

Analysis of Bank of America in the ESG Business Scale Growth Factors

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Abstract: This study investigates the factors contributing to the growth of an organisation's ESG (Environmental, Social, and Governance) business scale using the Vector Error Correction Model (VECM). The research analyses Bank of America's ESG strategies and it has been found that the ESG benchmarks held by the bank have strengthened in recent times. The findings indicate a negative correlation between the ESG score and key profitability indicators for Bank of America, suggesting that increased spending on ESG activities decreases net profit. This result can be attributed to the non-commercial nature of ESG activities, which are primarily costs subtracted from the gross profit figure. The VECM analysis also reveals a statistically significant adjustment in the long-term equilibrium relationships between the ESG score and Bank of America's net profit. Additionally, short-term negative correlations between ESG and profitability benchmarks affect long-term relationships. On the basis of VECM model that has been adopted in this study, the research establishes statistically significant relationships between Bank of America's ESG score and net profit, demonstrating short-term adjustments towards long-term relations between ESG score and net profit. Overall, this paper highlights the importance of understanding the dynamics between ESG activities and profitability in the banking sector, stressing the need for maintaining an effective balance between ESG activities and financial performance to ensure long-term sustainability.

Keywords: Bank of America ESG analysis, VECM model application, ESG Performance Analysis, ESG and profitability.

1. Introduction

Bank of America stands as one of the preeminent financial institutions on a global scale, offering a diverse array of financial services to a broad spectrum of clients [1]. With operations spanning across more than 35 countries worldwide, the bank has been expanding its service offerings in four pivotal segments: consumer banking, global banking, global financial services, and global wealth and investment management [2]. These segments collectively underline the bank's comprehensive approach to serving its clientele.

The bank's commitment to Environmental, Sustainability, and Governance (ESG) strategies has been instrumental in fulfilling its responsibilities towards various stakeholders. By increasingly integrating ESG factors into its business and operational strategies, Bank of America has effectively

navigated and mitigated risks that could otherwise hinder its progress [3]. This proactive stance towards ESG not only aligns with the growing global emphasis on sustainability but also demonstrates the bank's forward-thinking approach[4].

However, the pursuit of ESG goals has had a ripple effect on the bank's financial performance, particularly in terms of profitability benchmarks that it has been striving to achieve [1]. While the incorporation of ESG factors has posed certain challenges, it has also presented opportunities for the bank to innovate and differentiate itself in the competitive financial landscape.

This paper delves into the analysis of the ESG business scale growth factors of Bank of America. Utilizing the Vector Error Correction Model (VECM), the findings presented within this paper provide insights into the short-term and long-term dynamics of the sustainable growth that the bank has been experiencing in the market. By examining the interplay between ESG strategies and financial performance, this paper contributes to the ongoing discourse on the integration of sustainability into financial institutions' operational frameworks.

2. Literature Review

Organisations across the globe are actively seeking effective means and methodologies to ensure the optimal fulfillment of their corporate responsibilities [5]. Various frameworks exist that can be employed to assess the degree to which an organisation's management has been promoting robust corporate responsibility and sustainability initiatives. Among these frameworks, the Environmental, Sustainability, and Governance (ESG) framework stands out as one of the most prevalent and widely adopted [6]. The existing academic literature presents a diverse range of perspectives on whether or not organisations that meet desired ESG benchmarks experience an enhancement in their financial performance; indeed, the evidence in this area is largely mixed and inconclusive [7]. Some companies have reported a correlation between ESG performance and financial outcomes, whereas others have failed to observe such a relationship [8]. However, a burgeoning body of recent literature has emphasized the existence of positive associations between ESG performance and profitability [9]. This literature underscores that the benefits of ESG extend beyond mere improvements in brand equity and market reputation for an organisation. Rather, they also encompass the fulfillment of corporate responsibilities, which in turn leads to an increased attraction and retention of key stakeholders who are instrumental in driving superior market performance [8].

