

SPRINGBOARD—DSC PROGRAM CAPSTONE PROJECT 2

THE FINANCIAL PERFORMANCE OF THE ESG FUNDS

FINAL
PRESENTATION
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PROBLEM

- Growing interest in ESG (environmental, social, and governance) funds.
- The stakeholders, investing individuals or financial institutions, will be interested in knowing whether sustainability investments are profitable.
- Predictions of future financial returns of individual funds.



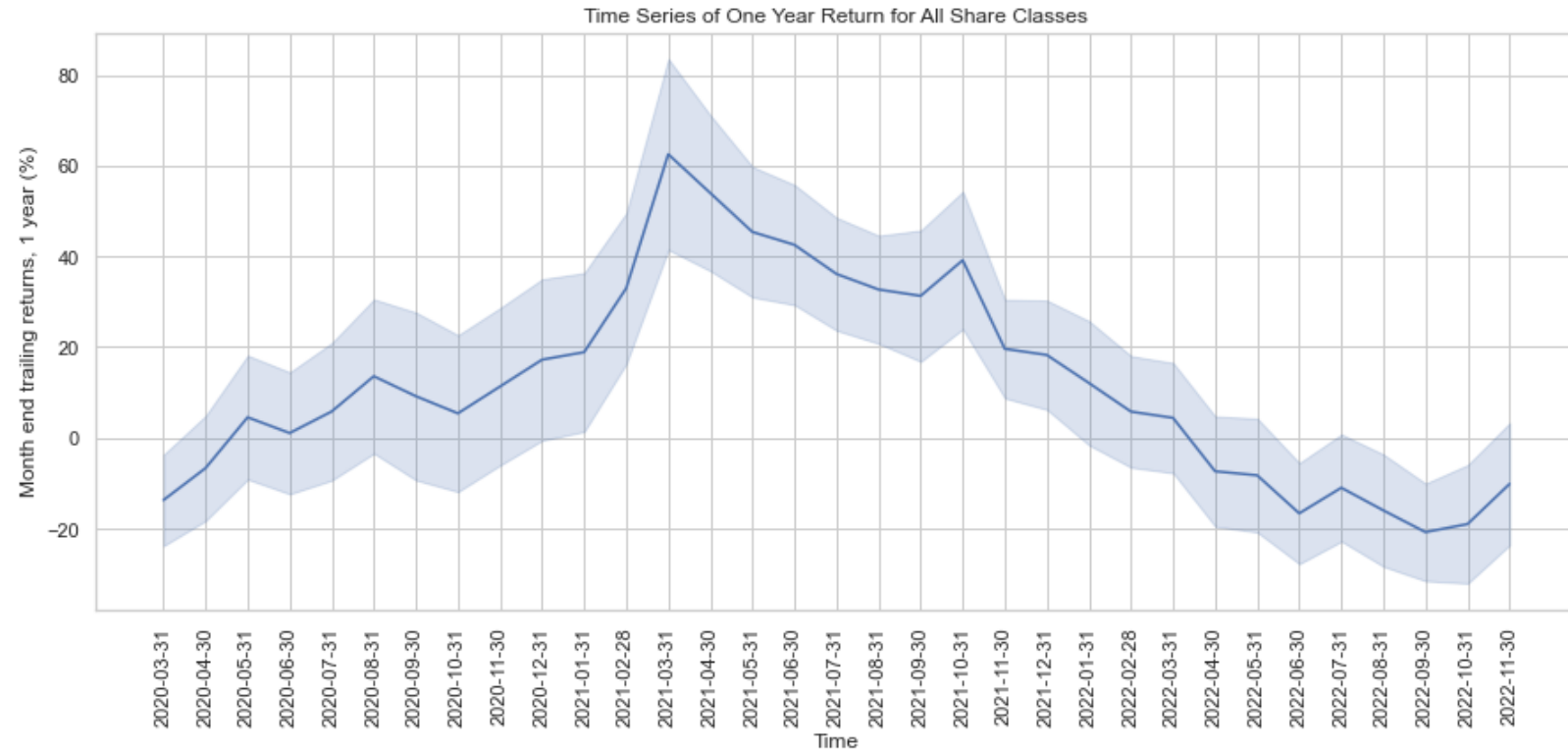
DATA

- Acquired datasets from the [Fossil Free Funds website](#)
- Financial data on equities and mutual funds sourced from Morningstar with ESG attributes
- Dated monthly from March 2020 to the present, with information on returns updated until November 2022
- Include 3000 funds with over 8,000 share classes for each month and only screen mutual funds with at least 50% invested in stock investments

