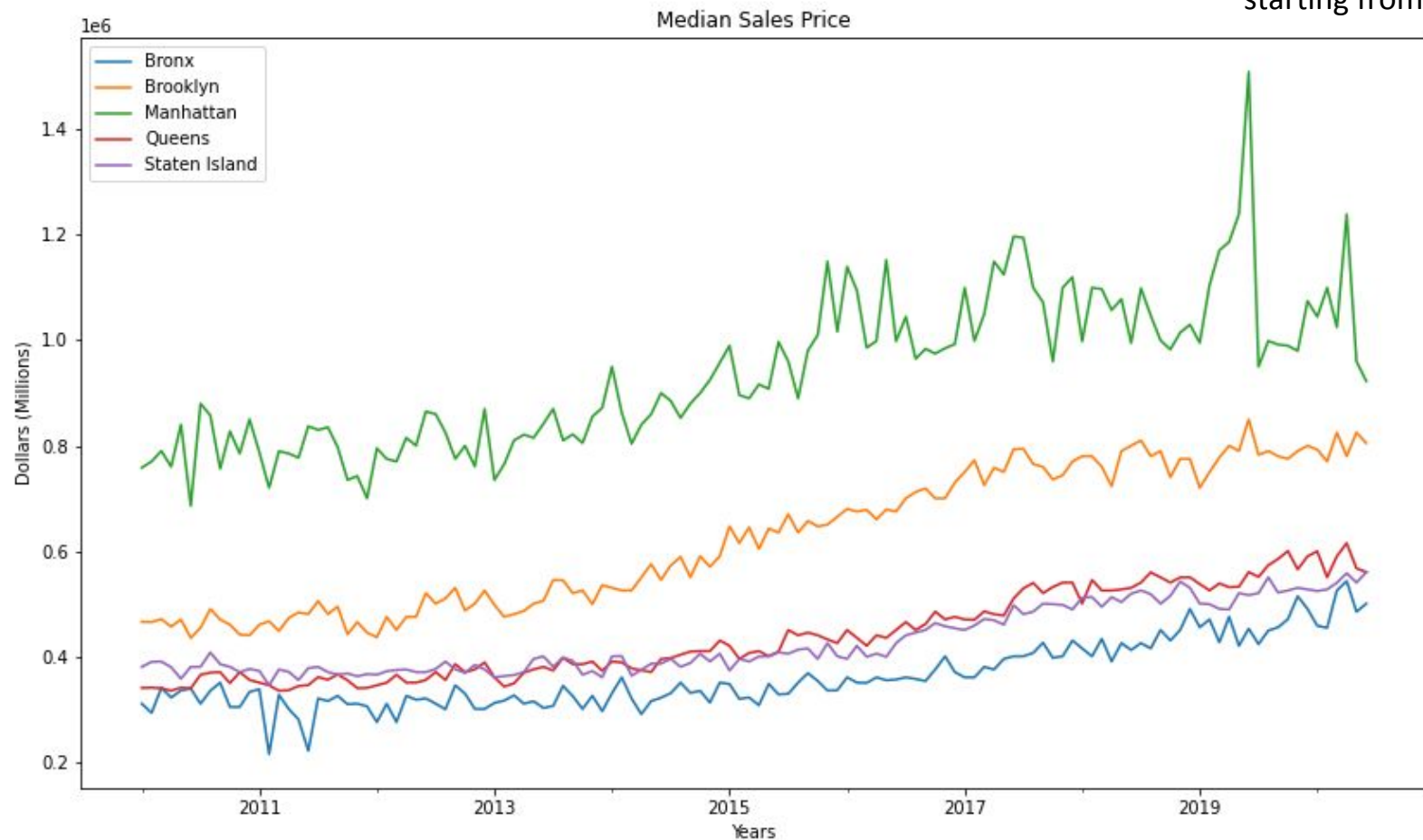| Data Collection	EDA & Statistical Analysis	Modeling	Conclusions
- Gathered Data from StreetEasy. - Created functions to clean up CSV files.	- Visualized pricing data over time. - Ran Dickey-Fuller test to check for stationarity.	Ran the following models: -AR (Baseline) -ARMA -ARIMA -Sarimax	- Selected best model - Interpreted results of the model

Borough Profiles

The data used for model is the median asking home prices for Manhattan and the Bronx. (All boroughs were tested but for brevity only Manhattan and the Bronx will be used.)

