DataFest Write-Up

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The pandemic that shook the world has ended, and its ramifications for the commercial real estate market have diminished. Yet, given the market's high volatility and diversity, identifying commercial real estate market trends remains challenging. This project aims to tackle this challenge, primarily focusing on the impact of socioeconomic and market factors on leasing activity, and to anticipate future market trends. Due to the limited resources, this project initially focuses on Austin's tech industry. The analytical pipeline established in this project, however, can be expanded to more generic analyses, such as those of other cities or industries.

The goal of our analysis is to predict the trend of leasing activity using the average square footage that is leased at the market level. We understand this value to be an indicator of the popularity of a market for a certain industry. Also, to a certain extent, this would reflect the degree to which businesses are satisfied with their arrangements in a market, since the land leased in a market would not be high if businesses were dissatisfied with the market. Thus, predicting the land leased in the future could allow Savills to inform clients of markets that are going to be popular before they are. To improve the interpretability of the amount of land being leased, we decided to normalize it using a min-max scale. In other words, we transformed the leasing variable to a normalized value that is within the range of 0 to 1.

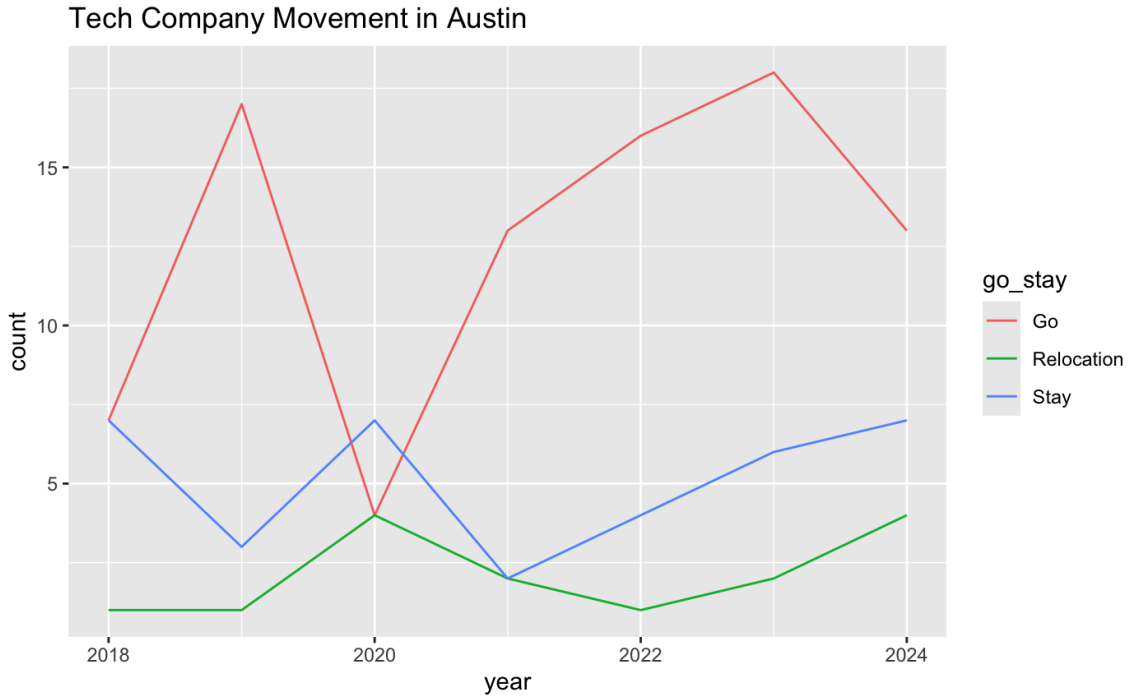
Austin is a relatively new city with its downtown rapidly growing over the last decades, accelerated by the recent tendency of tech companies moving from California. There has been a consistent number of companies moving to or staying in Austin (Appendix A). The tech companies in Austin prefer high-quality buildings, with more than 70% of leases by tech companies being made on high-quality buildings (Appendix B). The analysis in general thus concentrates on the high-quality leases and integrates transaction-level leasing data, embedding socioeconomic and market factors and leasing activity. The factors were chosen based on their statistical significance when correlation analysis was performed. Data from different sources were merged and aggregated quarterly, and the variables were normalized and scaled to ensure reliable analysis.