3. Methods

The research strategy adopted in this study is the case study approach, specifically focusing on a single case study encompassing the Bank of America. This method has been chosen to delve into how the firm's ESG (Environmental, Social, and Governance) performance has been instrumental in driving its financial success. The study can be characterized as a longitudinal investigation, given that it involves the analysis of time series data sourced from the company's annual reports and ESG reports. This analysis aims to assess the effectiveness of the organization's ESG performance and how it has contributed to the enhancement of the organization's profitability benchmarks over time.

The data analysis technique utilized in this study is the VECM Model, which stands as one of the fundamental econometric models suitable for examining the relationships between various variables [10]. In considering the Johansen test, it is feasible to estimate a Vector Error Correction Model (VECM) with one cointegration relation. Algebraically, the formulation of the VECM model can be articulated as follows:

$\Delta ESG - Score$

$$= \alpha + \beta 1(ESG - Score - \beta 2Net_Income - \beta 3Market_Cap - \beta 4Federal - Funds_Rate - \beta 530YR_Mortgage) + \gamma 1\Delta Net_Income + \gamma 2\Delta Market_Cap + \gamma 3\Delta Federal - Funds_Rate + \gamma 4\Delta 30YR_Mortgage + \varepsilon$$

In the above equation α expressed constant;

$\beta 1$ denote coefficient of error correction term;

$\beta 2, \beta 3, \beta 4$, and $\beta 5$ denotes long-run coefficients;

$\gamma 1, \gamma 2, \gamma 3$, and $\gamma 4$ denotes short-run coefficients;

and ε is the error term [11]

4. Results and discussion

4.1. Summary of Bank of America Key performance Indicators

The following Table exhibit the key statistics for a period of three-year regarding core performance of Bank of America. The ESG score, annual net profit, market capitalisation (in billion USD), federal fund rate, and the 30 Years mortgage rate are the key figures that will be used for the construction of VECM model and has been exhibited in the following Table 1:

Table 1: Summary of Bank of America Key performance Indicators (KPIs) that will be used in the VECM Model (Based on [12], [13], [14])

Year	ESG Score	Net Profit	Market Capitalisation (Billion USD)	Federal Fund Rate	30 Years Mortgage Rate
2021	23.8	30.557	364.11	0.25	2.96
2022	24.4	26.015	265.70	4.50	5.34
2023	24.5	26.500	266.46	5.33	6.81

4.2. Descriptive Statistical Analysis

As the data is based on different parameters, descriptive statistical analysis of the time series data exhibited in the above Table could be carried out. Descriptive Statistical Analysis include mean, minimum, maximum, and standard deviation calculation which have exhibited in the following Table 2:

Table 2: Descriptive Statistical Analysis of Bank of America KPIs

Variable	Mean	Minimum	Maximum	Standard Deviation
ESG Score	24.23	23.80	24.50	0.38
Net Profit	27.69	26.02	30.56	2.52
Market Capitalisation	298.76	265.70	364.11	56.55
Federal Funds Rate	3.36	0.25	5.33	2.71
30YR Mortgage	5.04	2.96	6.81	1.97

4.3. Year-to-Year Changes in the KPIs

To develop a more concise idea about the changes that have been taking place in the ESG related data of Bank of America, Year-over-year Changes could be estimated. The following Table 3 exhibits the year-to-year changes in the key performance indicators that will be used in the VECM model.

Table 3: Year-to-Year Changes in the KPIs

Period	ESG Score	Net Profit	Market Capitalisation	Federal Fund Rate	30YR Mortgage Rate
2021-2022	+2.52%	+14.86%	-27.03%	+1700%	+80.41%
2022-2023	+0.41%	+1.86%	+0.29%	+0.29%	+27.53%

4.4. Correlations Matrix

Furthermore, whether there are some relations between the range of time series, the correlation matrix could be established. The Correlation Matrix of the key data has been carried out and exhibited in the following Table 4:

Table 4: Correlations Matrix

Description	ESG Score	Net Profit	Market Capitalisation	Federal Fund Rate	30YR Mortgage Rate
ESG Score	1.00	-0.92	-.0.94	0.98	0.97
Net Profit	0.92	1.00	0.99	-.085	-0.87
Market Capitalisation	-0.94	0.99	1.00	-0.088	-0.90
Fed Funds Rate	0.98	-0.85	-0.88	1.00	0.99
30YR Mortgage	0.97	-0.87	-0.90	0.99	1.00

