

Predicting NYC Rents using SARIMAX Modeling

How Renters Can Weather the Current Crisis

David Richter
August 2, 2022

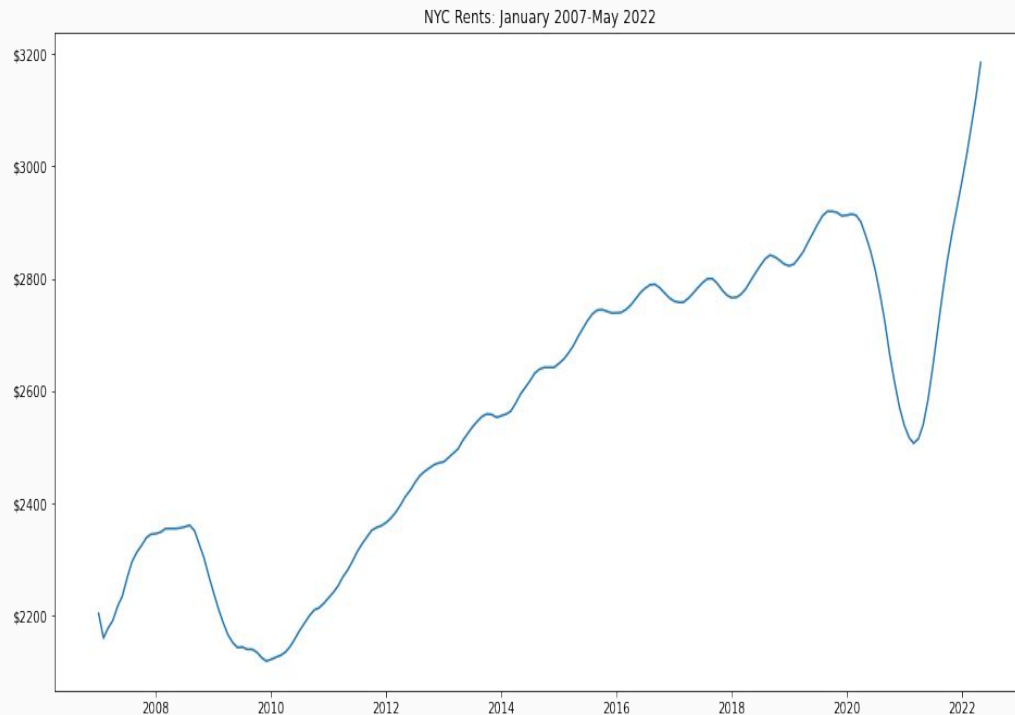
NYC Rental Trends Since 2007¹

\$3185

Median Rent
(May 2022)

25%

Rent Increase
(May 2021-May 2022)



Source: StreetEasy Rental Index: <https://streeteasy.com/blog/data-dashboard>

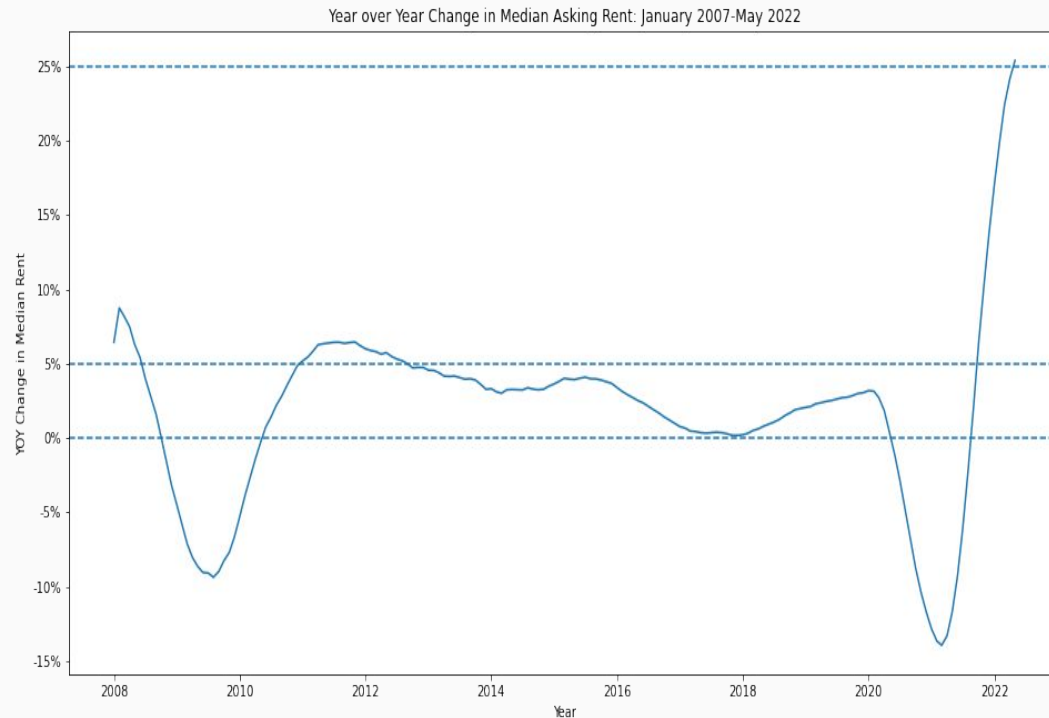
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Median Rent
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What Strategy Will Save Renters the Most Money?