For each socioeconomic and market factor of the aggregated data, we used a time-series forecasting model that applies STL decomposition to separate trend and seasonal (quarterly) components, then fits an ARIMA model on the residuals to capture short-term dynamics of the near future. The implemented model predicts an increase for all socioeconomic and market factors – rent, unemployment rate, proportional leasing availability, and wage – of which the next model will investigate their impacts on leasing activity.

To understand how socioeconomic and market factors correlate with leasing activity, we implemented a beta regression model to predict the normalized leasing variable using our previously mentioned market factors. A beta distribution naturally lends itself to our normalized leasing variable, since it is bounded from 0 to 1. For the tech industry in Austin, we found that average rent and average weekly wages had a positive effect on normalized leasing values, while the other covariates had a negative effect. The value of this model is that Savills can replicate our process and create unique models for different industries and markets.

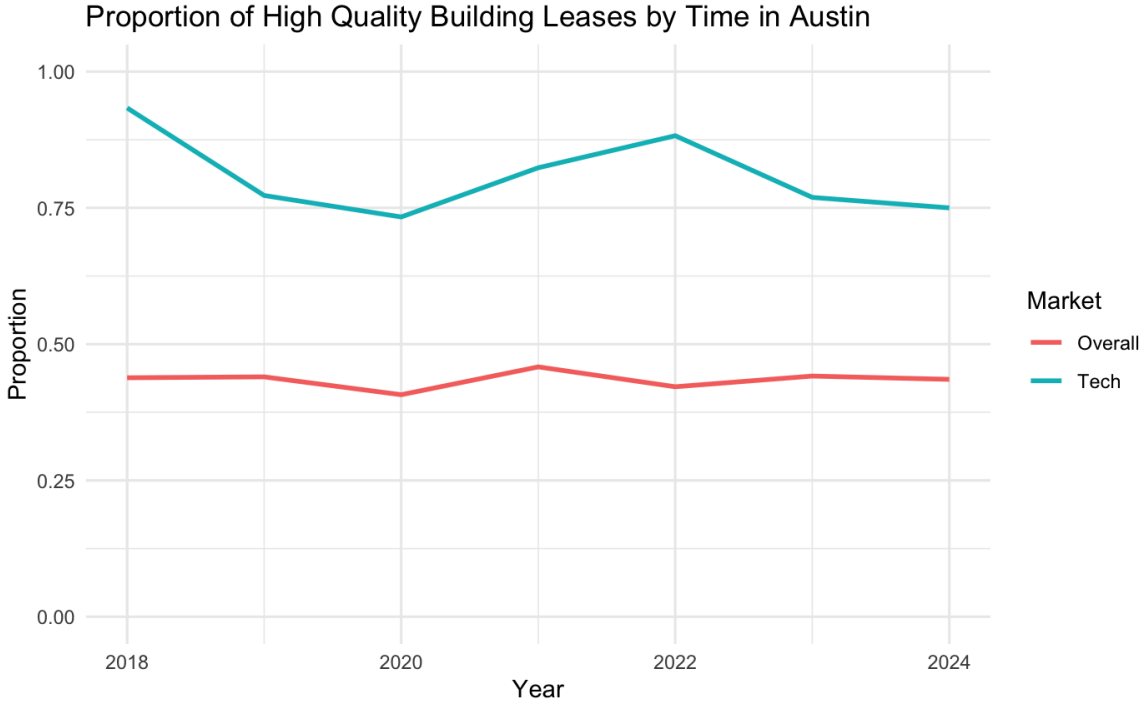
Appendices

Appendix A: Tech Company Movement in Austin (2018 - 2024)

