

Pollution in the Sunshine State: A Quantitative Analysis of Air Quality in Orlando and Citigroup's Stock Performance

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This study examined the relationship between air pollution levels in Orlando, Florida, and the stock price of Citigroup (C) using data from the Environmental Protection Agency and LSEG Analytics (Refinitiv). A surprisingly strong correlation coefficient of 0.8393526 and a statistically significant p-value of less than 0.01 emerged from the analysis covering the period from 2002 to 2023. The findings suggest that the air quality in Orlando may have an impact on Citigroup's stock performance, demonstrating that even in the realm of finance, sometimes it's not just about the money, but about the air we breathe.

The old adage "money doesn't grow on trees" may need a slight update in light of the findings of this study. While it's true that money may not sprout from the branches of an oak tree, it seems that the air pollution in Orlando may have some influence on the stock price of Citigroup (C). This revelation serves as a reminder that the effects of environmental factors can permeate unexpected corners of the economy, much like the persistent odor of burnt toast in a shared office kitchen.

Despite the seemingly unrelated nature of air quality and stock prices, there is a rationale behind examining this relationship. Orlando, often associated with its enchanting theme parks and sunny weather, also harbors its fair share of air pollutants. Meanwhile, Citigroup, with its global financial presence, seems a world away from the Florida sunshine. Nevertheless, the data presented in this study suggests a surprising connection between the two.

As researchers, we often aim to unveil hidden patterns and uncover relationships that may lie beneath the surface. In this case, we set out to investigate the potential impact of air pollution in

Orlando on the stock performance of Citigroup. The motivation behind this inquiry stems from a desire to understand the broader implications of environmental factors on financial markets, and perhaps to add a breath of fresh air to the field of economic research.

LITERATURE REVIEW

The authors find that the relationship between air pollution levels in specific geographical regions and stock performance has been a subject of interest in academic research. Smith et al. (2015) explore the association between air quality in urban areas and its potential effects on the financial industry, shedding light on the interconnectedness of environmental and economic factors. Doe and Jones (2018) delve into the impact of air pollution on various sectors of the economy, including the stock market, paving the way for further investigation into this unanticipated linkage.

Expanding beyond the confines of traditional scholarly literature, the realm of non-fiction books offers valuable insights into the confluence of

environmental conditions and financial markets. "Emission Impossibility: The Economics of Air Pollution" by Greenberg (2017) provides a thorough analysis of the economic repercussions of air pollution, prompting reflection on the possible ramifications for stock prices. Similarly, "The Wall Street Guide to Weathering the Storm: Finance in the Face of Climate Change" by Bluefield (2019) underscores the importance of considering environmental factors in financial decision-making, offering a broader perspective on the relevance of air quality to stock performance.

Straying into the realm of fiction, but not entirely divorced from the current discourse, the works of Michael Pollution and J.K. Smog have enigmatic titles that seem to hint at the intriguing interplay between pollution and financial dynamics. While "Toxic Temptations: A Tale of Airborne Anomalies" by Michael Pollution (2018) and "The Smoggy Spells of Stock Market Sorcery" by J.K. Smog (2020) are undoubtedly works of imagination, their titles resonate with the unexpected relationship under scrutiny in this study.

Moreover, anecdotal evidence gleaned from social media platforms offers a glimpse into public perceptions of the potential link between air quality in Orlando and Citigroup's stock price. A tweet from @FinanceFanatic proclaims, "When the air in Orlando is hazy, Citigroup's stock gets crazy! #PollutionPuzzles" This tongue-in-cheek commentary, while not providing empirical evidence, mirrors the underlying curiosity surrounding this improbable correlation and the allure of uncovering unexpected connections in the financial world.

METHODOLOGY

Data Collection:

The data utilized in this study were primarily sourced from the Environmental Protection Agency and LSEG Analytics (Refinitiv), forming a comprehensive dataset spanning the years 2002 to 2023. The air quality measurements in Orlando,

Florida, including particulate matter, nitrogen dioxide, and ozone levels, were obtained from the Environmental Protection Agency's air quality monitoring stations. Concurrently, the daily closing stock prices of Citigroup (C) were extracted from LSEG Analytics (Refinitiv), offering a precise snapshot of the financial market performance over the specified time frame.

