



Commodity Price and Machine Learning

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Presenter Introduction

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- ▶ Located in Minneapolis, Minnesota
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- ▶ Sawyer Tucker

- ▶ BBA in Computer Information Systems Western Michigan University, 2021
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- ▶ Greg Wagner

- ▶ BS in Mathematics from Davidson College, 2018
- ▶ Located in Fort Myers, Florida (part of the Washington, DC cohort)
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- ▶ Christopher Nash

- ▶ BBA of Computer Information Systems from Western Michigan University, 2021
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Project Introduction

- ▶ Commodities are raw materials or agricultural products
- ▶ Traded in Chicago Mercantile Exchange Group and the New York Mercantile Exchange
 - ▶ Like stocks, prices fluctuate minute-to-minute
- ▶ Unlike stocks, commodities are an asset that can be used or consumed
 - ▶ Value in being able to predict future prices of commodities
- ▶ Half our group is entering an agriculturally-focused field, so we examined three crops: corn, wheat, and soybeans

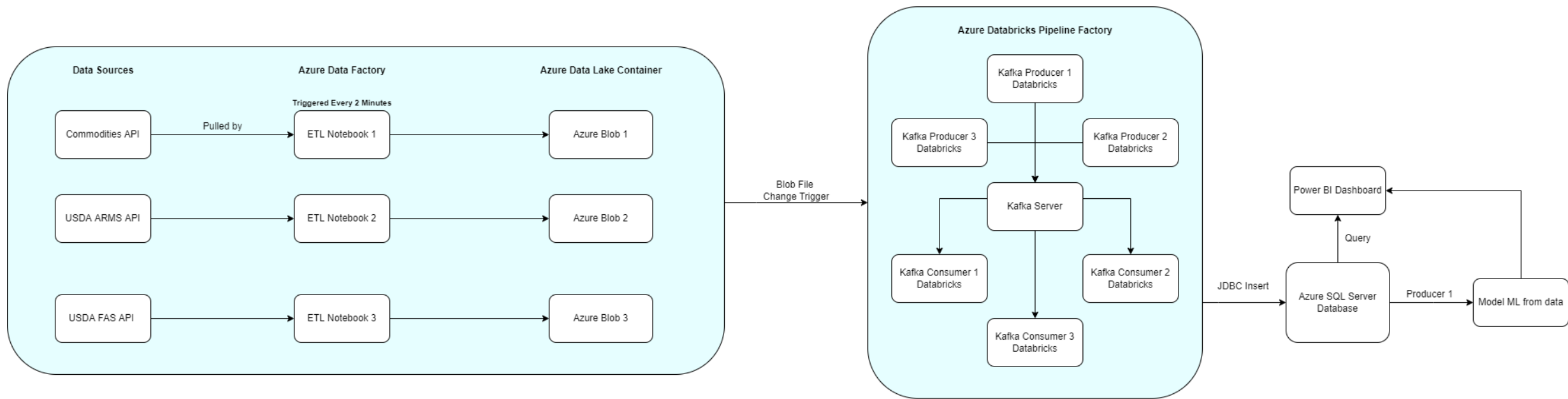
Initial Questions

- ▶ How have the prices of commodities like wheat, corn, and soybeans changed over time?
- ▶ What affects the prices of these commodities?
- ▶ Can we predict the price of these commodities in the future?
- ▶ Does our model change as we receive incoming data from the API?
- ▶ Which states are the top producers and consumers of these commodities?
- ▶ Which nations are the top producers and consumers of these commodities?

