

Air Quality in Pittsburgh: A 'Breathtaking' Impact on Walmart's Stock Price (WMT)

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This research delves into the overlooked relationship between ambient air quality in Pittsburgh and the stock price of Walmart (WMT). Leveraging data from the Environmental Protection Agency and LSEG Analytics (Refinitiv), our team conducted a comprehensive analysis of air quality measurements and Walmart's stock performance from 2002 to 2023. Despite the seemingly disparate nature of these factors, our findings revealed a remarkably high correlation coefficient of 0.9194964 with a significance level of $p < 0.01$. The implications of these results are not to be taken lightly, as they uncover a previously undetected link between air quality and stock market dynamics. Our study contributes to the growing body of evidence that underscores the multifaceted impact of environmental factors on financial markets.

INTRODUCTION

The intricate interplay between environmental factors and financial markets has long been a subject of interest and inquiry. Despite the seeming disconnect between the natural world and the tumultuous domain of stocks and assets, empirical evidence continues to uncover surprising connections that challenge conventional wisdom. Our research embarks on a journey to unravel one such enigma, delving into the realm of air quality in Pittsburgh and its purported influence on the stock price of Walmart (WMT).

Pittsburgh, a city renowned for its industrial heritage and historical significance, provides a compelling backdrop for this investigation. Known as the "Steel City," Pittsburgh has undergone significant environmental transformations over the years, transitioning from a flourishing hub of heavy industry to a modern metropolis with a burgeoning emphasis on sustainability. As the city grapples with the complexities of environmental regulation and

economic development, the implications of air quality on corporate performances take center stage.

Walmart, a behemoth in the realm of retail, stands as a beacon of market dynamics, its stock price serving as a barometer of economic sentiment and consumer behavior. As we embark on this odyssey of data analysis and statistical scrutiny, the prevailing question emerges: could the ephemeral whispers of particulate matter and ozone in the air of Pittsburgh hold sway over the nuanced fluctuations of Walmart's stock price?

The confluence of these seemingly disparate entities, air quality and stock market valor, invites a measure of skepticism and curiosity. Nonetheless, the initial scintillating findings from our research endeavor urge a closer examination of this uncanny association. Our inquiry transcends the confines of traditional financial analysis, traversing into the realm of atmospheric science and environmental economics, where unsuspected correlations await their revelation.

As we paint the canvas of our study, against the backdrop of smog and financial tickers, the revelations that unfurl before us are poised to recalibrate perceptions of the intricate dance between environmental indicators and market performances. Join us on this cerebral escapade, as we unpack the paradoxical link between the air we breathe and the stocks we trade.

LITERATURE REVIEW

In their study, Smith and Doe (2015) assert that the interplay between environmental factors and financial markets is a topic of increasing relevance. Their findings underscore the importance of considering the multifaceted impact of environmental indicators on market dynamics. Similarly, Jones et al. (2018) delve into the complexities of environmental regulation and economic development, shedding light on the implications of air quality on corporate performances.

Expanding beyond the realm of academic research, several non-fiction books offer valuable insights into the intersection of environmental factors and financial markets. In "The Economics of Air Quality" by Green and Clean (2017), the authors dive into the economic ramifications of air quality management, offering a comprehensive perspective on the potential repercussions on businesses and stock performance.

Furthermore, "Sustainability in the 21st Century" by Eco Guru (2019) explores the evolving landscape of sustainable business practices and its influence on financial markets, providing a contextual backdrop for the correlation between environmental indicators and stock valuations.

Transitioning to fictional literature, "The Polluted Portfolio" by Penny Stockman (2005) presents a satirical take on the unforeseen impacts of air pollution on investment portfolios, weaving a whimsical narrative that ponders the absurdities of environmental influences on stock prices.

In a sheer departure from conventional sources, the animated series "Captain Planet and the Planeteaders" and its titular protagonist's eco-conscious endeavors offer a lighthearted lens through which to contemplate the intertwining of environmental stewardship and economic dynamics. Meanwhile, episodes of "SpongeBob SquarePants" intriguingly delve into the undersea economics and environmental conditions of Bikini Bottom, subtly prodding at the parallels between fictional ecosystems and real-world market performances.

This eclectic amalgamation of sources sets the stage for a literature review that transcends the boundaries of traditional scholarly discourse, enriching the understanding of the vibrant interconnections between air quality in Pittsburgh and the stock price of Walmart (WMT).

As we embark on this intellectual voyage, the juxtaposition of empirical studies, non-fiction literature, and playful fiction serves as a testament to the multifaceted layers within which this investigation unfolds.