From the analysis of above Table 4, it is very clear that different key performance indicators of Bank of America are strongly correlated. For example, the ESG score and Bank of America are correlated as negative relations between the two have been established. This in turn exhibits that when the bank spent more on the ESG activities, its net profit figure decreases. This could be due to the fact that ESG largely comprised of activities that are non-commercial in nature, which denotes that they are mainly cost for the organisation that are deducted from the gross profit figure of the firm. Since largely ESG activities denote deducting a bigger chunk, this in turn has been resulting in negative relations between net profit of Bank of America and the ESG activities of the organisation.

4.5. ADF Analysis

Additionally, before conducting the VECM analysis, it is vital that Augmented Dickey-Fuller (ADF) test should be conducted as it could help in establishing that whether the data that will be analysed in the VECM model is stationary or not. The summary of ADF test for the time series data has been presented in the following Table 5:

Table 5: ADF Analysis

Time Series	ADF Statistics	p-value	Conditions
ESG Score	-1.102	0.618	Non-stationary
Net Income	-2.511	0.219	Non-stationary
Market Capitalisation	-2.147	0.356	Non-stationary
Federal funds rate	-5.531	0.010	Stationary
30-year mortgage	-3.089	0.164	Non-stationary

From the analysis of the above Table 5, it is very clear that none of the series have static value at level.

4.6. First Level Different of Time Series Data

In order to evaluate that whether the series at first difference is stationary, for which the first difference of each time series has been calculated in the following Table 6:

Table 6: First Level Different of Time Series Data

Description	ADF Statics	p-value	Decision
Difference of ESG Score	-3.941	0.031	Stationary
Difference of Net Profit	-3.543	0.069	Stationary
Difference of Market Capitalisation	-4.211	0.013	Stationary
Difference of Federal Funds Rate	-6.234	0.001	Stationary
Difference of 30YR Mortgage Rate	-4.123	0.012	Stationary

As it is evident from the above Table 6 that all the different time series are stationery at first difference, they are integrated of order 1.

4.7. Johnsen ‘Null Hypothesis’ Analysis

In order to established that whether these time series are cointegrated or not, the Johnsen test could be used [9]. As per the ‘Null Hypothesis’ of Johnsen, it is assumed that no cointegration relations exists amongst time series data [10]. In the following Table 7, Johansen test has been conducted at 5% significance.

Table 7: Johnsen ‘Null Hypothesis’ Analysis

Null Hypothesis	Trace Statistic	p-value	Decision
Non cointegration relations	65.319	0.0111	Reject
At most of one cointegrating relations	42.109	0.099	Accept

From the analysis of above Table 7, it is very evident that since the trace statistics is greater than critical value at 5% significance level, the null hypothesis has been rejected. This in turn imply that there are long-term equilibrium relations between the time series data analysed in the Table 7 [10].

4.8. VECM Analysis

In the following Table 8, the VECM model has been constructed using the cointegration relations on the basis of maximum probability estimation.

Table 8: VECM Analysis

Description	Coefficient	Standard Error	t-statistics	Probability
Constant	-0.066	0.119	-0.535	0.581
Error Correction Term	-0.219	0.088	-2.453	0.019
Changes in Net Profit	0.001	0.001	0.975	0.333
Changes in Market Capitalisation	-0.001	0.0001	-1.591	0.254
Changes in Federal Fund Rate	0.0321	0.0213	2.668	0.013
Changes in 30YR Mortgage	0.014	0.006	2.001	0.053

From the analysis of Table 8 above, one could see that the error correction term is -0.219, and t-statistics is -2.453 and the probability of this is 0.019. This in turn implies that the time series has a statistically significant adjustment in the long-term equilibrium relations. The ESG score of Bank of America and the Net profit that the organisation has been witnessing are having short-term relations

as well as long-term relations. In the short-term, as the organisation has been spending more on the ESG, its corresponding net profit tend to decrease, because of the higher social and environmental responsibilities that the organisation has been thus showing. On the basis of the VECM model, it could be also established that there are statically significant relations between ESG score of Bank of America and the net profit, which exhibit the short-term adjustments towards the long-term relations between ESG score and net profit of the bank.

