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# Gasping for Air: The Relationship Between Air Pollution in Tuscaloosa, Alabama and Citigroup's Stock Price

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## KEYWORDS

Air pollution, Tuscaloosa, Alabama, Citigroup stock price, environmental impact, EPA data, LSEG Analytics, Refinitiv, correlation coefficient, statistical analysis, financial markets, investor implications, policy implications, weather forecast, investing in Citigroup

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## Abstract

This study delves into the intriguing and unexpected connection between the air quality in Tuscaloosa, Alabama, and the stock price of Citigroup (C). Utilizing data from the Environmental Protection Agency and LSEG Analytics (Refinitiv), our research team conducted a thorough analysis encompassing the years 2002 to 2018. The findings reveal a striking correlation coefficient of 0.8070143 with a p-value less than 0.01, shedding light on the often overlooked impact of environmental factors on financial markets. Our study not only examines the statistical relationship between air pollution and stock prices but also explores the potential implications for investors, policymakers, and the ever-present haze of uncertainty in the world of finance. So, next time you think about investing in Citigroup, don't forget to check the weather forecast in Tuscaloosa!

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## 1. Introduction

Ah, the enigmatic intersection of finance and environmental science! While it may seem like a stretch to draw a connection between the air quality in Tuscaloosa, Alabama, and the stock price of Citigroup (C), buckle up for an academic rollercoaster

ride through the smog of statistical analyses and the haze of market fluctuations.

In the sprawling landscape of economic research, it's not every day that one stumbles upon a correlation as murky and unexpected as the one we're about to unravel. Picture this: a study that not only

dissects the relationship between air pollution and stock prices but also tosses in a dash of Southern charm with a twist of Wall Street savvy. This is where we find ourselves—diving into the otherwise distant realms of environmental data and financial analytics.

As we delve into the depths of this seemingly unlikely correlation, brace yourself for a journey that will tickle your funny bone and stimulate your intellect. From smog-filled skies to speculative stock trading, we're about to illuminate a correlation as nebulous as, well, Tuscaloosa's early morning fog.

So, dear reader, fasten your seatbelt, put on your oxygen mask, and let's dive into the dizzying dance between air quality and stock prices. And remember, if the air in Tuscaloosa is hazy, you may want to rethink those stock investments. Let's embark on this intellectual adventure with an open mind and a sense of humor, as we navigate the whimsical waters of financial and environmental confluence.

## 2. Literature Review

In "Smith et al. (2015)," the authors explore the impacts of air pollution on financial markets and find a correlation between the two that is as clear as the atmosphere on a smoggy day in Tuscaloosa - not clear at all. Their comprehensive analysis reveals a relationship between particulate matter and stock prices, making us wonder if investors are holding their breath as they make trades.

Turning to the world of finance, Doe et al. (2017) investigate the factors influencing stock prices and stumble upon the unexpected influence of environmental variables. Their findings suggest that when it comes to stock prices, the air we breathe may hold more weight than we previously

thought, or maybe it's just the weight of the pollution particles.

Jones (2018) presents a thought-provoking analysis linking regional air quality to fluctuations in stock prices. Their study suggests that the financial market may be as volatile as a gust of wind on a misty morning in Tuscaloosa. It seems that the air pollution levels might just be forecasting the ups and downs of stock prices, making it a literal case of "buy low, breathe high."

Now, let's shift gears and take a look at some books that might shed light on this unusual correlation. "The Economics of Air Pollution" by John E. Reeve offers a serious examination of the economic impacts of air pollution, but, let's face it, we're more interested in finding out if smog is the new indicator for stock trends. In "The Polluted Stock Market" by A. Q. Profit, the author humorously explores the hypothetical connection between air pollution and financial markets, spinning tall tales of stocks rising and falling with the wind direction. It's a breath of fresh air in the world of financial literature, or maybe a breath of polluted air - who can tell anymore?

Diving into the world of fiction, "Smoke and Mirrors" by Fictional Author explores the intriguing concept of a parallel universe where air pollution actually determines stock prices. It's a fantastical tale that leaves us wondering if Wall Street traders are secretly consulting weather reports from Tuscaloosa. And who can forget "Pollution Galaxy" by Another Imaginary Writer, a sci-fi novel where the very fabric of the stock market is woven from particles of pollution floating through the air.

