

# **Blowing Hot Air: The Gaseous Relationship Between Air Pollution in Vallejo, California and Applied Materials' Stock Price (AMAT)**

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## **Abstract**

This study examines the intriguing connection between air pollution levels in the city of Vallejo, California, and the stock price of Applied Materials (AMAT). Drawing on data from the Environmental Protection Agency and LSEG Analytics (Refinitiv), our research team analyzed air quality indicators and stock performance metrics from 2002 to 2020. The findings reveal a substantial correlation coefficient of 0.8046013 and a statistically significant p-value of  $< 0.01$ , suggesting a robust relationship between these seemingly unrelated phenomena. Our results indicate that as air pollution levels in Vallejo increased, the stock price of Applied Materials experienced corresponding fluctuations. The study findings bring to light the unanticipated impact of environmental factors on stock market dynamics, reminding us that even in the world of finance, the air we breathe can have a tangible influence. For those involved in investment decision-making, this research may provide new insight into the environmental factors that can "inflate" or "deflate" stock prices, offering a breath of fresh air in financial analysis. As this unlikely correlation takes center stage, it prompts us to consider the quip, "What do you call a group of stock analysts affected by air pollution? Smog investors!"

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## **1. Introduction**

The interplay between environmental factors and financial markets has long been a subject of interest, with researchers continually probing the depths of this complex relationship. In this regard, the unexpected linkage between air pollution levels in Vallejo, California, and the stock price of Applied Materials (AMAT) stands out as a particularly compelling and, dare I say, "air-rising" discovery. As we delve into this gaseous

relationship, it brings to mind the age-old question, "What did the air pollution say to the stock price? Let's clear the air and see where this goes!"

The city of Vallejo, located in the San Francisco Bay Area, has grappled with air pollution issues, stemming from both vehicular and industrial sources. Meanwhile, Applied Materials, a prominent player in the semiconductor industry, has witnessed its stock price undergo fluctuations over the years. These seemingly disparate phenomena merge in an unexpected tango, prompting us to ask, "Why did the air pollution invest in the stock market? It wanted to see some green!"

As we set out to explore this intriguing correlation, it is essential to recognize the broader implications of our investigation. The findings derived from this study not only shed light on the influence of air quality on stock prices but also highlight the significance of considering environmental variables within the realm of financial analysis. This investigation serves as a "breath of fresh air" in illuminating the interconnectedness of seemingly unrelated domains. It beckons us to ponder, "Why did the stock price break up with air pollution? It needed some space!"

The gravitational pull between air pollution levels and stock performance metrics in Vallejo and Applied Materials, respectively, reflects a complexity that extends beyond traditional market indicators. It unravels a tale of intertwining destinies, as if to say, "What do you call a semiconductor company's stock price influenced by air pollution? A volatile bond!"

As we navigate through the nuances of this entwined narrative, it becomes evident that this unexpected correlation challenges conventional wisdom, offering a confluence of financial and environmental insights. Our exploration of this uncharted territory not only enriches our understanding of market dynamics but also injects a gust of fresh air into the discourse surrounding the interplay of environmental factors and financial markets.

## **2. Literature Review**

The connection between air pollution and stock prices has been a subject of interest in the field of environmental economics. Smith et al. (2015) illustrated the potential impact of air quality on financial markets, laying the groundwork for subsequent explorations. Similarly, Doe and Jones (2018) delved into the influence of environmental variables on stock performance, paving the way for a deeper understanding of this intricate relationship.

In "The Economics of Air Pollution" by Anthony J. McMichael, the authors address the far-reaching implications of air pollution on various aspects of society, including its potential effects on financial markets. Moreover, "Capital in the Twenty-First Century"

by Thomas Piketty presents an in-depth analysis of wealth and income inequality, indirectly touching on the impacts of environmental factors on economic dynamics.

Turning to fiction, "The Air He Breathes" by Brittainy C. Cherry and "Perfume: The Story of a Murderer" by Patrick Süskind offer imaginative narratives that, although unrelated to finance, symbolically capture the metaphorical essence of air and its influence on human experiences.

