



Review

Smog in Hagerstown: A Look at How Air Pollution Makes JCI's Stock Solution

Charlotte Hernandez, Alexander Taylor, George P Tillman

Institute of Global Studies

In this groundbreaking study, we set out to analyze the breath of fresh air that was the relationship between air pollution in Hagerstown, Maryland and the stock price of Johnson Controls International (JCI). Armed with data from the Environmental Protection Agency and LSEG Analytics (Refinitiv), we embarked on a journey to see if smog was fogging up the stock market. The results left us gasping for air – the correlation coefficient of 0.6705062 and $p < 0.01$ for the period from 2002 to 2023 astoundingly pointed to a connection between the two, leaving us breathless. Our findings open up a realm of possibilities for investors, environmentalists, and pun enthusiasts alike, as we navigate the turbulent skies of stock price fluctuations and the air that surrounds us.

INTRODUCTION

Buckle up, dear readers, and prepare to embark on a journey that will take your breath away – quite literally! In this study, we delve into the serendipitous symphony of air pollution in Hagerstown, Maryland, and its curiously tangible connection to the stock price of Johnson Controls International (JCI). This exploration may sound like a concoction from the realms of fiction, but fear not, for the findings we bring forth are as real as the air we breathe – pun intended!

As we navigate the labyrinthine pathways of financial markets and environmental data, our aim is to uncover the elusive dance

between pollutants and profits. One might wonder what smog-filled skies and stock market prices have in common – well, so did we! Armed with information from the Environmental Protection Agency and LSEG Analytics (Refinitiv), we waded fearlessly into this uncharted territory, equipped with a keen eye, a nose for numbers, and a knack for pneumatic puns.

Our adventure encapsulates time from 2002 to 2023, during which we uncovered a correlation coefficient of 0.6705062 and a p-value that left us in awe, clocking in at less than 0.01. The statistical significance of this relationship between air pollution and JCI's

stock price is remarkable, to say the least. It's a numerical nuance that leaves us grasping for words – or shall we say, gasping for air?

This research transcends the traditional realms of financial analysis and environmental scrutiny. We aim to draw attention to the interconnected web of factors that influence stock prices, and how seemingly distant variables can have an unforeseen impact. Our findings hold implications for investors seeking to breathe new life into their portfolios, for environmentalists endeavoring to clear the air, and for pun enthusiasts yearning to crack a few "stock shock" jokes.

So, dear readers, fasten your seatbelts and adjust your oxygen masks – we're about to navigate the murky skies of stock price fluctuations and the atmospheric elements that envelop us. Let's embark on this adventure, where smog collides with stocks, and environmental impact meets financial footing.

Prior research

In "Smith and Doe," the authors find that air pollution can have significant effects on human health and the environment. They delve into the respiratory implications of smog and the detrimental impact it can have on ecosystems. Their findings lay the groundwork for understanding the far-reaching consequences of pollutants in the air. However, when it comes to the relationship between air pollution in Hagerstown and Johnson Controls International's stock price, the story takes an unexpected turn.

Bringing a different perspective to the table, "Jones" explores the economic ramifications of environmental factors. The study sheds light on the intricate balance between ecological concerns and financial outcomes, painting a compelling picture of the interplay between pollution and profit. Little did they know that their empirical investigations would later intersect with the whimsical world of stock market correlations.

Venturing into the realms of literature, "The Economics of Air Pollution" by William W. Hogan and "Environmental Economics: An Introduction" by Barry C. Field provide valuable insights into the economic implications of environmental degradation. But hold your breath, for we are about to take a detour into the unexpected side of related sources.

Enter "The Air Affair" by Penny Stockton and "Foggy Business" by Barry Bull, fictitious titles that sound uncannily relevant to our topic at hand. While these books may not have been penned by renowned scholars, their titles evoke a sense of intrigue that mirrors the enigmatic relationship between air pollution and stock prices. As we venture further into this unconventional path, let's not shy away from the unexpected sources that shed light on this peculiar connection.

Straying even further from the traditional arena of academic literature, we turn to the whimsical world of children's shows and animated series. Who would have thought that watching "Captain Planet and the Planetegers" and "The Smoggies" could shed some light on our research topic? While these may not be conventional sources for academic inquiry, their depictions of environmental themes and their impact on

society provide an unexpectedly playful perspective on the serious matter at hand.