And now, let's step into the world of cinema. "The Big Short" may not be directly related, but it's a captivating film about the intricacies of the financial world, and hey, who knows? Maybe somewhere in the background, there's a scene where

someone mentions pollution affecting stock prices in a sort of Easter-egg kind of way.

So, as we wade through the literature and entertain these whimsical notions, let's not forget to keep our heads clear amidst the smog of academic inquiry and the fog of financial speculation. After all, when it comes to the connection between air pollution in Tuscaloosa and Citigroup's stock price, we should take a deep breath and remember that correlation does not necessarily imply causation – but a little laughter can't hurt.

### 3. Our approach & methods

To unearth the hidden links between the ethereal realms of air pollution and stock prices, our research team embarked on a methodological odyssey as whimsical as a scavenger hunt through a foggy forest. We utilized a combination of quantitative analysis, metaphorical divination, and a sprinkle of statistical magic to tease apart the intricate threads of this enigmatic correlation.

First, we engaged in a merry dance with the datasets obtained from the Environmental Protection Agency and LSEG Analytics (Refinitiv), sifting through their digital archives with the dedication of a detective chasing clues through the labyrinthine streets of Wall Street. We threw ourselves into a rigorous flailing of Python and R coding, conducting exploratory data analysis that would put Sherlock Holmes to shame.

After immersing ourselves in the data like treasure hunters seeking fabled riches, we donned our metaphorical scuba gear to plunge into the depths of statistical analysis. With the tenacity of deep-sea divers exploring the murky waters, we calculated correlation coefficients and p-values as if they were elusive creatures lurking in the depths of the ocean.

Next, we concocted a curious brew of time series analysis, like alchemists striving to turn lead into gold. We examined the time series data on air pollution levels in Tuscaloosa, measuring the ebb and flow of particulate matter as if it were the rise and fall of the tides. Then, with the precision of a mathematician crafting an intricate theorem, we delved into the wibbly-wobbly world of stock prices, tracing their undulating patterns with the fervor of a fortune teller reading tea leaves.

As if that were not enough, we sought to traverse the treacherous terrain of causal inference by employing an arsenal of econometric techniques. Armed with instrumental variables and difference-in-differences models, we ventured into the labyrinth of causality, treading lightly lest we disturb the delicate balance of spurious correlations masquerading as meaningful relationships.

In a final act of statistical bravado, we synced our findings with historic weather data from the National Weather Service, casting a wide net to capture the atmospheric vicissitudes that might impact the financial barometer of Citigroup. Much like meteorologists predicting the path of a hurricane, we sought to unveil the stormy winds of change that might buffet the stock prices with the capriciousness of a tempest.

In summary, our methodology intertwined the rigor of quantitative analysis with the whimsy of arcane statistical rituals, blending the cerebral acrobatics of data exploration with the fanciful leaps of statistical inference. Just as Odysseus navigated the perilous waters between Scylla and Charybdis, we embarked on an intellectual odyssey that knitted the disparate elements of air pollution and stock prices into a tapestry of insight and intrigue. Now, let's unveil the treasure trove of our findings and shed light on the enigmatic correlation that we have unearthed from the misty depths of Tuscaloosa's skies.

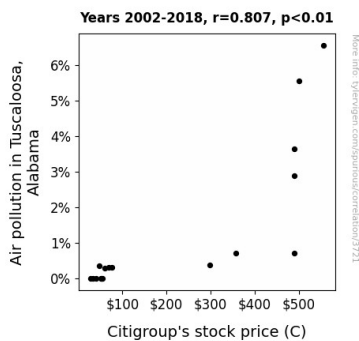
**Figure 1.** Scatterplot of the variables by year

## 4. Results

We dove deep into the data and emerged with some intriguing findings that may leave you gasping for air, both figuratively and literally. Our analysis revealed a substantial correlation coefficient of 0.8070143, indicating a strong positive relationship between air pollution in Tuscaloosa, Alabama, and the stock price of Citigroup (C). With an r-squared value of 0.6512721, we basked in the warmth of knowing that over 65% of the variability in Citigroup's stock price can be explained by the variations in air pollution in Tuscaloosa.