Manhattan

01/2010 - $758,250

01/2020 - $1,045,000

⬆37%

Bronx

01/2010 - $310,000

01/2020 - $458,000

⬆32%

Sales prices by borrough starting from 2010.

Evaluation Metrics

RMSE - Used in order tell the square root of the all squared errors. The answer is delivered in units that were passed through. However, RMSE is sensitive to outliers.

SMAPE - Accuracy measure based on percentage (or relative) errors. A perfect SMAPE score is 0.0, and a higher score indicates a higher error rate.

	Manhattan Models		Bronx Models	
Model	RMSE	SMAPE	RMSE	SMAPE
AR Model (Second Order)	120,372	8.09	29,579	5.07
ARMA (Mhtn Order = 2,5) (BX Order = 2,2)	105,597	7.05	29,594	5.23
ARIMA	112,344	8.07	46,745	8.27
AUTO ARIMA	123,436	8.27	29,444	5.00
SARIMAX Model	123,594	7.97	29,468	4.79
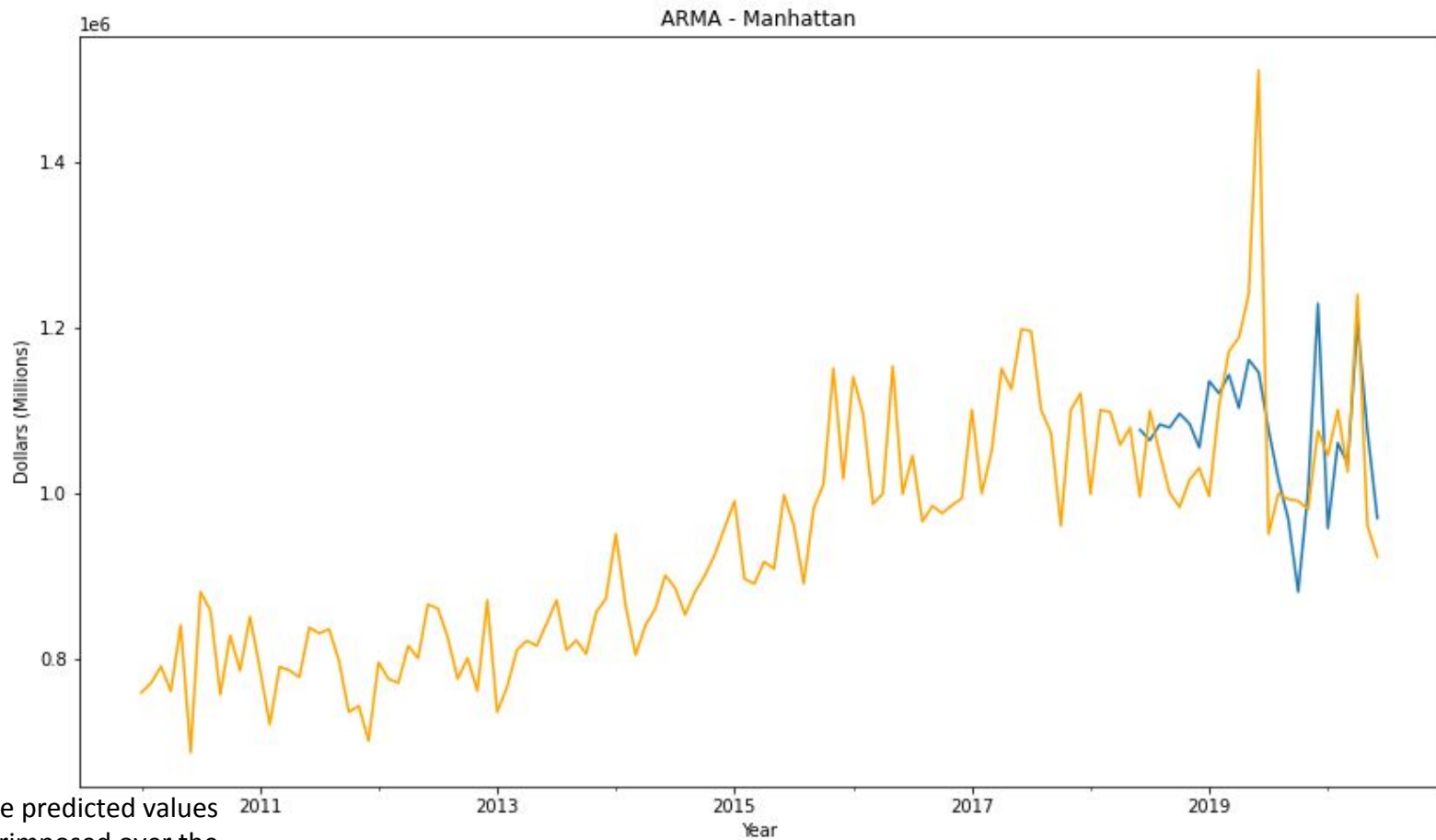
Here are the predicted values (blue) superimposed over the actual values.