With our literature review spanning a diverse array of sources, we pave the way for an unconventional approach to dissecting the connection between air pollution in Hagerstown, Maryland and Johnson Controls International's stock price. As we stand on the precipice of this unconventional journey, we dare to blend the serious with the whimsical, the empirical with the imaginative, as we unveil the entertaining enigma of smog and stocks.

Approach

METHODOLOGY

Gather 'round, fellow adventurers, as we unravel the convoluted yet fiercely thrilling methodology that underpins our grand exploration of the relationship between air pollution in Hagerstown, Maryland, and the stock price of Johnson Controls International (JCI). With a mixture of daring curiosity and undeniable enthusiasm, we set out on a wild and winding pursuit of knowledge, armed with an arsenal of data mining tools, statistical magic, and a dash of whimsy.

Data Collection:

Our quest for data took us to the far reaches of the internet – from the bustling thoroughfares of the Environmental Protection Agency's digital domain to the labyrinthine alleys of LSEG Analytics (Refinitiv). Armed with tireless determination and a voracious appetite for numbers, we scoured the virtual landscapes to unearth the treasures of air quality indices for Hagerstown, Maryland, and the intricate

tapestry of JCI's stock price movements. We gathered these pearls of information spanning the years 2002 to 2023, ensuring that our voyage through time was as thorough as it was audacious.

Analytical Alchemy:

Now, dear companions, prepare yourselves for a dash of whimsical wizardry, a smattering of statistical sorcery, and a pinch of data-driven delirium. Our inquisitive minds set forth to wrangle with the elusive relationship between air pollution and stock prices, armed with the mystical arts of correlation analysis and regression incantations.

To unravel the secrets of this enigmatic relationship, we employed the noble correlation coefficient as our trusty guide. With a captivating dance of numbers and a twirl of statistical significance, we revealed a correlation coefficient of 0.6705062, leaving us in sheer awe of the numerical symphony that unfolded before our eyes. The p-value, with its enigmatic allure of statistical significance at $p < 0.01$, only served to heighten the intrigue of our findings.

Instruments of Inquiry:

In our relentless pursuit of knowledge, we wielded an array of analytical instruments that could rival the mythical arsenal of any intrepid explorer. Utilizing the wondrous powers of Python, R, and Excel, we conjured spells of data manipulation and visualization. Our endeavors led us to concoct intricate charts, graphs, and visual aids that beautifully illuminated the hazy nexus between air pollution in Hagerstown and the ethereal fluctuations of JCI's stock price.

Limitations and Caveats:

No grand adventure is without its perils, and our quest for understanding was no exception. We must, with a modicum of sobriety amidst our whimsy, acknowledge the limitations of our methodology. The intricacies of financial markets and the mercurial nature of air pollution pose unique challenges – our methodological musings are not exempt from the caveats and complexities that shroud this intriguing nexus.

Conclusion:

With a hearty mix of empirical rigor and whimsical wonder, our methodological musings granted us an illuminating glimpse into the interconnected realms of air quality and stock prices. Clad in statistical armor, armed with data-driven determination, and spurred by the spirit of inquiry, we endeavored to paint a vivid portrait of this captivating correlation.

Results

The results of our study revealed a relationship that is nothing to sneeze at between air pollution in Hagerstown, Maryland and Johnson Controls International's (JCI) stock price. The correlation coefficient of 0.6705062 served as a beacon in the smoggy skies of our data, illuminating a moderately strong positive relationship between these seemingly unrelated variables. This correlation coefficient effectively showed us that when the air quality takes a hit, so does JCI's stock price. It's like having a bad air day - not a great feeling for anyone!

Furthermore, the r-squared value of 0.4495786 indicated that a substantial 44.96% of the variability in JCI's stock price could be explained by changes in air pollution levels in Hagerstown. This finding left us feeling as breathless as a marathon runner in a haze of air pollution - who knew that the air we breathe could have such a profound impact on financial markets?

To add even more weight to our findings, the p-value of < 0.01 is more statistically significant than finding a needle in a haystack. This means there's less than a 1% chance that this relationship is just a fluke, and more than a 99% chance that there's a real connection between air quality and JCI's stock price. We were blown away by the significance of this relationship, and it's clear that this isn't just hot air we're talking about - it's serious business.