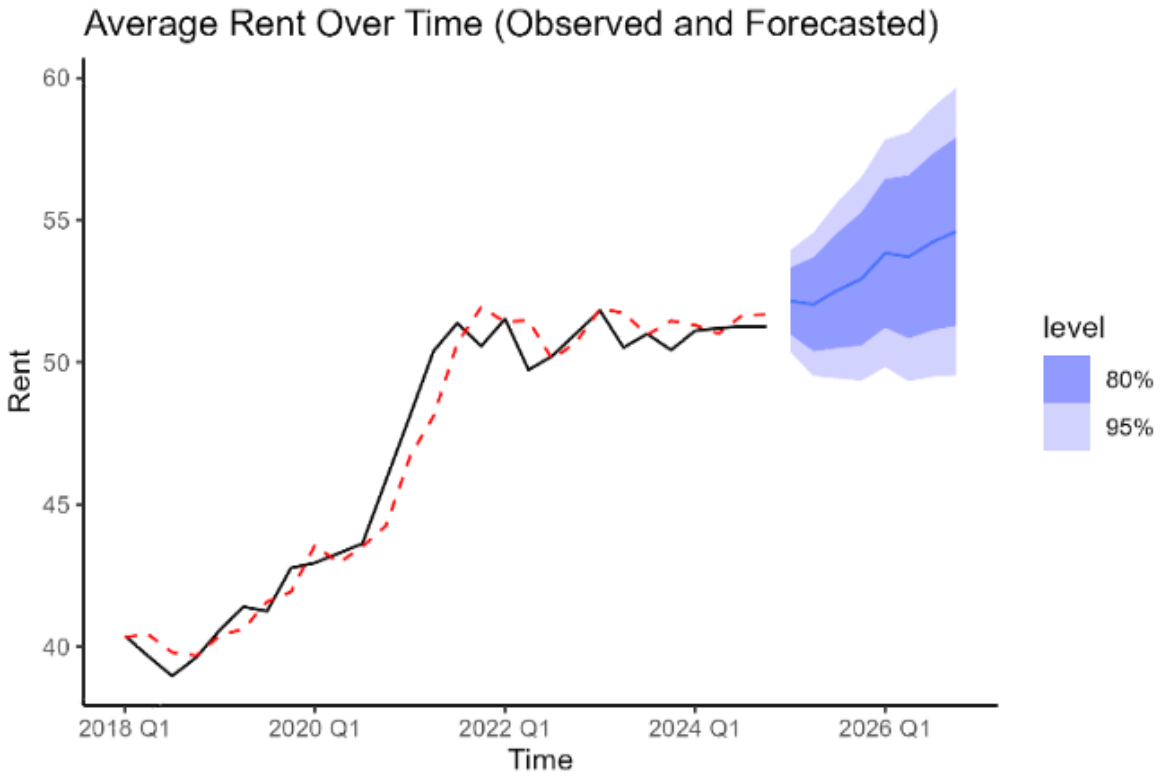


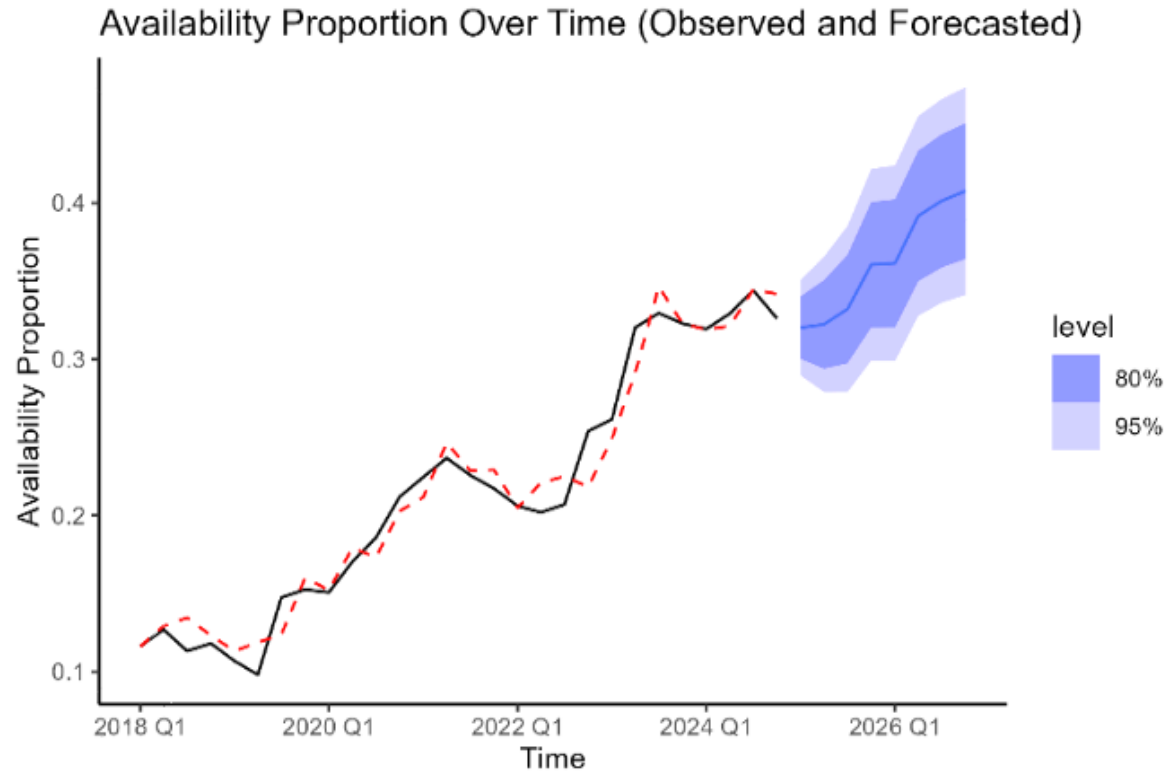
- Go: Tech companies newly coming to Austin
- Relocation: Tech companies moving within Austin