Data Sources

- ▶ [Commodities API](#) - updates every two minutes
 - ▶ Corn, wheat, soy, gold, relevant foreign currencies
 - ▶ Used in ML model
- ▶ [Economic Research Service API](#) - US Department of Agriculture
 - ▶ Reports how much and what type of commodity is produced in USD
- ▶ [Foreign Agricultural Service Data API](#) - National Agriculture Stats Service
 - ▶ What is being exported and to whom in USD

Data Platform Overview



Visualizations

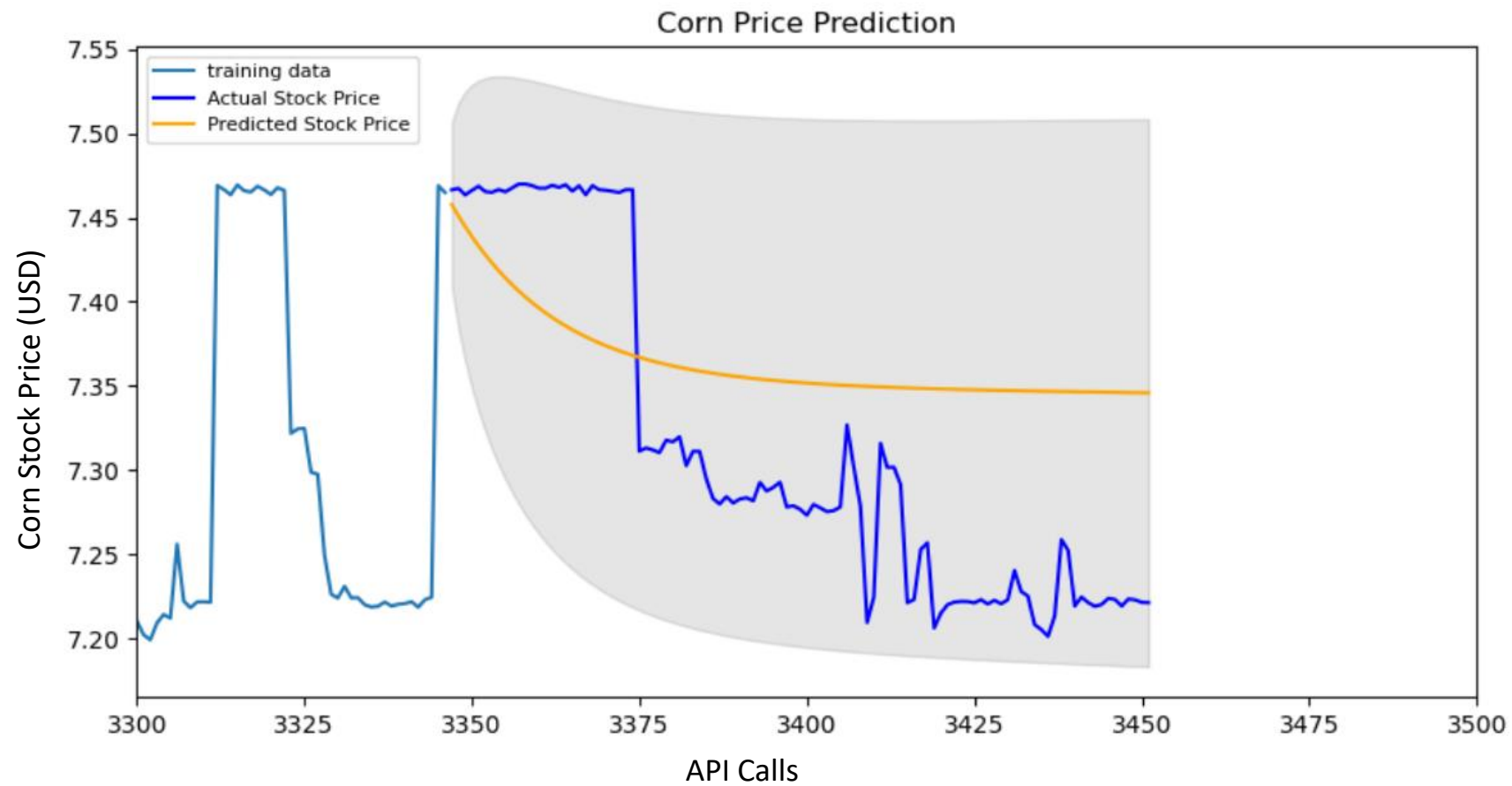