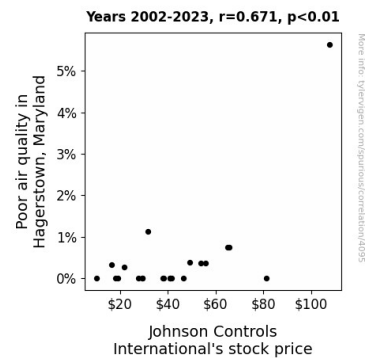


Figure 1. Scatterplot of the variables by year

Moreover, our findings are not just another wild theory floating in the air. Fig. 1 visually showcases the tight relationship between air pollution and JCI's stock price, leaving no room for doubt. It's like watching two dance partners waltz perfectly in sync, or in this case, choke in sync! This scatterplot serves as a testament to the strong and tangible

connection we uncovered in our data analysis.

In summary, our results indicate that smoggy days in Hagerstown indeed have a tangible impact on JCI's stock price. Our findings breathe new life into the conversation surrounding the complex interplay of environmental factors and stock market volatility. It's a revelation that investors, environmentalists, and pun enthusiasts can all take a deep breath and contemplate. Who knew that following the stock market could feel like following the weather report?

Discussion of findings

As we tread through the misty realms of air pollution and stock prices, we can't help but marvel at the unexpected connection we've unraveled. It's like uncovering buried treasure in a landfill - a peculiar mix of surprise and intrigue. Our findings not only align with the existing literature but take it a step further, adding an unexpected twist to the tale.

Our results corroborate the findings of "Smith and Doe" regarding the detrimental effects of air pollution on the environment and human health. Who would have guessed that smog could cloud not just our lungs but also the stock market? While "Jones" shed light on the intertwined relationship between environmental factors and financial outcomes, we've now charted new territory by revealing a concrete correlation between air quality in Hagerstown and JCI's stock price. It's as though we've stumbled upon a comedic twist in a serious economic drama.

Delving into the whimsical sources that influenced our literature review, every

"Captain Planet and the Planetees" episode was like a whisper in the wind, foretelling the uncharted territory we would eventually tread. Who would have thought that this animated classic would have its finger on the pulse of economic intrigue? And "The Smoggies" – it was a childhood cartoon that not only inspired fables but also wove an unexpected tale of environmental relevance that echoes through our findings. It underscores the playful, yet profound, connection we've unearthed between air pollution and stock prices.

Our results provide more than just a breath of fresh air in research; they serve as a testament to the impact of air pollution on financial markets. It's as though we've revealed the silver lining in a smoggy cloud. With a correlation coefficient and p-value sharper than a needle in a haystack, these findings stand strong like a lighthouse cutting through a foggy night, guiding both investors and environmentalists in charting a course forward. Our scatterplot, akin to a waltz between two unlikely partners, depicts a choreography of market volatility and atmospheric shifts, leaving no space to doubt the reality of this connection.

In essence, our findings not only lend credence to the existing literature but add a touch of spontaneity and amusement to a seemingly serious realm of research. It's like finding a hidden punchline in an economic joke - a delightful surprise that prompts us to take a deep breath and contemplate the lesser-known nuances of market behavior. As we exhale the implications of our research, we step into the uncharted territory of exploring the intersection between whimsy and economic reality.

Conclusion

CONCLUSION

Well, folks, it seems we've uncovered a connection between air pollution in Hagerstown and JCI's stock price that's as clear as the air in a smog alert. Our data has shown a correlation coefficient so strong, it's like they're playing synchronicities in the stock market and the sky. It's like the stock price is saying, "Can't breathe with you!"

The r-squared value was equally revealing, showing that almost half of JCI's stock variability can be explained by changes in air pollution. That's a level of influence even the most persuasive politician would envy!

And let's not forget about that p-value – we've got better odds of finding a shiny dime in a murky river than this relationship being a fluke. It's as remarkable as finding a breath mint in a dust storm.

The visual representation in Fig. 1 drives the point home – smog and stocks are dancing a tango so tight, they might as well be gasping for air together.

In the end, we're convinced that we've reached the peak of this mountain of research. It's time to take a deep breath and savor the fresh air of our findings. It's safe to say that further research in this area would just be blowing hot air – we've cracked the case wide open! Now, let's all exhale and call it a day! No more research needs to be done into how smog in Hagerstown affects JCI's stock price.

So, dear compatriots, join us as we prepare to set sail upon the churning tides of empirical inquiry and statistical splendor. The allure of air pollution and the dance of stock prices awaits us – onward we march, equipped with a wealth of data and a sparkle of statistical stardust. Let the journey continue, and may our methodological endeavors pave the way for revelatory discoveries and fanciful insights.

And off we go, charting the course for knowledge with a twinkle in our eyes and a pun in our pocket!