Price Increases Expected to Continue

- Renters should lock in a new lease ASAP.
- Renters should **sign multi-year leases** if possible, even at a higher price point

Price Increases Expected to Slow or Reverse

- Renters should hold off on signing new leases.
- Renters should **avoid multi-year leases** at higher price points

Methods for Predicting Rental Prices

SARIMA Modeling

Predicts future values of a time series based on past values of that same series.

SARIMAX Modeling

SARIMA + Exogenous Variables.

Identifying Possible Exogenous Variables for SARIMAX Model^{1, 2, 3}

Month over month increases in the following variables were consistently correlated with month over month changes in rental prices:

Exogenous Variable	Correlated at Lag:
Total Wages and Salaries Earned in New York State	16, 9 Months
Producer Price Index (PPI) for Building Materials	14 Months
Total Wages and Salaries, New York State	6 Months
Federal Funds Rate	4 Months

Effect of Predictors on Final Model^{1, 2, 3}

\$1066

Total Rental Price Increase:
2007-2022

\$1041

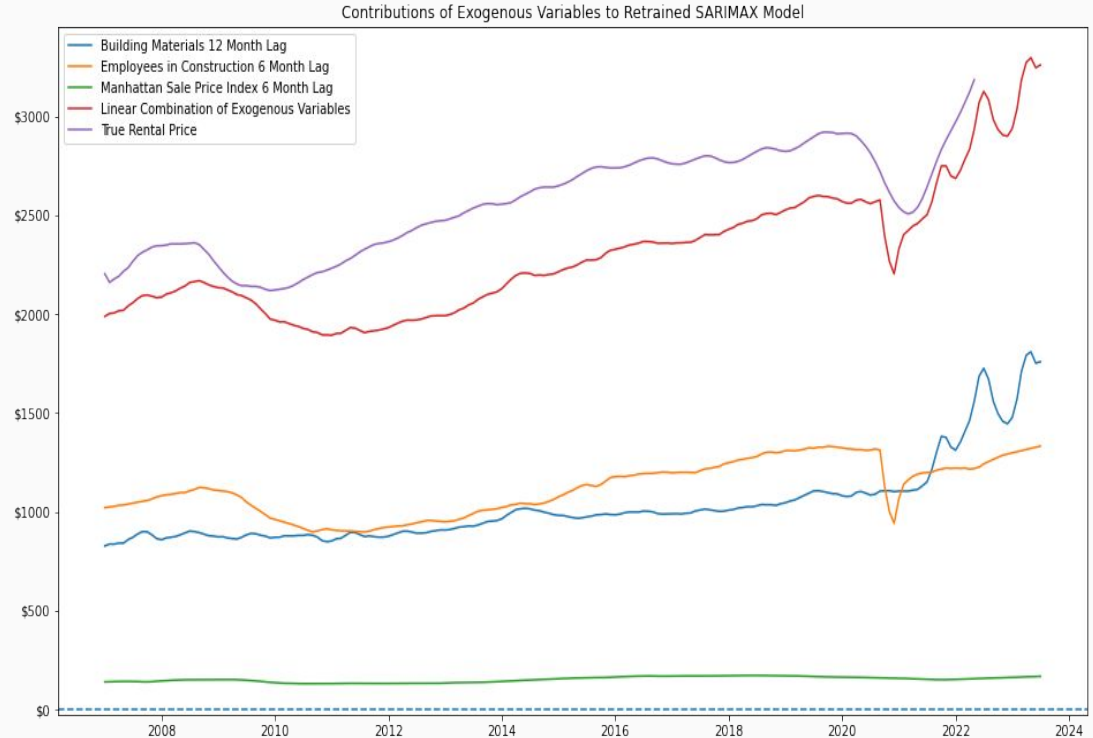
Variation predicted by All
Exogenous Predictors