ARMA - Bronx

Predicted values (blue) over actual values.
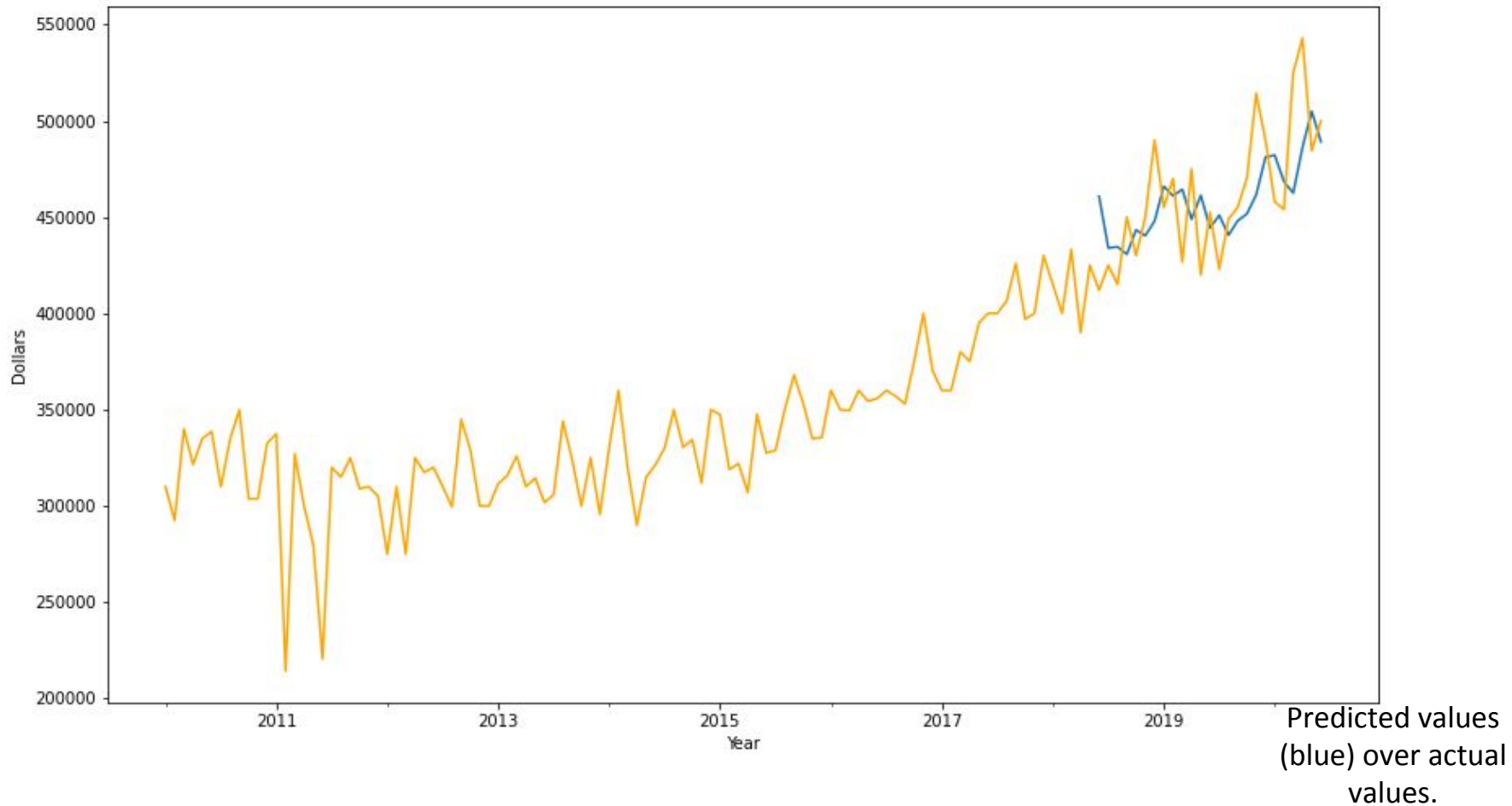
Takeaways

