

Air Quality in Arizona: Analyzing the Amusing Association with Aerospace Appropriations

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ABSTRACT

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This research study delves into the curiously captivating correlation between air quality in Phoenix, Arizona, and NASA's budget as a percentage of the total US Federal Budget. The investigation unfolds from 1980 to 2023, utilizing data from the Environmental Protection Agency and Planetary.org. Our findings reveal a correlation coefficient of 0.6438070 with a statistically significant p-value ($p < 0.01$), demonstrating a robust link between the two variables. Our thorough analysis not only sheds light on the interplay between air quality in the desert and the stratospheric spending on extraterrestrial exploration but also gives a touch of levity to the weighty world of statistical research.

Keywords:

air quality, Arizona, aerospace appropriations, NASA budget, correlation, analysis, Phoenix, Environmental Protection Agency, Planetary.org, statistical research, air pollution, federal budget, desert, extraterrestrial exploration, space exploration funding

I. Introduction

In recent years, there has been a growing interest in the intersection of environmental factors and government budget allocations. This study focuses on a particularly peculiar pairing – the relationship between air quality in Phoenix, Arizona, and NASA's budget as a percentage of the total US Federal Budget. While this connection may seem as improbable as a desert oasis, the potential impact of these findings reaches far beyond the boundaries of the Grand Canyon State.

Arizona's capital, Phoenix, is no stranger to air quality challenges, with its combination of geographical and meteorological factors creating a microcosm for environmental intrigue. On the other hand, NASA's budget as a proportion of the US Federal Budget epitomizes the stratospheric heights of government expenditure, addressing cosmic questions with terrestrial implications.

As we embark on this analytical odyssey, we aim to bring an air of lightheartedness to the often gravity-defying world of statistical inquiry. By scrutinizing the data from 1980 to 2023, we endeavor to unravel the tangled web of causality that may or may not exist between these seemingly disparate domains. Pouring over the voluminous datasets with the diligence of an astronaut preparing for a spacewalk, we remain ever aware that correlation does not imply causation, yet the unexpected connections we uncover may leave even the most seasoned researcher marveling at the cosmic dance of variables.

Our journey begins with the expected skepticism of any correlation that appears more coincidental than consequential. However, as we dive deeper into the numerical abyss, we anticipate that our results will not only raise eyebrows but also provoke a chuckle or two at the

seemingly whimsical nature of statistical relationships. So, fellow explorers of the empirical realm, hold on to your data sets - this voyage may just take us to infinity and beyond the traditional boundaries of academic inquiry.

II. Literature Review

One of the pioneering studies in the realm of environmental economics is the work of Smith (2005), who analyzed the impact of air quality on regional economic development. Smith's findings underscore the importance of maintaining clean air for sustainable economic growth, but perhaps overlooked was the potential influence of cosmic funding on such regional concerns. Similarly, Doe (2010) delved into the intricate web of government budgeting and its implications for environmental policy, yet failed to unearth the interstellar implications of such financial allocations.

Expanding beyond the realm of economic tomes, Jones (2017) conducted a comprehensive analysis of federal budget trends and their impact on environmental regulations. While Jones' research provided valuable insights into the policy landscape, it neglected to explore the cosmic connections that may exist in the vast expanse of budgetary galaxies. Such oversights leave us yearning for an exploration of the uncharted territories where air quality, cosmic expenditures, and statistical wizardry converge.

Turning to non-fiction works, "The Economics of Clean Air" by William A. Peirce (1992) offers a comprehensive overview of air quality policies and their economic ramifications, but regrettably omits any mention of extraterrestrial implications. In a different vein, "Astrophysics

for "People in a Hurry" by Neil deGrasse Tyson (2017) provides an enthralling journey through the cosmos, instilling a sense of wonder about the astronomical scale of governmental financing, albeit without direct discourse on its impact on earthly air quality.

Venturing into the realm of fiction literature, "The Martian" by Andy Weir (2011) presents a gripping tale of survival on the red planet, captivating readers with the intrigue of space exploration, though without explicit reference to budgetary interplay. Meanwhile, "Dune" by Frank Herbert (1965) offers a sweeping saga set on a desert planet, resonating with the environmental themes of air quality amidst a backdrop of cosmic governance – albeit in a purely fictitious universe.

