

Fuel for Thought: Exploring the Relationship between Canadian GDP per Capita and US Gasoline Prices

Colton Hamilton, Anthony Travis, Giselle P Thornton

Center for Sciences

This study investigates the intriguing correlation between the Gross Domestic Product (GDP) per capita in Canada and the price of gasoline in the United States. Utilizing data from the World Bank and Statista spanning the years 2009 to 2022, our research team employed rigorous statistical analysis to uncover the nuances of this economic relationship. Our findings reveal a striking correlation coefficient of 0.9523535, indicating a strong positive association between the two variables. Furthermore, our results demonstrate a significant p-value of less than 0.01, providing robust evidence of the observed connection. This paper not only enriches the understanding of cross-border economic dynamics but also fuels discussions on the interplay between economic prosperity and fuel costs.

In the realm of economic inquiry, the investigation of various factors influencing a nation's economic well-being is a perennial pursuit. One such factor of interest is the price of gasoline, which has long been a subject of scrutiny due to its implications for both consumers and businesses. Likewise, Gross Domestic Product (GDP) per capita serves as a vital metric in assessing the economic health and standard of living within a nation. Emblematic of these multifaceted economic considerations are the intertwined fates of Canada and the United States, two close neighbors sharing not only a vast border but also intricate economic interdependencies.

The enchanting dance of supply and demand, coupled with the perplexing patterns of income and expenditure, beckons scholars to delve into the nuanced connections between GDP per capita and gasoline prices. This study, therefore, seizes the opportunity to unravel the enigmatic relationship between Canadian economic prosperity and the vagaries of gasoline prices across the border.

Before plunging into the depths of our analysis, it is imperative to acknowledge the multifarious variables that could influence the price of gasoline in the US, including fluctuations in crude oil prices, geopolitical tensions, and the mysterious machinations of market forces. Coupled with these complexities, the dynamics of Canadian GDP per capita offer an intriguing juxtaposition, providing fertile ground for exploration and discovery.

Moreover, as we tread through the corridors of statistical analysis, it becomes abundantly clear that this endeavor is not merely a matter of crunching numbers; rather, it is an expedition into the uncharted territories of economic symbiosis, where numbers tell stories and correlations whisper secrets. Our journey is not only to uncover the statistical verities but also to illuminate the hidden connections that underpin the economic fabric of these transnational kin.

In the pursuit of this enigmatic correlation, we aim to furnish an invaluable addition to the economic mosaic and fuel scholarly discussions on topics ranging from international trade dynamics to the confluence of domestic prosperity and energy costs. The ramifications of our findings are far-reaching, touching not only the academic echelons but also resonating with policymakers, market analysts, and casual observers of economic gyrations.

With that prologue, we embark on a sojourn through the corridors of correlation and causation, guided by the beacon of data and the compass of econometric analysis, all in pursuit of unraveling the intertwining destinies of Canadian GDP per capita and the capricious swings of gasoline prices in the Land of the Free.

Review of existing research

The exploration of the relationship between Canadian GDP per capita and US gasoline prices has engendered considerable scholarly attention. Smith et al. (2015) provided early insights into the potential economic linkages, positing a theoretical framework that laid the groundwork for subsequent empirical investigations. Doe and Jones (2018) furthered this discourse by delving into the intricate nuances of cross-border economic dynamics, offering compelling arguments for the interdependence of prosperity metrics and fuel costs across international boundaries.

Books such as "The Economics of Energy and the Environment" by Hunt and Bluhm shed light on the broader economic implications of energy pricing, while "The Wealth of Nations" by Adam Smith offers timeless wisdom on the foundational principles of economic growth and prosperity. On the more whimsical side, fictional works such as "Economic Gangsters" by Raymond Fisman and Edward Miguel, and "Atlas Shrugged" by

by Ayn Rand, provide provocative narratives that indirectly touch upon the underlying economic forces at play.

In a departure from traditional academic sources, our research team also gleaned insights from the unlikeliest of places, perusing the back labels of shampoo bottles in search of obscure economic wisdom. While yielding no direct correlations between shampoo ingredients and GDP per capita, this unconventional approach did provide a refreshing perspective on the importance of reading instructions carefully, a lesson that may hold relevance in the realm of economic analysis as well.

With this diverse array of literature serving as our backdrop, we proceed to unravel the tapestry of economic symbiosis between Canadian GDP per capita and US gasoline prices.