Power BI



Machine Learning

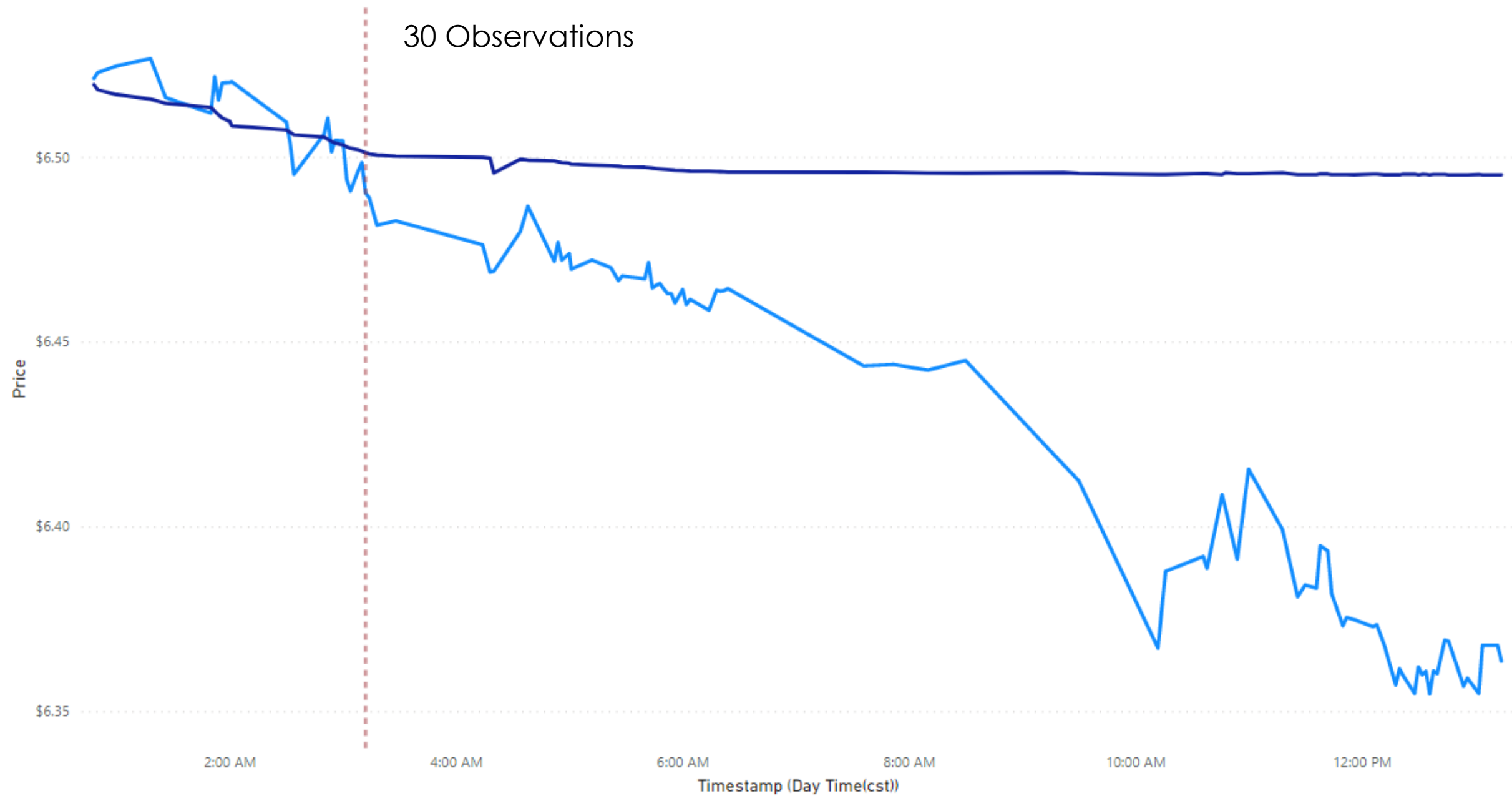
- ▶ Using ARIMA forecasting model for Wheat/Corn/Soybeans
 - ▶ AutoRegressive Integrated Moving Average
- ▶ Training with 90% commodity data, testing with last 10%
- ▶ Using autoARIMA python package to select best hyperparameters for each commodity
 - ▶ Corn: {1, 0, 3} p, d, q values respectively
- ▶ MAPE = 0.00235 ~ 99.765% accurate
- ▶ Limitation - modeling must be graphed on a separate Power BI report

