

Team 2 | Midterm Presentation

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Technical Project: **Predictive Modeling of Interest Rates**

Team 2 | **Research Questions**

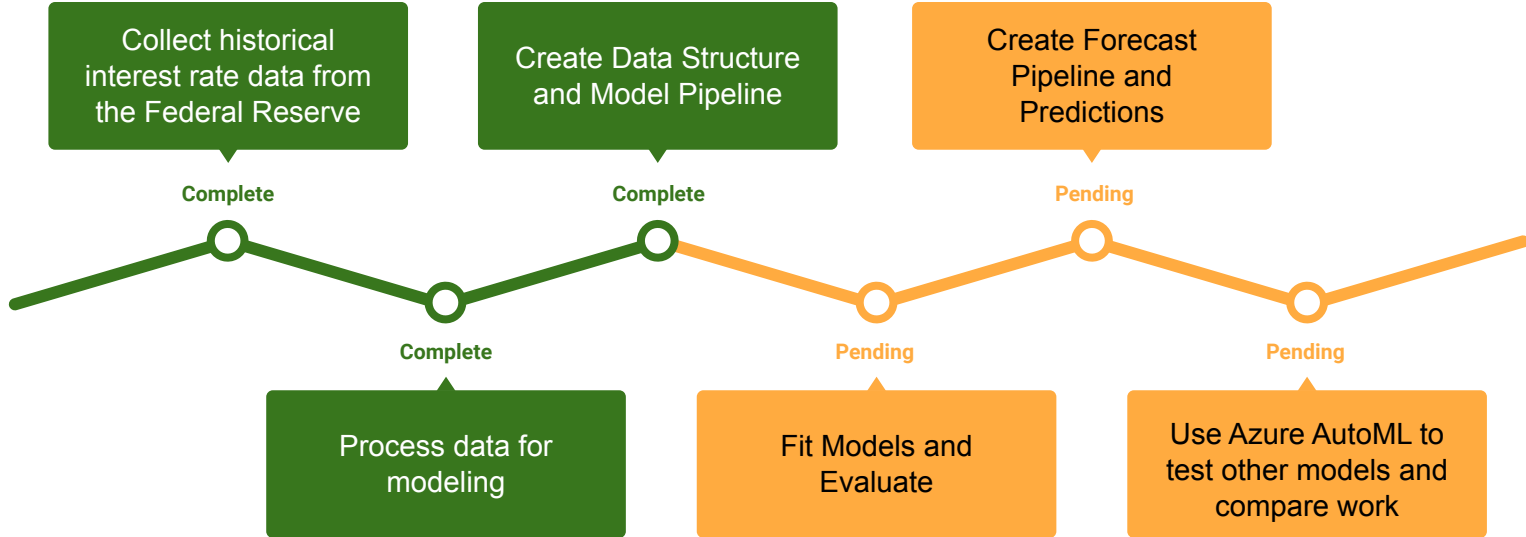
For specified forward prediction ranges (1 day, 1 month, 1 year, 1 decade):

1. What is the optimal lookback range to predict interest rate movements from previous data?
2. How do the predictions from the forward prediction ranges vary?

Secondary effort:

1. Does the inclusion of secondary data streams make interest rate prediction better?

Team 2 | Modeling Approach



Team 2 | Current Status of Technical Project

- Acquire maximum range of interest rate data from Federal Reserve and compile into a useful format. **Complete**
- To facilitate rapid experimentation, the team prioritized constructing and proofing a pipeline to build the dataset and train an MLP Regressor based on parameters (look back, look forward, hidden layer sizes). **Complete**
- Next step is begin experimentation and identify optimal model parameters for each timeframe. **Pending**
- Once models are trained, we will construct a second function to generate (ideally) 10 years of predictions for interest rates to compare each model output. **Pending**
- We may explore cloud-based ML solutions (e.g. Azure AutoML) to augment the model searching space by using experiments to triangulate other approaches. **Pending**
- If able, we plan to integrate additional data into our prediction models, but this data will not be available for the future, so we would open a new experiment arm. **Hypothetical**