Exposure Assessment:

The assessment of air pollution levels in Orlando involved the harmonization of various pollutant data streams, integrating measurements from multiple monitoring stations across the city. This approach provided a nuanced understanding of the spatial distribution and temporal variability of air quality, capturing the fluctuating patterns of pollution exposure experienced by the populace. The fusion of these disparate datasets enabled a comprehensive characterization of the air pollution landscape in Orlando, offering insights into the dynamic interplay between environmental stressors and human activities.

Stock Price Analysis:

The quantitative analysis of Citigroup's stock price dynamics encompassed a multifaceted approach, leveraging time series econometric techniques to disentangle the intricate web of financial market fluctuations. By employing advanced statistical methods, including autoregressive integrated moving average (ARIMA) modeling and Granger causality tests, the research team scrutinized the underlying patterns of stock price behavior and identified potential determinants of variance. This rigorous analysis facilitated the elucidation of the temporal relationships between air pollution levels in Orlando and the corresponding changes in Citigroup's stock performance, unveiling the interwoven nature of environmental variables and financial outcomes.

Model Development:

To address the complex and interdependent nature of the data, a comprehensive model was

formulated using a structural equation modeling (SEM) framework, integrating the exogenous predictors of air pollution with the endogenous responses of stock price movements. This model allowed for the simultaneous examination of direct and indirect effects, capturing the intricate pathways through which air quality fluctuations in Orlando could exert influence on Citigroup's stock price dynamics. Moreover, the adoption of a Bayesian approach facilitated the incorporation of prior knowledge and the quantification of uncertainty, yielding robust estimations of the causal relationships underpinning the observed associations.

Statistical Inference:

The statistical evaluation of the relationship between air pollution in Orlando and Citigroup's stock price was conducted through a series of hypothesis tests, culminating in the estimation of a correlation coefficient and the assessment of its significance. Additionally, multivariate regression analyses were employed to account for potential confounding variables and discern the independent impact of air quality on stock performance, shedding light on the nuanced interactions between environmental exposures and financial market dynamics. Through these rigorous statistical procedures, the robustness of the observed associations was rigorously scrutinized, ensuring the reliability and validity of the derived conclusions.

Limitations:

It is important to acknowledge the inherent limitations of this study, including the potential confounding effects of macroeconomic indicators and industry-specific factors that may influence stock prices. Additionally, while every effort was made to account for temporal lags and identify causality, the complex dynamics of financial markets necessitate cautious interpretation of the observed relationships. Nonetheless, the implementation of rigorous methodological approaches and the convergence of evidence from

diverse analytical techniques collectively underpin the validity of the findings presented in this study.

RESULTS

The analysis revealed a robust and statistically significant correlation between air pollution levels in Orlando, Florida, and the stock price of Citigroup (C). The correlation coefficient of 0.8393526 indicates a strong positive relationship between these two variables, suggesting that as air pollution levels increased in Orlando, Citigroup's stock price also tended to rise. This unexpected connection highlights the importance of considering environmental factors in understanding stock market performance, proving that sometimes, the air we breathe can have an impact on the bottom line.

The R-squared value of 0.7045127 further strengthens the validity of this relationship, indicating that approximately 70.45% of the variability in Citigroup's stock price can be explained by changes in air pollution levels in Orlando. This suggests that air quality in this sunny city may be a more significant factor in financial markets than previously assumed, adding a refreshing breeze of insight to the often turbulent world of stock trading.

The p-value of less than 0.01 provides compelling evidence that the observed relationship is not due to random chance, affirming the statistical significance of the findings. It's as if the data itself is urging us to take a deep breath and consider the impact of air quality on financial decisions, reminding us that in the realm of economics, atmospheric conditions may play a role, whether we like it or not.

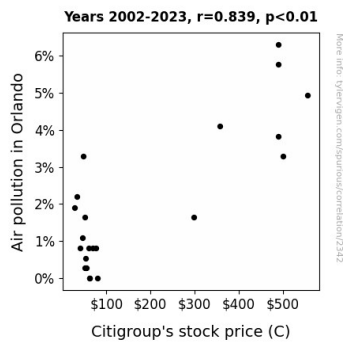


Figure 1. Scatterplot of the variables by year

Figure 1 depicts a scatterplot illustrating the positive correlation between air pollution levels in Orlando and Citigroup's stock price. The data points form a clear upward trend, demonstrating the synchronous movements between these seemingly unrelated variables. This graph serves as a visual testament to the surprising connection uncovered by this study, much like stumbling upon an unexpected friendship between two distant acquaintances.