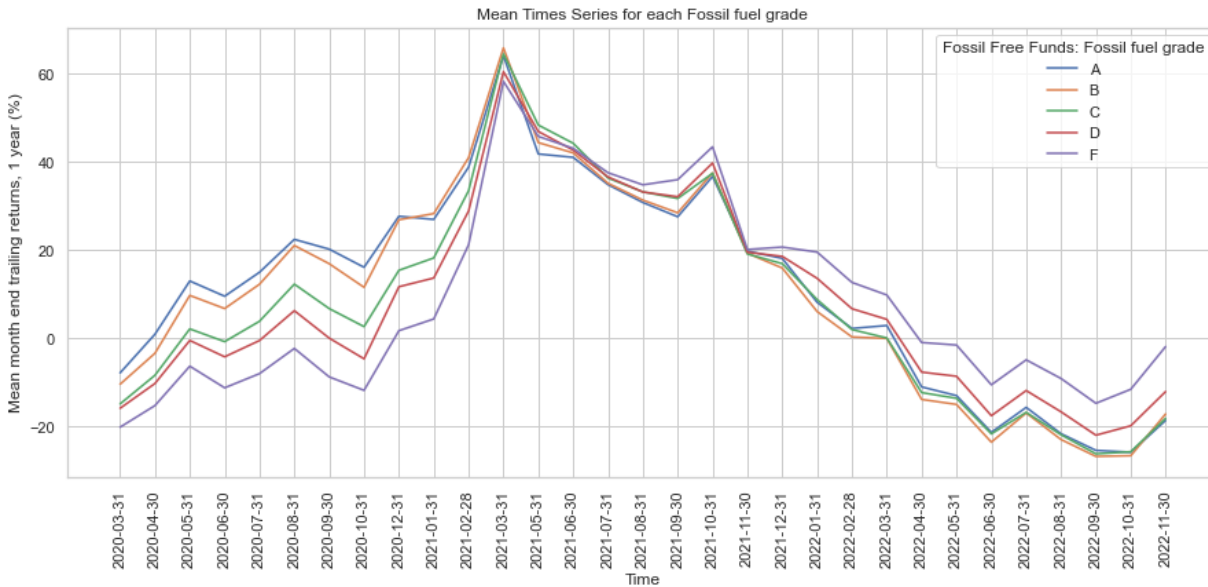


METHODS

1. Target and features
2. Exploratory analysis
3. Data preprocessing
4. Models
 - ARIMA models
 - Random Forest models
5. Model application
6. Model comparison



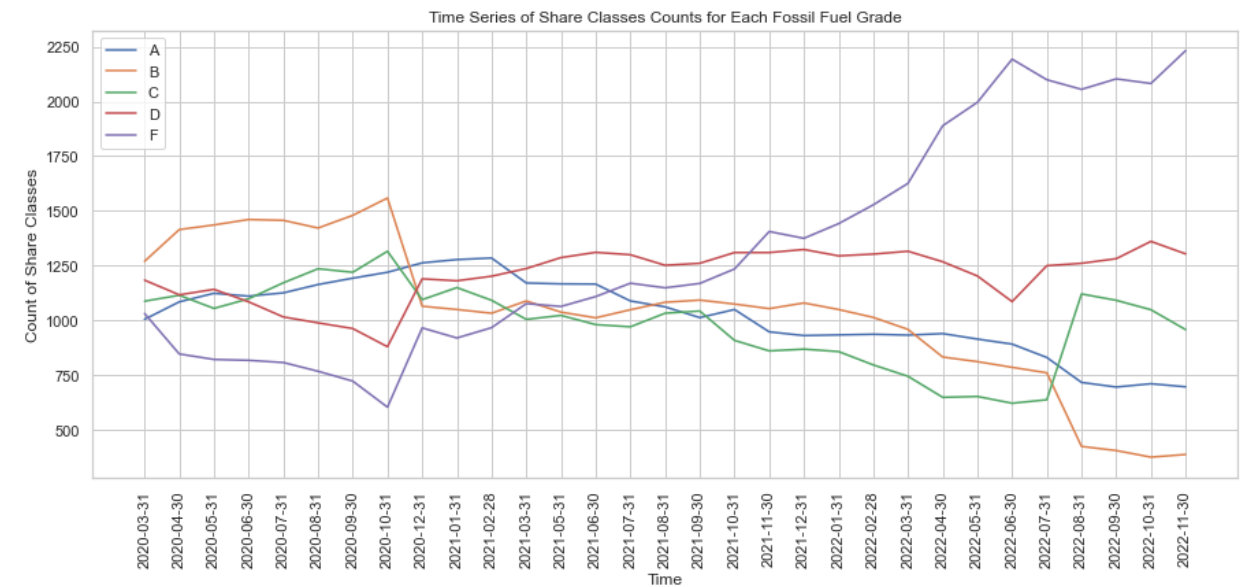
FOSSIL FUEL FEATURES



Tipping point in March 2021

Before, fossil fuel-free funds performed better

After, fossil fuel-rich funds performed better.