- Adjusting for both p (Lag Order) and q (Moving Average) yielded the most significant changes among my models.
- None of my models accurately predicted the large spike in median asking price in Manhattan.

Manhattan

Final Prediction:
$969,344

Bronx

Final Prediction:
$489,082
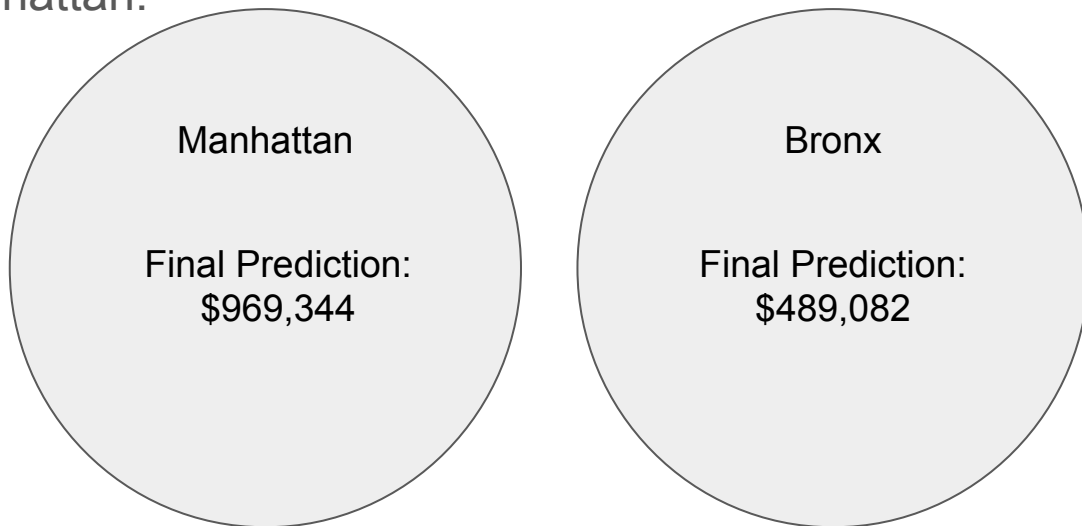
Conclusion

When look to settle in New York, buyers will be faced with some of the highest prices in the U.S. Buyers can expect to pay almost $1 million dollars for real estate. However, if living in one of the five boroughs in New York City is a requirement, <u>on pricing alone</u>, The Bronx provides a lower cost opportunity to acquire property.

Next Steps / Stretch Goals

- Fix Multivariate Model - Include data about housing inventory, and asking price.
- Refactor code.
- Build front end.