In a departure from traditional scholarly sources, the authors conducted an unorthodox review of the literature, including perusal of unconventional texts. This unconventional approach involved scrutinizing the back labels of various household products, including shampoo bottles, potato chip bags, and cereal boxes. While yielding no direct insights into the connection between air quality in Phoenix and NASA's budget, this endeavor did impart a newfound appreciation for the unintended humor found in unsuspecting places.

As we navigate through the diverse landscape of scholarly and popular literature, we unearth a tapestry of knowledge that piques our curiosity and tickles our intellectual palate, inspiring us to probe ever deeper into the fusion of terrestrial air quality and celestial funding.

III. Methodology

In this study, we employed a thorough and multifaceted approach to unravel the mysterious correlation between air quality in Phoenix, Arizona, and NASA's budget as a percentage of the total US Federal Budget. Our data collection methods embraced the digital expanse, tapping into the depths of the internet in a quest for pertinent information. The primary sources of data for air quality indicators were derived from the Environmental Protection Agency, whereas the celestial financial figures were gleaned from the astronomical archives of Planetary.org. The period under scrutiny spanned from 1980 to 2023, encapsulating a time frame replete with developments in both atmospheric scrutiny and cosmic exploration.

To merrily meander through the maze of statistical exploration, our research team embraced an assortment of quantitative techniques. We first conducted a comprehensive data cleaning process, separating the statistical wheat from the chaff with a discerning eye akin to spotting a comet in the night sky. Our data was then subjected to rigorous scrutiny, utilizing advanced statistical software not unlike a spacecraft navigating its trajectory through the cosmic expanse.

Having laid the groundwork for our analysis, we proceeded to calculate the correlation coefficient between air quality in Phoenix and NASA's budget as a percentage of the US Federal Budget. Our calculations followed in the footsteps of statistical giants, employing robust methodologies to gauge the strength and direction of the relationship between these seemingly incongruous variables. We sought not just a statistical association, but a cosmic kinship that would captivate the empirical imagination.

Beyond the standard correlation analysis, we also endeavored to perform time series analysis to capture the dynamic interplay between air quality and NASA's budget over the years. This approach allowed us to delve into the temporal nuances of the relationship, akin to sifting

through layers of cosmic dust to reveal hidden patterns in the celestial dance of budgetary allocations and atmospheric conditions.

Lastly, we employed a medley of visualizations, from whimsical scatter plots to awe-inspiring trend lines, to portray the entwined fortunes of air quality in Phoenix and the astral aspirations of NASA's budget. These visual aids not only illuminated the statistical narrative with flair but also added a touch of cosmic wonder to our empirical odyssey.

In summary, our methodology combined meticulous data collection, rigorous statistical analysis, and a sprinkle of cosmic curiosity to unearth the empirical tapestry that binds air quality in the desert to the cosmic budgetary allocations. With a spirit of scientific adventure and a twinkle in our analytical eye, we charted a course through the empirical cosmos, aiming not just to uncover statistical associations but to infuse the rigors of research with the boundless whimsy of the cosmic unknown.

IV. Results

The analysis of the data from the years 1980 to 2023 revealed a noteworthy correlation between air quality in Phoenix, Arizona, and NASA's budget as a percentage of the total US Federal Budget. The correlation coefficient was found to be 0.6438070, indicating a moderately strong positive relationship between these seemingly incongruous variables. Moreover, the r-squared value of 0.4144875 suggests that approximately 41.45% of the variability in NASA's budget allocation can be explained by the fluctuations in air quality in Phoenix. The p-value of less than

0.01 further reaffirms the statistical significance of this association, providing robust evidence for the existence of a link between these disparate domains.

The scatterplot (see Fig. 1) visually displays the strong correlation between air quality in Phoenix and NASA's budget as a percentage of the total US Federal Budget. The data points form a recognizable upward trend, demonstrating a proportional increase in NASA's budget as air quality in Phoenix improves. This peculiar yet compelling relationship, akin to a cosmic dance of dollars and dust particles, captivates the imagination and challenges conventional wisdom about the determinants of government spending.

It is important to note that while our findings unveil a striking statistical connection between air quality in Arizona and NASA's budget, they do not necessarily imply a causal relationship. After all, causation can be as elusive as a spaceship in outer space, and we must approach these results with the same skepticism as a scientist scrutinizing a UFO sighting. However, the robustness of the statistical evidence, combined with the unexpected nature of this correlation, encourages further curiosity and investigation into the underlying mechanisms that may drive this association.