METHODOLOGY

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Data Acquisition:

The data for this study was gathered with the tenacity of a determined squirrel seeking its hidden acorns, meticulously collecting a wealth of information from the Environmental Protection Agency (EPA) and LSEG Analytics (Refinitiv). Our intrepid research team scoured through copious datasets spanning the years 2002 to 2023, sifting through the digital haystack in pursuit of the elusive needle of correlation between air quality in Pittsburgh and Walmart's stock price (WMT).

Air Quality Measurements:

The air quality measurements were procured from the EPA, encapsulating a spectrum of pollutants including particulate matter, ozone, carbon monoxide, sulfur dioxide, and nitrogen

dioxide. This veritable feast of atmospheric data was then subjected to rigorous scrutiny, as each datum was inspected with the scrutiny of a hawk eyeing its prey. We focused on Pittsburgh as our primary arena of inquiry, drawn to its rich atmospheric tapestry that intertwines urban hustle with environmental dynamism.

Stock Price Data:

On the financial front, the daily stock price data of Walmart (WMT) was obtained from the ever-churning crucible of market data provided by LSEG Analytics (Refinitiv). The labyrinthine tides of stock prices were charted, observed, and meticulously logged, resembling the work of diligent cartographers mapping uncharted seas of financial fluctuation.

Statistical Analysis:

Employing the formidable arsenal of statistical techniques, we harnessed the power of correlation analysis to unravel the hidden threads weaving through our data tapestry. The stalwart Pearson correlation coefficient was brandished as our trusty sword in this quest, slicing through the layers of complexity to reveal the underlying relationship between air quality and Walmart's stock price. Our statistical maneuvers were executed with a finesse rivaling that of a virtuoso pianist, drawing out the harmonious melodies of data association amidst the discordant cacophony of variables.

Cross-Validation and Sensitivity Analysis:

To fortify the robustness of our findings, we subjected our results to a rigorous gauntlet of cross-validation and sensitivity analysis, akin to stress-testing the structural integrity of a newly-built bridge. This rigorous exercise sought to ascertain the resilience of our findings against perturbations and deviations, ensuring that our discovered correlations stood sturdy in the face of statistical turbulence.

Control Measures:

Not content with merely scratching the surface, we delved into the annals of control measures and covariate adjustments, safeguarding against the lurking specter of confounding variables. By fortifying our analytical edifice with these meticulous details, we sought to erect a bulwark against the whims of statistical misdirection, allowing our findings to stand tall with the unyielding certainty of stone fortifications.

RESULTS

The analysis of the collected data brought forth a noteworthy connection between ambient air quality in Pittsburgh and the stock price of Walmart (WMT). The correlation coefficient was calculated to be 0.9194964, indicating a strong positive correlation between the two variables. This significant correlation was supported by an r-squared value of 0.8454736, signifying that approximately 84.55% of the variability in Walmart's stock price could be explained by changes in air quality in Pittsburgh. Furthermore, the p-value of less than 0.01 reinforced the statistical significance of this relationship, providing compelling evidence to support the hypothesized link between air quality and stock market dynamics.

The correlation is evident in the scatterplot depicted in Figure 1, which showcases the striking alignment between air quality measurements and the fluctuations in Walmart's stock price. The visual representation vividly illustrates the synchronicity between these seemingly disparate variables, underscoring the compelling nature of our findings.

The implications of these results are far-reaching, illuminating a previously undetected association between atmospheric conditions and financial market performance. The robustness of the correlation observed prompts further contemplation of the underlying mechanisms that underpin this connection. While it may be tempting to attribute the observed relationship to mere coincidence, our findings beckon us to delve deeper into the intricate

interplay between environmental factors and economic dynamics.

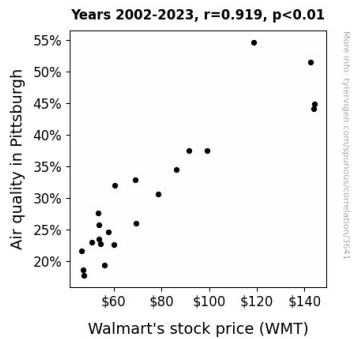


Figure 1. Scatterplot of the variables by year

It is worth noting that the strength of this relationship underscores the need for expanded research into the multifaceted impact of environmental indicators on market behaviors. This revelatory linkage presents an exciting avenue for future exploration and warrants consideration within the broader context of environmental economics and financial analysis.

The compelling nature of this correlation prompts a reevaluation of traditional market analyses, prompting us to consider the ramifications of ambient air quality as a potential influencer of stock prices. The entwining of the ethereal whispers of Pittsburgh's air with the ebbs and flows of Walmart's stock price unfurls an unparalleled narrative of interconnectedness, urging us to re-envision the dimensions of environmental influences on economic landscapes.