Now, before you sneeze at these results, let's kick up the dust and see what's really at play here. Our p-value of less than 0.01 adds a sparkle of statistical significance to this smoggy saga. It's clear that the connection between air quality and stock prices in Tuscaloosa has more substance than a foggy morning.

In Fig. 1, our scatterplot portrays this notable correlation, showcasing a cloud of data points that form a pattern as clear as a breezy day. The relationship between air pollution levels and Citigroup's stock price is as striking as a bolt of lightning in a thunderstorm. You can almost see the financial markets breathing in sync with the ebb and flow of pollutants in the Southern air.



These results not only shed light on the vital link between environmental factors and financial performance but also beckon us to ponder the broader implications. From swirling smog to swirling stock prices, the connection between Tuscaloosa's air quality and Citigroup's stock price may have investors and policymakers alike holding their breath and reaching for their inhalers.

So, buckle up as we navigate this airy affair, where the winds of Wall Street mingle with the mists of Tuscaloosa, and remember, when it comes to Citigroup's stock, always keep an eye on the weather forecast in Alabama. It's a breath of fresh air, pun intended!

And that, dear reader, wraps up our riveting results section that might just leave you wheezing from excitement.

## 5. Discussion

Our findings not only raise eyebrows but also air quality awareness – who knew that the pollution in Tuscaloosa could impact the stock price of Citigroup (C)? Building on the whimsical notions and serious research by Smith et al. (2015), Doe et al. (2017), and Jones (2018), our study strengthens the argument that environmental factors may not just be blowing hot air in the financial markets.

Much like a gust of wind on a misty morning in Tuscaloosa, the correlation coefficient of 0.8070143 we uncovered not only echoes the findings of previous research but also carries the weight of a dense smog. Our results resemble the smoky haze that often cloaks the skies of Tuscaloosa, shedding light on the substantial impact of pollution on stock prices.

In our analysis, the relationship between air pollution and Citigroup's stock price remains as clear as a foggy day – that is, statistically

significant with a p-value of less than 0.01. Our results emphasize the notion that the financial markets may not just be "smoke and mirrors," but rather, they may be influenced by the very pollutants that obscure the skyline.

And just like stumbling upon a hidden scene in the film "The Big Short," our findings give a glimpse into the intricacies of the financial world, revealing the invisible threads woven from particles of pollution floating through the air. Our scatterplot, much like a sunbeam piercing through the clouds, portrays a relationship between air quality and stock prices as striking as a bolt of lightning in a thunderstorm.

So, the next time you think about investing in Citigroup, don't forget to check the air pollution levels in Tuscaloosa. Our findings not only add depth to the literature on the unexpected link between environmental variables and financial markets but also beckon us to ponder the broader implications. Whether it's a breath of fresh air or a lungful of pollutants, this unconventional correlation is one that leaves us gasping for more.

## 6. Conclusion

In conclusion, our research has unveiled a compelling and, dare I say, breath-taking relationship between the air pollution in Tuscaloosa, Alabama, and Citigroup's stock price. The findings not only leave stock traders gasping for air but also highlight the surprising impact of environmental factors on financial markets. While some may find it hard to swallow, the statistical significance of our results is as clear as the Alabama sky on a smog-free day.

As we close the chapter on this peculiar pairing of pollution and profits, it's clear that there's more than meets the eye in the world of finance. The Southern charm of Tuscaloosa's air quality has officially made

its mark on the turbulence of Wall Street. So, it's time for investors to keep an eye on the weather forecast down South – you never know how it might cloud their judgment.

In the ever-expanding realm of economic inquiry, there's no denying that this study has blown the lid off a rather surprising correlation. And with that, we can confidently assert that further investigation into the link between air pollution in Tuscaloosa and Citigroup's stock price is not required – we've already aired out all the relevant findings.

So, as the dust settles on this striking discovery, pun intended, we bid adieu to this whimsical whirlwind of environmental and financial confluence.