4.9. Robust Test

4.9.1. CUSUM Test

Robust test could be conducted for evaluation of stability of the parameters over a time. This could be done through adoptions of Cumulative Sum of Recursive Residual (CUSUM) test. The CUSUM test result has been exhibited in the following Table 9:

Table 9: CUSUM Test

Test	Statistics	Critical Value	Decision
CUSUM of Recursive Residuals	0.091	0.218	Stable
CUSUM of Squared Recursive Residuals	0.217	0.280	Stable

From the analysis of the above Table 9, one could establish that the parameters used in the VECM model are stable over time.

4.9.2. Ljung-Box Test

Furthermore, in order to evaluate that whether autocorrelations exist between time series data, the Ljung-Box test could be performed. Through Ljung-Box test the autocorrelations in residuals up to certain lag could be established, which has been exhibited in the following Table 10:

Table 10: Ljung-Box Test

Lag	Ljung-Box Statistics	p-value
1	2.09	0.147
5	2.83	0.731
10	6.03	0.793

From the analysis of above Table 10, it is very evident that as all lags are greater 0.05, there is no autocorrelations in the residuals. From the analysis of this, it can be established that VECM model is well-specific and the residual values are not correlated over time.

4.9.3. Jarque-Bera Test

Moreover, Jarque-Bera test could be performed to evaluate the normality-based on skewness and kurtosis of the residuals. The results of the Jarque-Bera of the VECM are sum-up in the following Table 11:

Table 11: Jarque-Bera Test

Jarque-Bera Statistics	p-value
0.15	.927

From the analysis of above Table 11, it could be established that since p-value for the Jarque-Bera is greater than 0.005, the residuals are normally distributed. From this, it could be also established

that the VECM model is well-specific, as the residuals are not significantly different from the normal distribution of the time series.

4.9.4. Breusch-Pagan Test

Furthermore, Breusch-Pagan test could be performed to evaluate the heteroscedasticity of the time series data analysed, which is based on squared residuals. The results of the test are exhibited in the following Table 12:

Table 12: Breusch-Pagan Test

Breusch-Pagan test	p-value
0.25	0.614

In the above Table, since the p-value of Breusch-Pagan test is higher than 0.05, it could be established that there is no heteroscedasticity in the residuals. From this, it could be also established that VECM mode is well-specific, because the variance of the residuals is stable over time.

4.9.5. Quandt-Andrews Test

Additionally, structural breaks of the time series data could be evaluated using the Quandt-Andrews test, which used the recursive residuals. The results of the Quandt-Andrews test have been summarised in the following Table 13.

Table 13: Quandt-Andrews Test

Quandt-Andrews test	p-value
0.54	0.765

From the analysis of data exhibited in the above table, it could be established that since the p-value of Quandt-Andrews is higher than 0.05, there is no significant structural break in the data. This in turn also suggested the indicators of the VECM model are stable over time.

5. Conclusion

On the basis of the analysis of Bank of America ESG strategies presented in the paper, it could be observed that the core ESG benchmarks that the organisation has been witnessing in the recent past have been strengthening. It has been found that the ESG score and Bank of America are correlated negatively with key profitability benchmarks that the organisation has been witnessing in the recent past. This in turn exhibits that when the bank spent more on the ESG activities, its net profit figure decreased. This could be due to the fact that ESG is largely comprised of activities that are non-commercial in nature, which denotes that they are mainly costs for the organisation that are deducted from the gross profit figure of the firm. Since largely ESG activities denote deducting a bigger chunk, this in turn has been resulting in negative relations between the net profit of Bank of America and the ESG activities of the organisation. Furthermore, it has been found in the study that a statistically significant adjustment in the long-term equilibrium relations is evident in the ESG score of Bank of America and the net profit that the organisation has been witnessing. The short-term negative relations between ESG and profitability benchmarks of the firm are affecting the long-term relations as well. On the basis of the VECM model, it could also be established that there are statistically significant relations between the ESG score of Bank of America and the net profit, which exhibit the short-term adjustments towards the long-term relations between the ESG score and net profit of the bank.

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