

FINAL PROJECT REPORT

LOYOLA UNIVERSITY MASTERS IN BUSINESS DATA ANALYTICS
FINAL PROJECT REVIEW TO DELOITTE

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ESG V PERFORMANCE

CONTENT TODAY

- Research Objectives
- Data Outline
- KPIs and EDA
- Models Review
- Findings

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ESG V PERFORMANCE

WELCOME TO OUR FINAL PROJECT REVIEW

Research Objectives

1. Predict financial performance and volatility based on ESG ratings
2. Determine importance of different granularities of ESG on performance
3. Explore correlations of ESG variables and financial outcomes



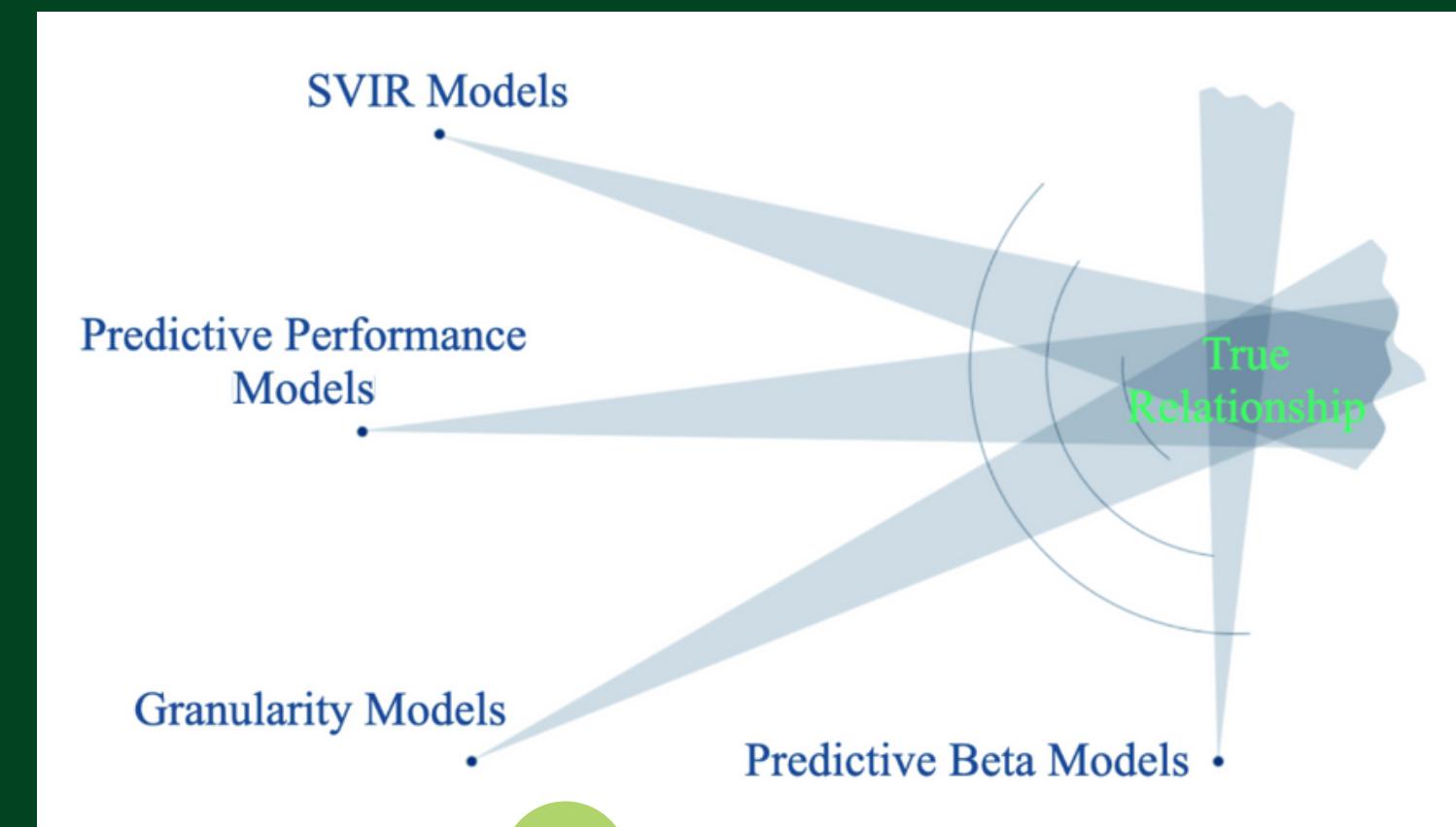
THESIS

There exists no relationship between current available ESG metrics and the financial performance of banks in the United States. With a goal as complex as understanding the multifold impact of ESG rankings on the banking industry, we knew that no one single method would be able to describe that relationship so without being misleading at best, and outright false at worst. With this in mind, we opted for a triangulation approach, where we would tackle the same question from a variety of different angles, hoping to arrive at a common true relationship.

For our study we employed four different methodological approaches, each making use of multiple model variations to further dissect the question at hand. The four methods are the following:

- Predictive Performance Models
- Predictive Beta Model
- Single Variable Input Regression (SVIR) Models
- Granularity Models

Each of the models devised in the study invites further analysis into their specific conclusions, yet taken as a totality they provide no unifying theory for ESG metrics. The lack of an observable effect is only valid for the US banking industry and conclusions should not be extrapolated to other industries.



ASSUMPTIONS & LIMITATIONS