\$730

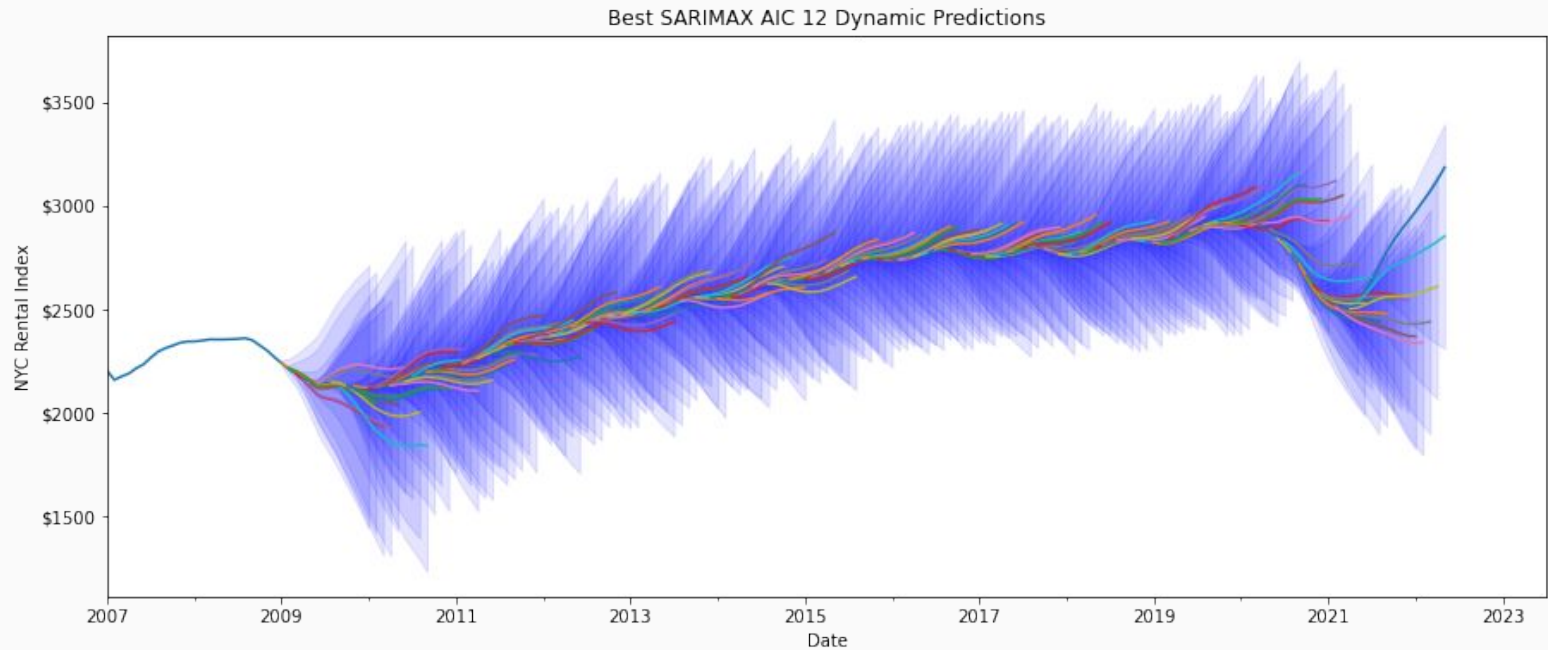
Variation predicted by the Cost of
Building Materials