- Stay: Tech companies staying in Austin by renewal, expansion, etc.

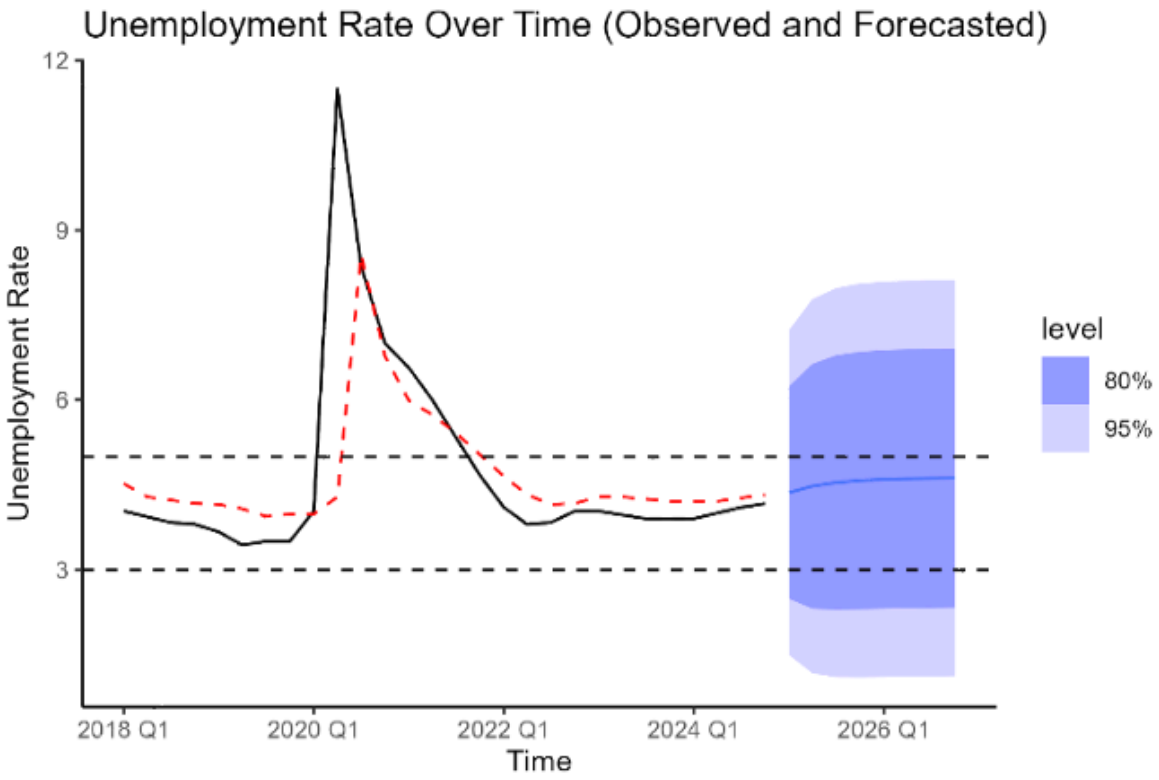
Appendix B: Proportion of High Quality Building Leases by Time in Austin