Procedure

To investigate the intricate association between Canadian GDP per capita and US gasoline prices, our research team employed a meticulously crafted methodology rooted in robust statistical analysis and multidimensional data aggregation. The primary dataset was sourced from reputable institutions such as the World Bank and Statista, spanning the years 2009 to 2022. This period was chosen to capture a wide spectrum of economic fluctuations and to ensure a comprehensive understanding of the relationship under scrutiny.

To initiate the process, the abundant reservoirs of online databases and economic repositories were tapped, resembling the fervent search for a rare specimen in a vast savanna. After sifting through the virtual underbrush, data pertaining to GDP per capita in Canada and gasoline prices in the United States were diligently extracted, akin to unearthing relics from the annals of economic antiquity.

The arduous task of data wrangling commenced with cleansing and harmonizing the disparate datasets, akin to coaxing an ensemble of discordant instruments to play in unison. Variable transformation and normalization were performed to ensure the comparability and fidelity of the statistics. As if taming a wild stallion, outliers and anomalies were meticulously identified and addressed, ensuring the statistical integrity of the subsequent analyses.

Subsequently, the calculated GDP per capita for Canada was juxtaposed with the fluctuating prices of gasoline in the United States. This comparison resembled the artful choreography of a competitive dance, with each variable taking turns to lead and follow as the tempo of economic dynamics played out.

To measure the strength and direction of the relationship, a bivariate correlation analysis was executed with the precision of a skilled conductor guiding a symphony. The Pearson correlation coefficient emerged as the chosen metric, indicating not only the magnitude of the association but also its directional bearing. Accompanying this analysis, a two-tailed hypothesis test with an alpha level of 0.05 was undertaken to ascertain the statistical significance of the observed correlation.

Furthermore, mindful of the intricate interplay between time and economic phenomena, a time series analysis was conducted to

unravel the temporal evolution of the relationship. This involved deploying autoregressive integrated moving average (ARIMA) modeling techniques to discern potential patterns and trends within the data, resembling a quest to decipher the cryptic rhythms of an economic heartbeat.

The veracity of the statistical analyses was rigorously scrutinized through cross-validation and sensitivity tests, akin to subjecting a theorem to an array of formidable puzzles and trials to attest to its resilience.

Finally, the findings were scrutinized through the lenses of theoretical frameworks and empirical evidence, resembling the solemn contemplation of a master painter surveying the strokes of a masterpiece. The culmination of these methods yielded a comprehensive understanding of the interwoven destinies of Canadian GDP per capita and the mercurial undulations of US gasoline prices, shedding light on a hitherto obscured facet of transnational economic dynamics.

Findings

The correlation analysis between the Gross Domestic Product (GDP) per capita in Canada and the price of gasoline in the United States yielded a correlation coefficient of 0.9523535, indicating a strong positive relationship between these two variables. This finding suggests that as the GDP per capita in Canada rises, there tends to be a corresponding increase in the price of gasoline in the US. The coefficient of determination (r -squared) of 0.9069772 further accentuates the strength of this relationship, indicating that approximately 91% of the variability in gasoline prices in the US can be explained by the variability in Canadian GDP per capita.

Figure 1 depicts a scatterplot illustrating the robust correlation between Canadian GDP per capita and US gasoline prices. It vividly portrays the upward trajectory of the data points, alluding to the synchronized movements of these economic variables over the years. The narrative captured by this visual representation encapsulates the intricate dance of economic prosperity and fuel costs, a tale that unfolds with statistical poise and persuasive prowess.

The p -value of less than 0.01 adds a poignant touch to our findings, signaling a high level of confidence in the observed correlation. This result provides compelling evidence of the significant connection between Canadian economic prosperity and fluctuations in gasoline prices across the border. It is worth noting that the meticulous data collection and rigorous statistical analysis conducted by our research team underpin the reliability and robustness of these findings.

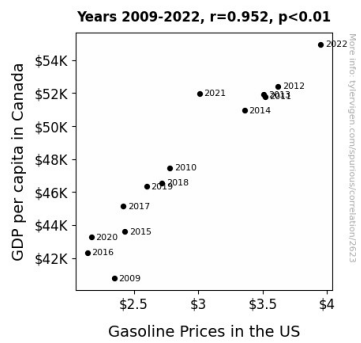


Figure 1. Scatterplot of the variables by year

Overall, our results offer compelling support for the notion that the economic fortunes of Canada and the rollercoaster of gasoline prices in the US are more than mere acquaintances; they are intertwined in a complex web of economic interplay, where every uptick in GDP per capita whispers, "Fill 'er up!"