Items to Note Going Forward

- Numerous research studies on this correlation
 - Little success has been found
- Subjective data feed
 - New exposure/maintenance on scoring
- Short historical timeline for modeling





ESG V PERFORMANCE

DATA PREPARATION

Cleaning

We exported data from Refinitiv Eikon and ensured that the data is cleaned and in the optimal format for modeling.

Validation & Model Selection

We split our data into training and testing datasets to determine how well our models performed on 'unseen' data. From there, we used various criteria to determine which models are the most accurate and predict future values of our target variables.

Data

Master dataset



Time Span

- 10 years (2012 - 2021)
- Challenge: missing data at higher rate for earlier years
- NYU insights have concluded that stronger correlation is found in a longer timeframe

Data Cleaning

- Bank Deletion if missing data >70%
 - No Imputations
- Column Deletion if Metric > 30% null
- Final Dataset = 1446 data points



DATA ANALYSIS

KPI SELECTION

Performance:

Annualized Stock Return

Volatility:

Annualized Volatility

Data Description

Name of variable	Description
ROE	Net income divided by shareholders' equity
ROA	Net income divided by total assets
Beta	Market beta of banks collected from Refinitiv database
P/B	Market price per share divided by book price per share
ESG Score	ESG performance score of Refinitiv (0-100) includes 34 environmental, 46 social, and 56 governance indicators
Stock Price Return	Change in stock price over one year
Volatility	Measure of stock's deviations from its average



Data Description Cont.

Log Transformations

Name of variable	Description
Log of Market Cap	Natural log of the market price per share divided by book price per share
Log of Price to Book	Natural log of market price per share divided by book price per share