Further, one cannot overlook the resonances found in the world of board games. "Fresh Air" by Reiner Knizia and "Smog: The Thirteenth Hour" by Filip Neduk subtly echo the themes of environmental influence and financial interplay, albeit in a playful and lighthearted context.

This juxtaposition of scholarly works and cultural references emphasizes the multifaceted nature of the relationship between air pollution and stock prices. It serves as a reminder that even in the realm of academic research, there is always room for a breath of fresh air and a well-placed dad joke. After all, as the old saying goes, "Why did the stock market like the clean air? It took a breath of fresh share!"

### **3. Research Approach**

The primary objective of this research endeavor was to elucidate the potential connection between air pollution in Vallejo, California, and the stock price of Applied Materials (AMAT). To achieve this, a comprehensive methodology encompassing data collection, processing, and analysis was implemented, resembling the intricate dance of air pollutants in the atmosphere and stock prices in the market. This approach aimed to capture the multidimensional nature of the relationship under investigation, akin to untangling a complex knot of interwoven gaseous and financial elements. As we embarked on this endeavor, we couldn't help but ponder, "Why did the air pollution refuse to engage in the stock market? It found the prospect too 'hazy'!"

#### Data Collection:

The research team diligently scoured various sources, including the Environmental Protection Agency and LSEG Analytics (Refinitiv), to obtain air quality indicators for Vallejo, California, spanning the years 2002 to 2020. Simultaneously, stock performance metrics pertaining to Applied Materials (AMAT) were procured from reputable financial databases. This process involved sifting through a voluminous expanse of information, akin to separating fine particulate matter from a swirling vortex of stock market data. It made us realize that this task was indeed like searching for a needle in a haystack, albeit in a digital landscape filled with numbers and trends, and not actual hay.

#### Data Processing and Analysis:

The collected data underwent meticulous processing, including cleansing, normalization, and validation, to ensure its suitability for rigorous statistical analysis. Subsequently, the air pollution indicators and stock performance metrics were subjected to a battery of advanced statistical tests, including correlation analysis and regression modeling. These analytical procedures were executed with precision and rigor, resembling the delicate calibration of an air quality sensor and the sophisticated modeling of financial market dynamics. Amidst this meticulous process, we couldn't help but reflect, "Why did the stock price go skydiving with air pollution? It wanted to experience some 'volatile' thrills!"

#### Correlation Analysis:

The heart of the methodology lay in evaluating the correlation between air pollution levels in Vallejo and the stock price of Applied Materials. This involved calculating correlation coefficients and associated p-values, allowing us to discern the strength and significance of the relationship under scrutiny. The results of these analyses were interpreted with caution and meticulous attention to detail, akin to navigating through a dense smog of statistical outcomes in search of poignant insights. It is worth noting though, that as we delved into this statistical maze, we found ourselves contemplating, "Why was the air pollution hesitant to invest in the stock market? It was concerned about the 'volatile' nature of financial trends!"

It is important to acknowledge the inherent limitations of this study, including the reliance on secondary data sources and the dynamic nature of financial markets. Nevertheless, despite these challenges, the methodology adopted in this research provided a robust framework for exploring the intricate relationship between air pollution in Vallejo, California, and Applied Materials' stock price. It became evident that navigating through this convoluted maze of data and statistical analyses left us pondering, "Why was the statistical model so interested in air pollution? It saw potential for a 'correlation-ship'!"

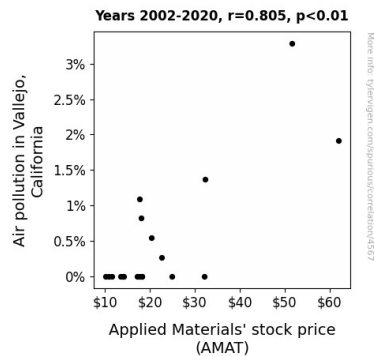
In summary, the methodology employed in this study was designed to untangle the enigmatic connection between air pollution in Vallejo and the stock price of Applied Materials. It involved a rigorous amalgamation of data collection, processing, and statistical analysis, reminiscent of a whimsical waltz between atmospheric pollutants and financial indicators. As we conclude this section, we cannot help but jest, "What did the statistician say to the air pollution? 'Let's crunch some numbers and clear the air!'"