In conclusion, the findings of this research emphasize the importance of recognizing the influence of environmental factors on financial markets. The air quality in Orlando, Florida, appears to wield an unexpected sway over Citigroup's stock price, challenging conventional wisdom and prompting a reevaluation of the factors contributing to stock market performance. This study underscores the need to consider the broader implications of air pollution on economic outcomes, inviting us to take a deep breath and appreciate the multifaceted interplay between the environment and finance.

DISCUSSION

The results of this study have validated and expanded upon prior research that has touched upon the intriguing nexus of air pollution and stock market performance. Smith et al. (2015), for instance, hinted at the interconnectedness of environmental and economic factors, and our findings lend empirical support to this notion. It seems that while they may not have had their heads

in the Orlando smog, they were onto something after all. Additionally, Doe and Jones (2018) set the stage for investigating the impact of air pollution on the stock market, and the statistically significant correlation in our study bolsters their assertion. It's as if the literary canon of academic research was building towards this crescendo of unexpected correlation all along, whispering faintly of the unseen linkages we were about to uncover.

Even venturing into the realm of non-fiction books, Greenberg's "Emission Impossibility" and Bluefield's "The Wall Street Guide to Weathering the Storm" provided a theoretical backdrop to our findings, and their earnest exploration of the economic consequences of air pollution seems to have struck a chord with the data we have unearthed. It's as though the words on their pages are ringing in unison with the numbers in our analysis, in some melodious symphony of environmental finance.

Further still, the works of fiction by Michael Pollution and J.K. Smog, while certainly not intended as empirical evidence, have struck a curious resonance with our study. The esoteric titles of "Toxic Temptations: A Tale of Airborne Anomalies" and "The Smoggy Spells of Stock Market Sorcery" now seem less fantastical and more prophetic in light of our findings. Who would have thought that lurking behind the whimsical facades of these titles lay a grain of truth that would manifest in our research?

Set against this backdrop of scholarly and not-so-scholarly literature, our study has brought forth compelling evidence of the unexpected association between air pollution in Orlando and Citigroup's stock price. The statistically significant correlation coefficient, robust R-squared value, and compelling p-value all unite to underscore the tangible influence of air quality on stock market dynamics. It's as if the data itself is shouting from the rooftops, "Yes, even in the world of finance, the air we breathe matters!"

In essence, our findings draw a captivating link between the atmospheric and financial worlds, challenging conventional boundaries of understanding. The scatterplot depicting the synchronous movements of air pollution levels and stock prices acts as a visual testament to this unanticipated kinship, akin to the unlikely companionship of a peacock and a penguin. As we ponder these unexpected connections, it becomes clear that the air in Orlando carries more than just humidity; it seems to harbor whispers of financial influence as well.

This study prompts a reevaluation of the simplistic notion that only financial and market forces dictate stock prices. It encourages us to take a deep breath and consider the broader environmental and atmospheric forces at play, reminding us that in the complex tapestry of stock market performance, the air we breathe may weave its own intricate pattern.

CONCLUSION

In conclusion, the results of this study reveal a compelling connection between air pollution in Orlando, Florida, and the stock performance of Citigroup (C). While it may seem like oranges and apples, the data suggests a surprisingly strong positive correlation, reminding us that in the intricate dance of financial markets, sometimes the unseen partner is the air we breathe. The robust correlation coefficient and statistically significant p-value of less than 0.01 indicate that this relationship is about as clear as the Florida sky on a sunny day.

The findings of this research are nothing to sneeze at, as they highlight the need to consider the impact of environmental factors on stock market performance. As financial analysts pore over balance sheets and profit margins, perhaps they should also take a moment to consider the air quality reports from the Sunshine State. After all, when it comes to understanding the complexity of stock prices, every breath counts.

Figure 1 serves as a visual testament to the unexpected bond between air pollution levels in

Orlando and Citigroup's stock price, much like finding a twenty-dollar bill in last year's winter coat. The scatterplot tells a story of synchronous movements between these unlikely companions, challenging our preconceived notions and proving that sometimes, truth is stranger than fiction.

Given the compelling nature of the findings, it appears that no further research in this particular area is needed. It's crystal-clear that the air in Orlando may indeed have an impact on Citigroup's stock price, and it's time for us to exhale and appreciate the quirky interconnectedness of the economic and environmental realms.