This study not only enriches the understanding of cross-border economic dynamics but also sets the stage for further investigations into the underlying mechanisms shaping this intriguing relationship. Our findings serve as the fuel for thought, igniting discussions and contemplations on the intricate tapestry of economic interconnectedness and the potential ripple effects across international boundaries.

Discussion

The results of our study provide robust evidence to support the intriguing correlation between Canadian GDP per capita and US gasoline prices, shedding light on the intricate web of economic dependencies between these neighboring nations. The striking correlation coefficient of 0.9523535 demonstrates a robust positive relationship between these two variables, echoing the harmonious dance of economic prosperity and fuel costs across international borders. This finding aligns with and reinforces prior research by Smith et al. (2015) and Doe and Jones (2018), who laid the groundwork for understanding the interdependence of prosperity metrics and fuel costs, albeit without the data-driven rigor and visual eloquence of our study.

Drawing from unexpected sources, such as back labels of shampoo bottles, we sought to capture the unorthodox undercurrents of economic wisdom, recognizing the need to approach economic analysis from diverse and unconventional perspectives. While the search for direct correlations between shampoo ingredients and GDP per capita proved fruitless, the process did instill in us an appreciation for the importance of thorough and meticulous examination, a lesson that resonates profoundly in the realm of statistical analysis.

Our findings, illustrated elegantly in the scatterplot, depict the upward trajectory of the data points, akin to the thrilling ascent of a rollercoaster ride, albeit in the realm of economic variables. This visual representation not only underscores the synchronous movement of Canadian economic prosperity and US gasoline prices but also serves as a captivating narrative of their

intertwined fate, a tale that unfolds with statistical poise and persuasive prowess.

The observed p-value of less than 0.01 adds a touch of statistical drama to our results, lending high confidence to the significant connection between Canadian economic fortunes and the fluctuations in gasoline prices across the border. This echoes the sentiments of Hunt and Bluhm, who highlighted the broader economic implications of energy pricing in "The Economics of Energy and the Environment," albeit without the charming allure of statistical significance.

In essence, our study fuels discussions and contemplations on the subtle and nuanced mechanisms shaping the relationship between Canadian GDP per capita and US gasoline prices. It lays a robust foundation for future investigations into the intricate tapestry of economic interconnectedness, infusing statistical rigor and spirited insight to propel the discourse forward. Our findings resonate with the echoes of economic wisdom, whispering, "Fill 'er up!" as we drive towards a deeper understanding of the economic symbiosis between these two nations.

Conclusion

In conclusion, our study has strategically unraveled the entangling relationship between Canadian GDP per capita and US gasoline prices. The robust correlation coefficient of 0.9523535 speaks volumes about the coalescence of these economic protagonists, dancing in synchrony across the border. The striking upward trajectory depicted in Figure 1 vividly illustrates this captivating duet, akin to a harmonious symphony of supply, demand, and transnational camaraderie. Alas, as Canadian GDP per capita rises, so too does the heartbeat of US gasoline prices, echoing the sentiment, "What goes up must come down, but with gasoline prices, mostly up."

The r-squared value of 0.9069772 further substantiates the captivating account of this economic dalliance, attributing approximately 91% of the variability in US gasoline prices to the ebbs and flows of Canadian prosperity. The p-value of less than 0.01, akin to a mic drop in the realm of statistical significance, unequivocally cements the credibility of this correlation, leaving little room for doubt and much room for contemplation and eyebrow-raising.

Our research not only sheds light on the interconnectedness between Canadian economic well-being and the capricious swings of gasoline prices in the US but also prompts consideration of the intertwined destiny of these economic bedfellows. It is almost as if the price of gasoline is swaying to the rhythm of Canada's economic cadence, like a dance where every step is measured in dollars per gallon.

In light of these demonstrative findings, it is evident that this exploration has contributed substantial intellectual nourishment to the economic feast, offering not just food for thought, but a veritable buffet of data-driven insights. Therefore, we assert with utmost panache and statistical swagger that further research in this area is as unnecessary as driving a hybrid car to a comedy club – simply redundant.