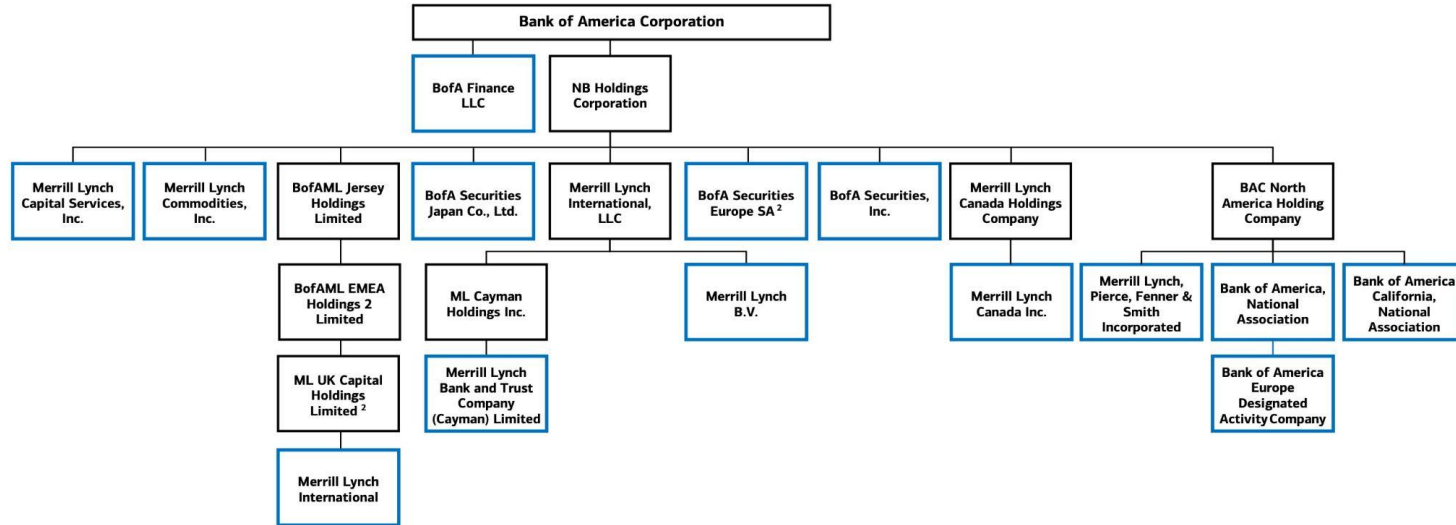
Nontechnical Project:





Team 2 | Research Questions and Data Collection

1. How is their corporate management structure constructed?
2. What are the main functions of each subdivision of the bank?
3. What does their balance sheet contain, and what are the risks they assume?
 - a. What is their VAR and how is that number calculated?
 - b. What do they stand to make or lose dependent on certain movers (i.e. S&P, Interest Rates)
4. Which skills and competencies are desirable, specifically what business functions require data science or quantitative skill sets?

Team 2 | Bank of America Corporate Structure



 Select client-facing or issuing subsidiaries
 Holding companies and other subsidiaries



¹ This chart includes only select client-facing or issuing subsidiaries and associated significant holding companies of Bank of America Corporation. Not all subsidiaries of Bank of America are represented.

² Reflects a majority-owned subsidiary.

Team 2 | Risk Assessment

Balance sheet data (as of Dec 31 2022):

<https://www.wsj.com/market-data/quotes/BAC/financials/annual/balance-sheet>

Basic types of risk:

- credit, operational, market, and liquidity risks
- Intend to look deeper at Bank of America's specific market risks

Risk Assessment paper

Yang, L. (2023). Risk Assessment on Bank of America. *Highlights in Business, Economics and Management*, 15, 105–110. <https://doi.org/10.54097/hbem.v15i.9324>

Team 2 | Roles and Responsibilities

Data Technology Analyst

- Enterprise Independent Testing (EIT)- Controls Team
- Conduct **testing assessment, inspection and observation** focused on data movement, data quality and data governance controls
- Review enterprise entity, application, and IT controls to complete year end testing cycles
- **Communicate with stakeholders** for introductions, test status updates, end to end execution along with audit & regulatory efforts

Quantitative Finance Analyst

- Global Risk Management/ Technology
- Develop market **risk models** (model development, submission, production roll-out)
- Perform **statistical analysis** on market historical data and model parameters
- Conduct **analysis and verification** on market data, risk metrics and P&L time series
- Develop and support **benchmarking and backtesting**

Team 2 | Skills and Competencies

Data Technology Analyst

- SQL/PL, Unix Scripting
- Strong Office Product Skills
- Direct controls testing experience, specifically having tested Data Controls, within processes, systems and regulatory reports
- Excellent communication, interpersonal and presentation skills

- Master's degree or PhD in Mathematics, Statistics, Data Science or related field)
- Broad financial product knowledge

Quantitative Finance Analyst

- Proven programming skills (Python, C++, SQL) to write reusable and testable code to develop tools
- Knowledge of **risk or pricing models** for fixed income or commodity products
- Understanding of regulatory capital and **risk management framework**

Team 2 | **Current Status of Non-technical Project**

- Acquire balance sheet data and income data from Bank of America. **Complete**
- Research and identify corporate structure. **Complete**
- Find roles and responsibilities related to job interests of group. **Complete**
- Decide on Non-technical report structure. **Complete**
- Next step is dividing the report based on each member's interest and starting report. **Pending**

Team 2 | **Future Work and Member Roles**

Andrew	<ul style="list-style-type: none">- Pipeline and forecast construction- 10-Year Rate Forecast Modeling- Potential roles and opportunities
Adler	<ul style="list-style-type: none">- 1-Year Rate Forecast Modeling- Balance Sheet and Risk Analysis- Potential roles and opportunities
Katherine	<ul style="list-style-type: none">- 1-Month Rate Forecast Modeling- Skills and Competencies- Potential roles and opportunities
Jeremy	<ul style="list-style-type: none">- Pipeline and forecast construction- 1-Day Forecast Modeling- Potential roles and opportunities