Since January 2021,

the number of the most fossil-rich funds increased,

the number of the clean funds generally decreased.

MODEL PERFORMANCE COMPARISON

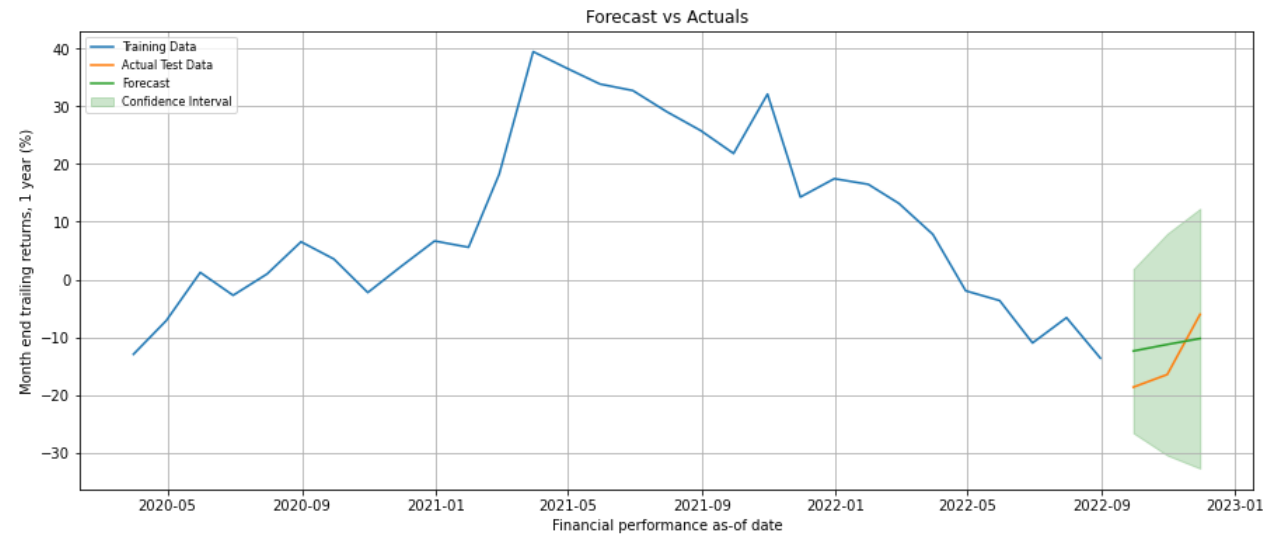


- Randomly selected 10 time series from thousands of fund share classes in the dataset
- Compare the performance in predicting each of the time series using **ARIMA models** and **Random Forest models**.
- The **ARIMA models outperform** the Random Forest models in terms of MAPE in 8 out of these 10 cases

| Fund Share Class Name | ARIMA MAPE | Random Forest MAPE | ARIMA MAPE - Random Forest MAPE |
|---------------------------------------|---------------|-----------------------|------------------------------------|
| American Century Equity Income Inv | 65.51 | 84.95 | -19.44 |
| BlackRock Global Dividend Inv A | 44.88 | 94.07 | -49.19 |
| Brown Advisory Sustainable Growth Adv | 23.31 | 55.26 | -31.95 |
| Columbia Emerging Markets Adv | 15.04 | 26.06 | -11.01 |
| Fidelity Growth & Income K | 82.9 | 80.18 | 2.72 |
| First Eagle Global I | 253.78 | 173.3 | 80.48 |
| Franklin Utilities Adv | 119.06 | 176.97 | -57.91 |
| SEI Tax-Managed Large Cap F (SIMT) | 52.25 | 68.49 | -16.24 |
| Vanguard Value Index I | 107.69 | 312.11 | -204.42 |
| iShares Russell Top 200 ETF | 26.5 | 57.1 | -30.6 |

FINAL MODEL

- Selected the **ARIMA model** as our final model for the prediction task.
- Displayed one example of comparing the forecast value to the actual value in the test set for **BlackRock Global Dividend Inv A**.
- The ARIMA model successfully captured the upward trend in the forecast horizon, though with a smaller variation.





CONCLUSION AND DISCUSSION

CONCLUSION

- ARIMA models outperforms Random forest models
- Time dependencies are crucial to the data

HOW TO USE

The stakeholders can use the function we built around the ARIMA model to forecast the future returns for any funds in the dataset and use it as a reference.

FUTURE WORK

- Improve Random forest models
- Different regression models
- AutoML
- Rank funds by future return forecasts
- Observability

LIMITATION

Return variables in the dataset lastly updated to November 2022, need to acquire longer and more recent data.

THANK YOU