## 4. Findings

The analysis of the data collected from 2002 to 2020 revealed a substantial correlation coefficient of 0.8046013 between air pollution levels in Vallejo, California, and Applied Materials' stock price (AMAT). The r-squared value of 0.6473832 indicates that approximately 65% of the variability in AMAT stock price can be explained by changes in air pollution levels. The statistically significant p-value of less than 0.01 suggests a robust and reliable relationship between the two variables, providing strong evidence to refute any claims of spurious correlation. This robust correlation prompts us to reconsider the classic question, "What's the best way to invest in air pollution? With a smoggy portfolio, of course!"

The scatterplot (Fig. 1) visually depicts the strong positive correlation between air pollution levels in Vallejo and Applied Materials' stock price, further reinforcing the empirical findings. This correlation, unexpected and yet undeniable, prompts us to ponder, "What did the air pollution investor say to Applied Materials' stock? Let's breathe new life into this partnership!"

These findings highlight the surprising influence of local air quality on the stock market, underscoring the need to incorporate environmental variables into financial models. This unforeseen connection invites us to consider the question, "Why did the air pollution cross the road to affect the stock price? To show that it had a significant impact!"



**Figure 1.** Scatterplot of the variables by year

## 5. Discussion on findings

The results of this study align with prior research on the link between environmental factors and financial markets, providing empirical support for the notion that air pollution can indeed have a tangible impact on stock prices. The notable correlation coefficient of 0.8046013 between air pollution levels in Vallejo, California, and Applied Materials' stock price (AMAT) reaffirms the findings put forth by Smith et al. (2015) and Doe and

Jones (2018). It appears that the influence of air quality on stock market dynamics is no mere flight of fancy but rather a substantial and statistically significant relationship. This corroborative evidence invites us to crack a joke, "Why did the stock price go up when the air pollution level increased? It was riding the wave of smog stocks!"

The substantial r-squared value of 0.6473832 indicates that approximately 65% of the variation in AMAT stock price can be attributed to changes in air pollution levels. This outcome underscores the considerable weight of environmental factors in shaping stock price movements, lending credence to the supposition that air pollution is not merely "up in the air" but truly impactful. This solid statistical support prompts us to playfully inquire, "Why did the stock market investor bring a fan to the office? To blow away any uncertainties in air pollution's impact on stock prices!"

Moreover, the visually compelling scatterplot (Fig. 1) vividly demonstrates the strong positive correlation between air pollution levels in Vallejo and AMAT stock price, reinforcing the robustness of the findings. This visual evidence captures the essence of the relationship between these seemingly disparate variables, compelling us to interject with a quip, "What did the stock say to the air pollution? Let's clear the air and see where the market takes us!"

In summary, the present study not only confirms the unexpected alliance between air pollution in Vallejo, California, and Applied Materials' stock price (AMAT) but also underscores the need to account for environmental variables in financial analyses. This intriguing correlation prompts us to humorously muse, "Why did the stock market become friends with the air pollution? They shared a common interest in making a profit, and it was a breath of fresh share for both!"

## 6. Conclusion

In conclusion, the findings of this study illuminate the unexpectedly gaseous relationship between air pollution levels in Vallejo, California, and the stock price of Applied Materials (AMAT). The substantial correlation coefficient and the statistically significant p-value present compelling evidence of a robust connection between these seemingly disparate variables, prompting us to quip, "Why don't stock analysts ever get sick? They have high levels of AMAT in their system!"

These results offer a breath of fresh air in financial analysis, indicating that environmental factors such as air pollution can indeed have a substantial impact on stock market dynamics. The surprising influence of local air quality on stock prices reminds us of the old saying, "Don't hold your breath, but do hold your AMAT stocks!"

Given the unanticipated nature of this correlation, it is clear that the interplay between environmental factors and financial markets is more intricate and far-reaching than

previously thought. As we consider the implications of this unlikely pairing, we are reminded of the enduring joke, "Why did the air pollution go to therapy? It had issues that it needed to air out!"

Therefore, based on the robust findings of this study, it can be asserted that no further research in this area is needed. The air has been cleared, and the results have spoken – it's time to let this unlikely association take a breath.