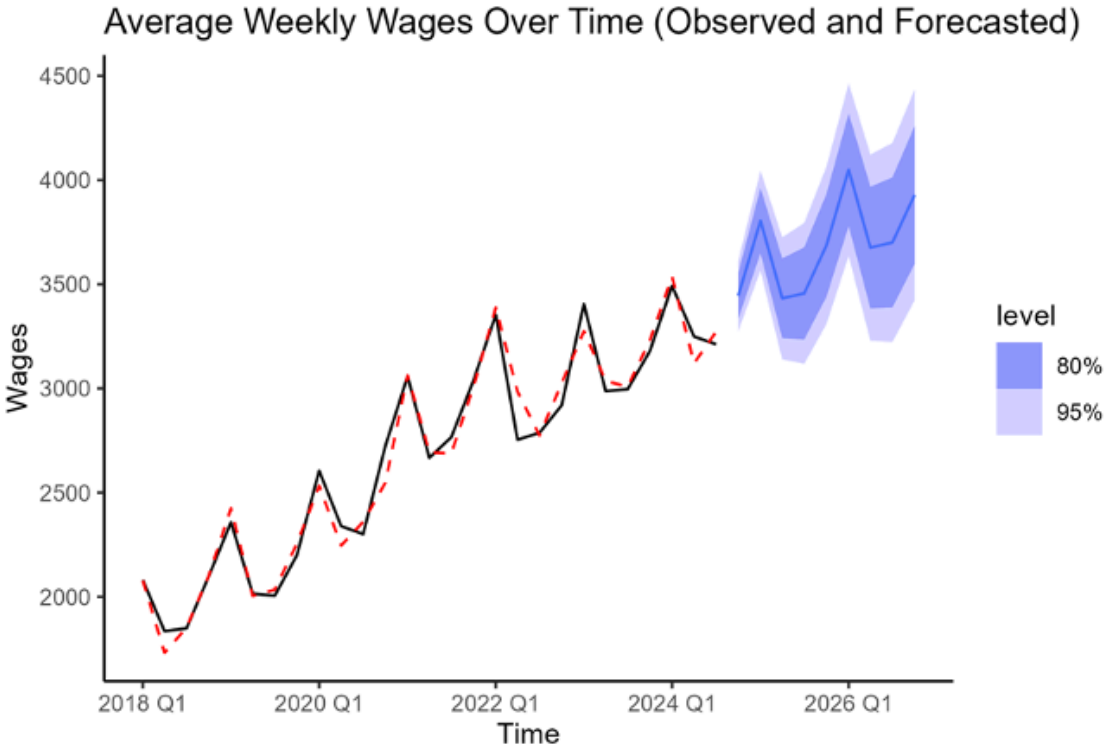


Appendix C: Observed and Forecasted Value of Socioeconomic Factors






Unemployment Rate Over Time (Observed and Forecasted)
Unemployment Rate
12
9
6
3
2018 Q1
2020 Q1
2022 Q1
2024 Q1
2026 Q1
Time
level
80%
95%


Average Weekly Wages Over Time (Observed and Forecasted)
Wages
4500
4000
3500
3000
2500
2000
2018 Q1
2020 Q1
2022 Q1
2024 Q1
2026 Q1
Time
level
80%
95%

Appendix D: Shiny App