ESG V PERFORMANCE

EXPLORATORY DATA VISUALIZATION

ESG
PILLAR DISTRIBUTIONS

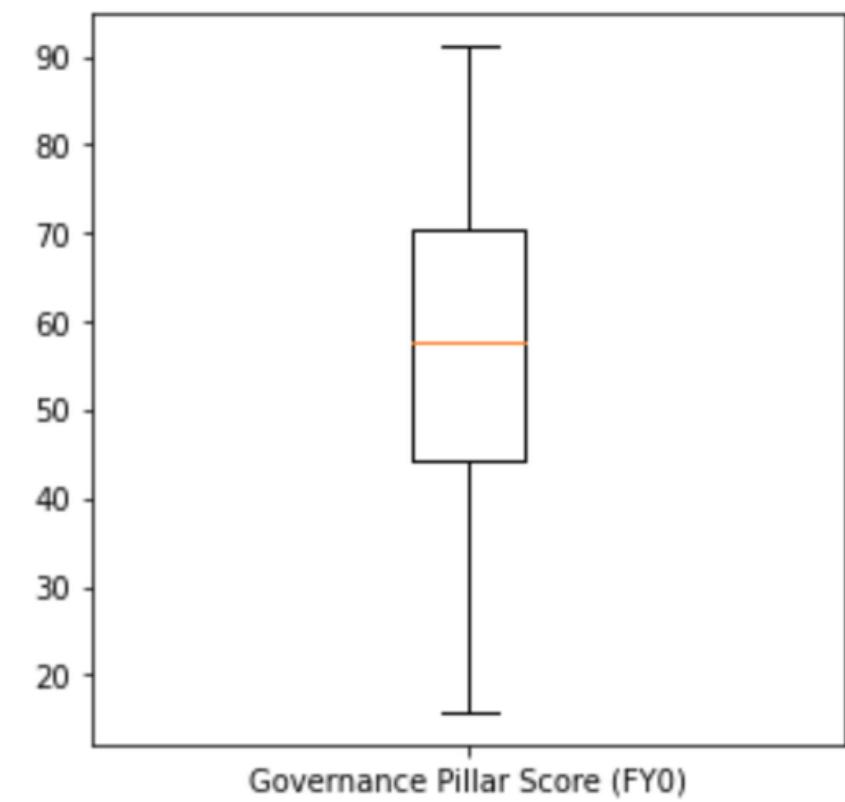