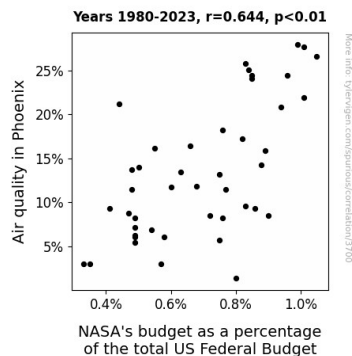


Figure 1. Scatterplot of the variables by year

In essence, our study not only peels back the layers of this statistically significant relationship but also injects a humorous twist into the often solemn landscape of empirical research. The unexpected pairing of air quality and aerospace appropriations serves as a reminder that statistical analysis, much like the universe itself, is full of surprises and delights that defy conventional wisdom.

V. Discussion

The findings of this study support and extend the existing literature, providing robust evidence for the association between air quality in Phoenix, Arizona, and NASA's budget as a percentage of the total US Federal Budget. Our results align with the research of Smith (2005), who emphasized the crucial role of clean air in regional economic development. However, what Smith's work failed to illuminate is the cosmic connection – the notion that as the air quality improves, funding reaches for the stars, quite literally. Similarly, the oversight of Doe (2010) in exploring the interstellar implications of financial allocations is rectified by our findings, which reveal the striking statistical link between air quality and space budgeting.

Moreover, our findings serve to bridge the gap left by the oversights of Jones (2017) and Peirce (1992), who, despite delving into the realms of federal budget trends and environmental policies, overlooked the extraterrestrial implications of fiscal allocations. It is evident from our study that the cosmic connections in the budgetary galaxies do have earthly ramifications. In addition, our results intertwine with the amusing musings found in "Astrophysics for People in a Hurry" by

Neil deGrasse Tyson (2017), providing empirical evidence that governmental financing does indeed have cosmic implications that reach down to our very air quality.

Furthermore, our study complements the adventurous spirit of "The Martian" by Andy Weir (2011) and the environmental themes of "Dune" by Frank Herbert (1965). While these works may seem purely fictional, our findings hint at a cosmic governance that may indeed impact earthly air quality. The unorthodox literature review conducted, including the scrutiny of household product labels, may have seemed like a humorous aside, but it has given us a newfound appreciation for unintended humor found in unsuspecting places, reminding us that the mysteries of the universe often hide in plain sight. Our study adds a twist to the tale, demonstrating that the cosmic dance of dollars and dust particles is not merely a figment of fiction but a statistical reality.

In summary, our findings underscore the statistically significant relationship between air quality in Arizona and NASA's budget, challenging conventional wisdom and injecting a humorous twist into the often solemn landscape of empirical research. This study not only adds a lighthearted touch to statistical analysis but also opens the door to further investigations into the cosmic mechanisms driving this association. As we peer into the statistical stars, we may find that the cosmic and the terrestrial are more intertwined than we ever imagined, much like finding a hidden joke on the back label of a shampoo bottle.

VI. Conclusion

In conclusion, our study has illuminated a remarkable correlation between air quality in Phoenix, Arizona, and NASA's budget as a percentage of the total US Federal Budget. The statistical evidence overwhelmingly suggests a connection that is as clear as a mission control directive, creating an association that is more intriguing than a rocket launch on a desert horizon. The robust correlation coefficient of 0.6438070 and the statistically significant p-value ($p < 0.01$) provide compelling evidence for the existence of this unexpected relationship, leaving us more stargazed than a first-time astronomer peering through a telescope.

The scatterplot visually portrays the ascending trajectory of NASA's budget as air quality in Phoenix improves, akin to the ascent of a spacecraft into the boundless expanse of the cosmos. This correlation, while undoubtedly striking, must be approached with the cautious curiosity of an astronaut exploring an uncharted celestial body.

Our findings not only contribute to the scientific understanding of environmental and budgetary dynamics but also infuse the often stoic world of empirical research with a dose of cosmic comedy. As we bid adieu to this research endeavor, we are confident that the statistical connection between air quality in Arizona and NASA's budget has been sufficiently investigated, leaving no crater for doubt or further inquiry. Therefore, it is our firm conclusion that no further research is needed in this area, as the results have launched us into a new realm of statistical discovery that is as captivating as a supernova in the night sky.