ARIMA Testing



Corn - Forecasted Price vs. Actual (USD)

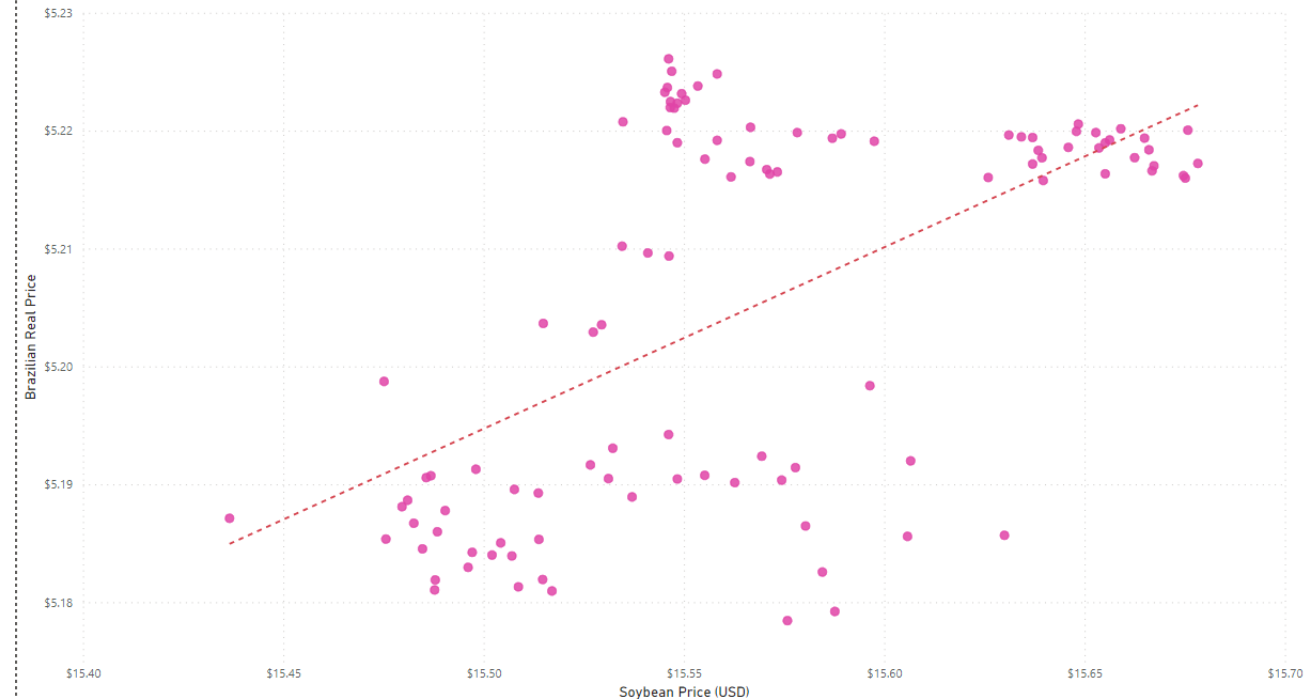
● Actual Corn Price ● Forecasted Corn Price



Recommendations

- ▶ Predicting time series data is tricky and needs to be updated frequently to retain accuracy
 - ▶ Real world events and weather patterns change our model
 - ▶ Example: The Russia-Ukraine (global), Canada Truckers (more local)
- ▶ Minnesota is a top producer of Corn and Soybean in the US
- ▶ Possible Commodity-Currency Link

Soybean vs. Brazilian currency prices (USD)





THANK YOU

ANY QUESTIONS?