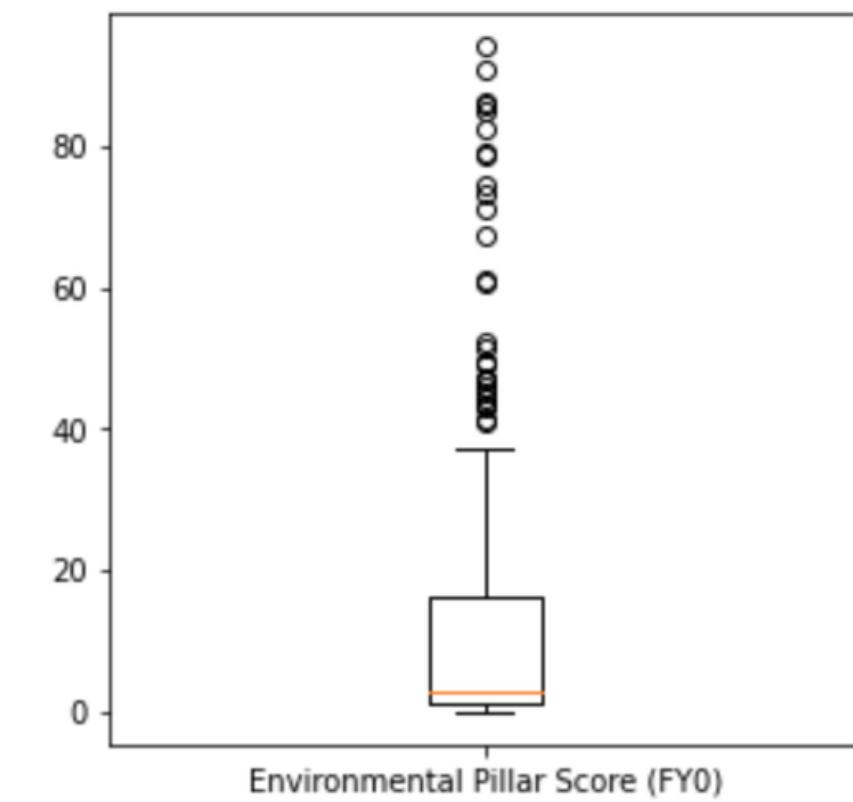
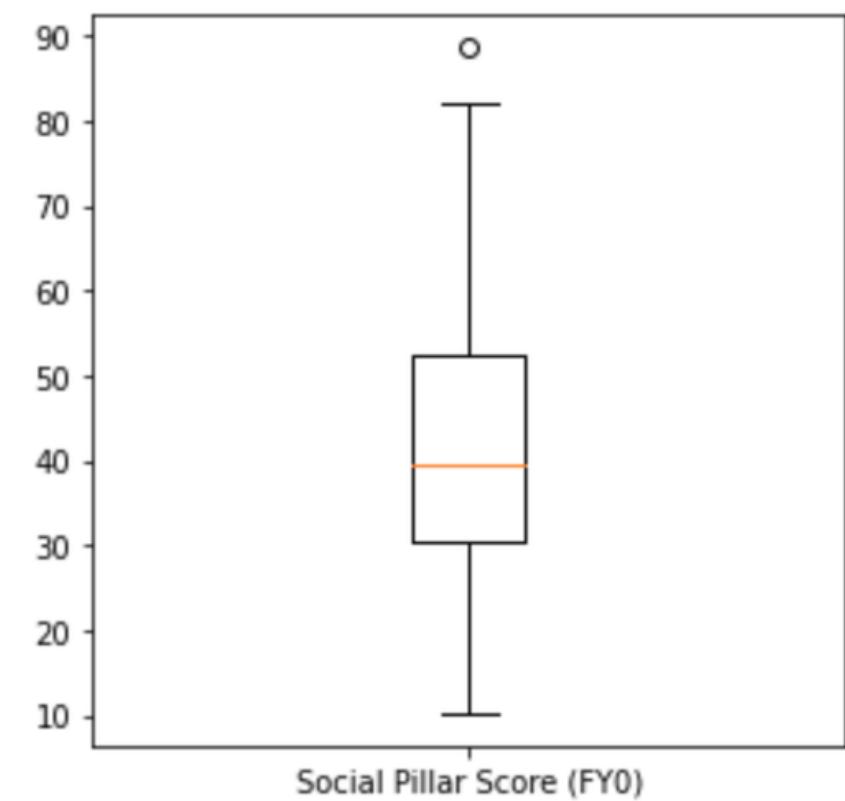
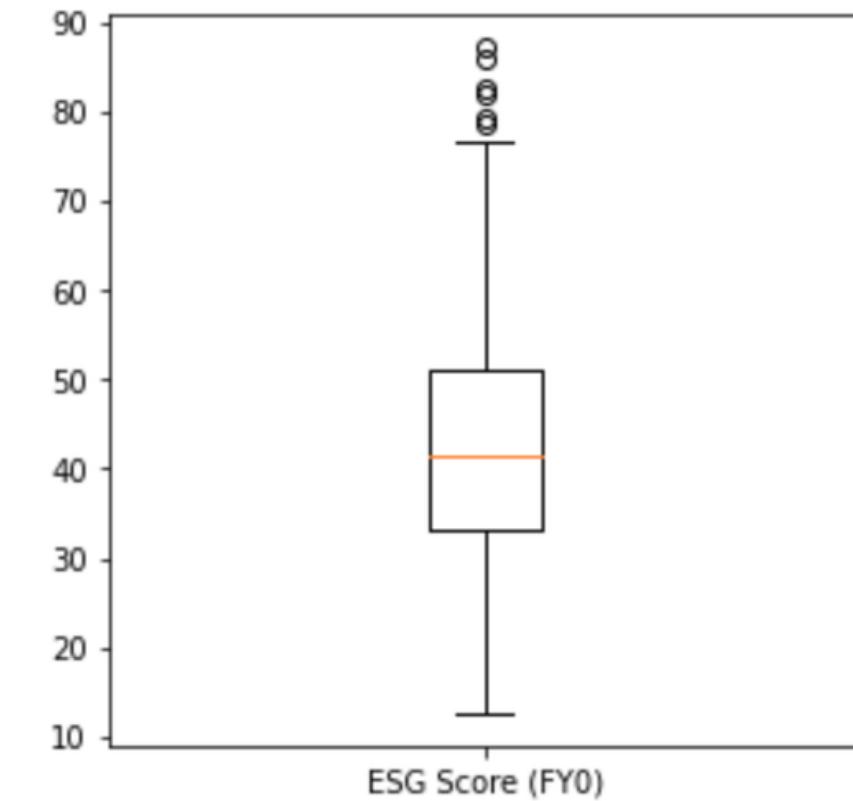
ESG HISTORICAL TRENDS