\$430

Variation predicted by Employees
in Construction, NYS



Dynamic Predictions of Model: 2007-2022^{1, 2, 3}

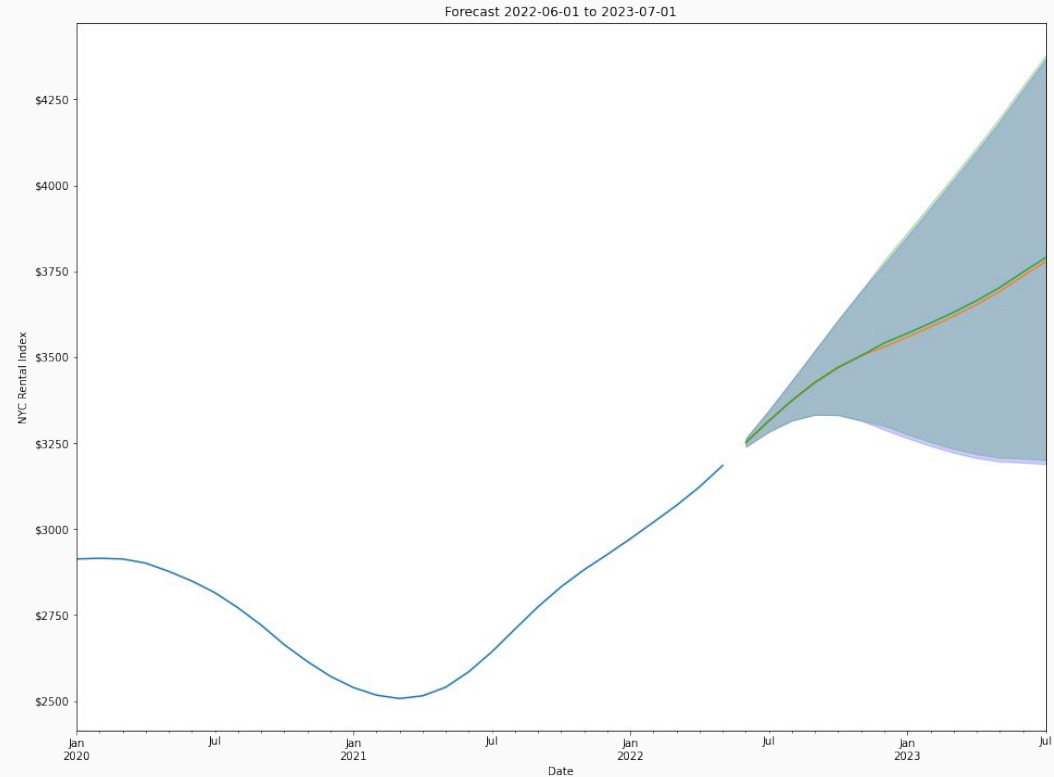


Model Forecasts: June 2022 - July 2023^{1, 2, 3}

Predicted Rent

\$3315 July 2022

\$3790 July 2023



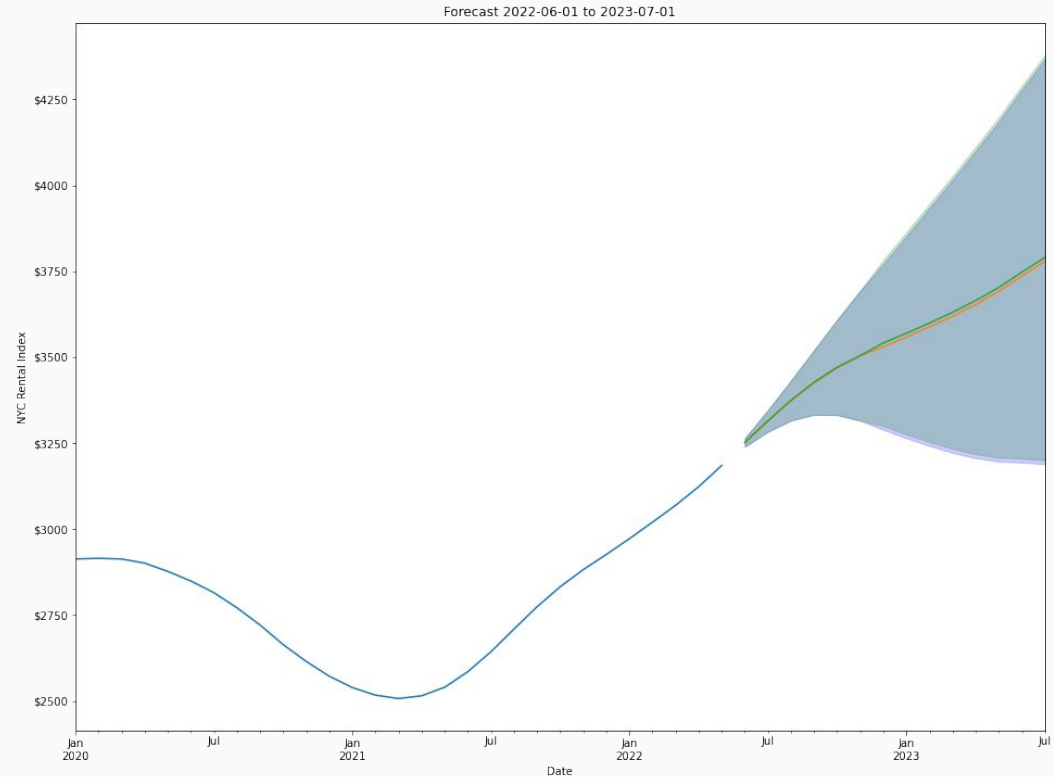
*Blue field represents 97.5% Prediction Interval

Model Forecasts: June 2022 - July 2023^{1, 2, 3}

Past vs. Predicted Increase

25% May 2021-May 2022

14% July 2022 - July 2023



*Blue field represents 97.5% Prediction Interval

**Price increases
expected to increase
14% YoY.**

- Sign new lease ASAP
- Avoid two-year leases at >14% above July rental values

References

1. [StreetEasy Data Dashboard](#)
2. U.S. Bureau of Labor Statistics, Producer Price Index by Industry: Building Material and Supplies Dealers [PCU44414441], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/PCU44414441>, July 19, 2022.
3. U.S. Bureau of Labor Statistics and Federal Reserve Bank of St. Louis, All Employees: Construction: Residential Building Construction in New York [SMU36000002023610001SA], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/SMU36000002023610001SA>, July 22, 2022.

Thank you for viewing!

Data and code used for this presentation can be viewed at:

<https://github.com/DavidKRichter/dsc-rental-project>

Please email me with any questions at:

d.richte@gmail.com