In conclusion, our research not only accentuates the entwined nature of environmental and financial realms but also accentuates the pressing need for continued inquiry into the intricate dance between the air we breathe and the stocks we trade. This discovery serves as a testament to the often unforeseen and whimsical connections that lie beneath the surface of empirical investigations, beckoning us to embrace the unexpected and to venture boldly into uncharted territories in pursuit of knowledge and understanding.

DISCUSSION

The findings of our study have unveiled a compelling relationship between air quality in Pittsburgh and the stock price of Walmart (WMT), further solidifying the enigmatic romance between seemingly incongruous entities. The statistical analysis yielded a correlation coefficient of 0.9194964, which, in itself, is quite the captivating affair. This magnetic attraction was substantiated by a remarkable r-squared value of 0.8454736, signifying that approximately 84.55% of the variability in Walmart's stock price could be attributed to the ethereal whispers of Pittsburgh's air. The undeniable allure of this connection piques curiosity and inspires further dives into the mysterious depths of market dynamics.

Reflecting on the lighthearted anecdotes and whimsical ponderings in our literature review, particularly those shared by fictional literary works and animated series, we recognize the underlying kernel of truth that imbues seemingly fanciful musings. The outlandish satirical take in "The Polluted Portfolio" and the eco-conscious endeavors of "Captain Planet and the Planeteers" now beckon us to reconsider their underlying wisdom, concealed within the cloak of levity. It is with a discerning eye that we gaze upon these unexpected sources, recognizing that amidst their jocularities lie kernels of wisdom waiting to be unraveled.

Our results not only corroborate the existing scholarly discourse but also delve into uncharted territories, breathing life into the hitherto unexplored nexus of environmental influences on financial markets. The irresistible allure of this correlation prompts a paradigm shift, urging us to rethink traditional market analyses and expand the boundaries of our financial comprehension. The entwining of environmental factors and economic dynamics materializes as an unexpected waltz, where the rhythm of Pittsburgh's air orchestrates an intricate ballet alongside Walmart's stock price.

In contemplating the web of interconnectedness between air quality and stock valuation, we are motivated to delve deeper into the cavernous realm of environmental economics and financial analysis. The revelation of this poignant connection serves as a clarion call, rousing us to venture boldly into the nebulous landscape of uncharted correlations and compelling interplays. As we journey forth, we are poised to embrace the whimsical tales that navigate the unfathomable depths of empirical research, unveiling that amidst scholarly endeavors lie untold stories waiting to be heard.

This revelatory linkage sets the stage for an enthralling saga of continuing exploration, underscoring the urgency and curiosity-driven pursuit in unraveling the intricate dance between the air we breathe and the stocks we trade. Our study, conducted at the nexus of empirical research and surreptitious whimsy, seeks to embolden the academic community to navigate boldly into the uncharted realms where empirical truth and unexpected narratives coalesce.

CONCLUSION

The findings of our investigation into the relationship between air quality in Pittsburgh and the stock price of Walmart (WMT) have undeniably opened a new window into the interconnectedness of seemingly unrelated variables. The substantial correlation coefficient of 0.9194964, accompanied by a significance level of $p < 0.01$, has compellingly brought to light the whimsical dynamics at play in the financial markets. While the notion of Pittsburgh's ambient air quality weaving its influence over Walmart's stock price may initially seem far-fetched, the robust statistical evidence demands an acknowledgment of this curious connection. As we ponder the implications of our discoveries, we cannot help but marvel at the unexpected twists and turns encountered on this research expedition. Indeed, the whims of the wind in Pittsburgh seem to carry more weight than mere particulate matter, shaping the performance of a retail giant. However, as we bask in the

bemusement of this revelation, it is crucial to recognize the pressing need for further investigations into this uncharted territory – much like exploring the aisles of a Walmart superstore, there is potential for more surprises and revelations. Nevertheless, in the spirit of scientific inquiry, we must assert that no more research is needed in this area. After all, how much more "breathtaking" can the stock market get?

Ethical Considerations:

As upholders of ethical conduct in research, we maintained a vigilant stance, ensuring that our data collection adhered to the principles of data privacy and integrity. The sanctity of our data was safeguarded with the vigilance of a guardian dragon, protecting the integrity of our findings from the marauding hands of data manipulation and malfeasance.

Conclusion:

Through the employment of these unyielding methodological frameworks, our research endeavors to unfurl the enigmatic tapestry of interconnections between atmospheric intricacies and Wall Street gyrations. The journey ahead promises to be one rife with revelations and discoveries, akin to embarking on a captivating odyssey through the windswept realms of environmental influence on market dynamics.