ESG COMPONENT
CORRELATIONS

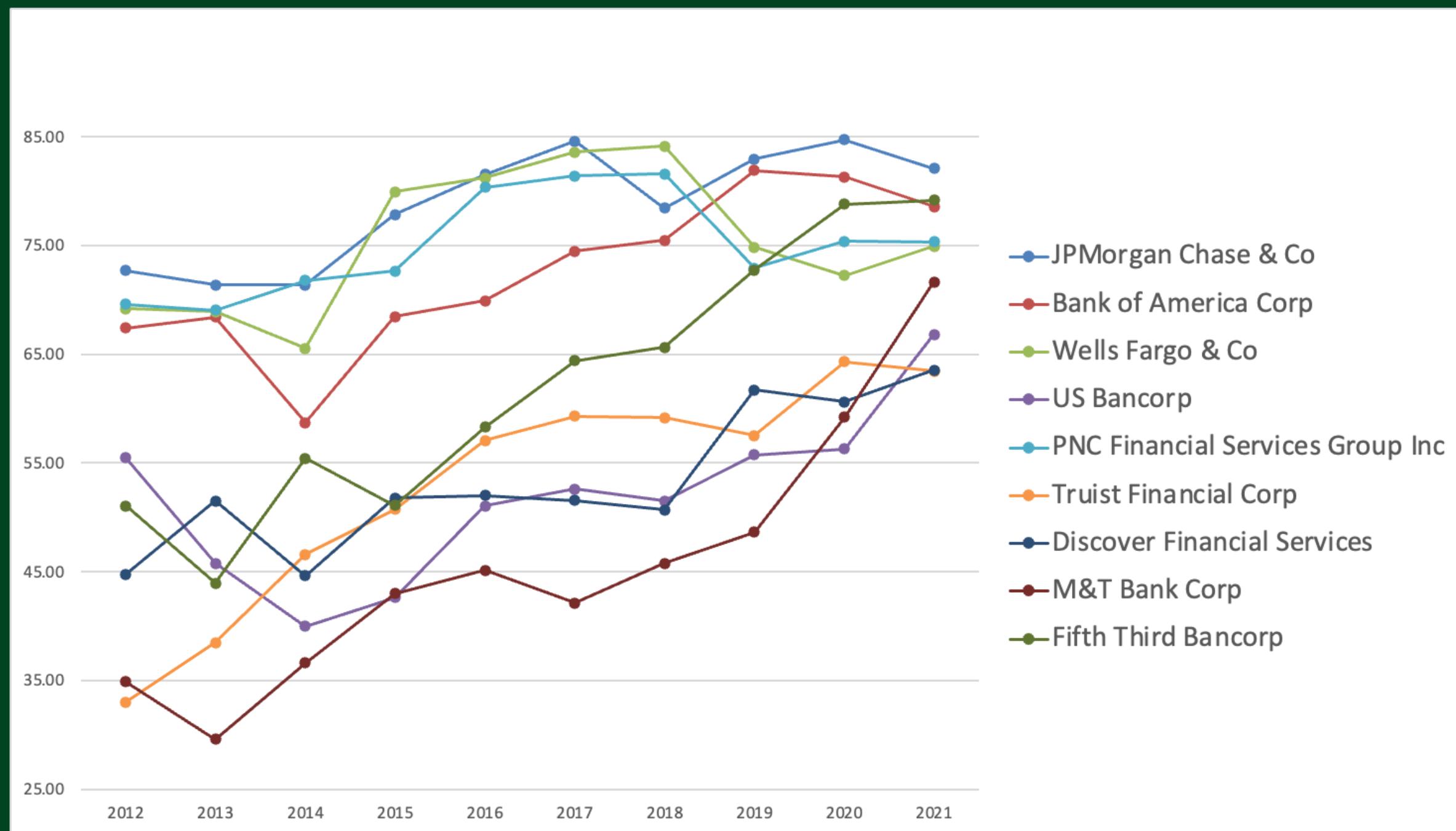
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Distribution of Overall ESG & Individual Pillars



10 year history of ESG scores for top 10 U.S. banks*



*excluding Controversy score

ESG

Correlational

Heatmap

All Banks





PROJECT CHALLENGES



Capture Relationship Between Financial Performance & ESG Scores

- Predict effects of ESG score
- Identify important ESG metrics



Create Value Through Gained Perspective of ESG Impacts

FINAL MODELS

Multiple Approach:

