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Research Article

A Correlation Analysis between Weather Conditions and Stock Market Prices in the Philippines

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ABSTRACT

This study examines the relationship between weather conditions and stock market performance in the Philippines, a tropical country characterized by high temperature variability and an active financial market. The research addresses a gap in local empirical studies exploring whether daily temperature fluctuations affect market behavior. Using a quantitative correlational design, the study analyzed annual data from 2014 to 2023 on minimum and maximum temperatures (sourced from PAGASA) and Philippine Stock Exchange Index (PSEi) values (sourced from Yahoo Finance). The data were analyzed using SPSS, employing the Pearson correlation coefficient with a significance level of 0.05. Results revealed a weak positive correlation between maximum temperature and stock prices ($r = 0.35, p = 0.3261$) and a moderate negative correlation between minimum temperature and stock prices ($r = -0.47, p = 0.1664$), both of which were statistically insignificant. These findings suggest that temperature variations do not meaningfully predict stock market movements in the Philippine context. The study concludes that market fluctuations are primarily driven by macroeconomic and global factors rather than weather-related sentiment. It recommends that investors rely on technical and fundamental analyses instead of climate-based speculation.

Keywords: Correlation analysis, Philippines, Stock market prices, Temperatures, Weather

Background

The influence of weather on stock market behavior has long intrigued economists and behavioral finance scholars. Weather variables, such as temperature, humidity, and sunlight exposure, are believed to influence investor

mood, risk perception, and ultimately, market returns. For instance, studies by Sariannidis et al. (2016) and Wang et al. (2021) found that mood-related weather factors can influence trading aggressiveness and market activity. Conversely, other studies suggest negligible or

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inconsistent effects, underscoring the complexity of the weather–market nexus (Apergis et al., 2016; Trifan, 2021).

In tropical economies like the Philippines, characterized by high humidity, monsoons, and extreme heat, examining the potential influence of weather on market behavior is particularly relevant. Despite an active financial market, local studies examining this relationship remain limited, presenting a research gap that this study aims to address.

Understanding whether temperature fluctuations affect investor sentiment and stock market performance has practical implications. It can inform risk management strategies, help investors interpret market anomalies, and guide policymakers in framing climate-resilient economic policies. Thus, this study examines the correlation between minimum and maximum temperatures and stock market prices in the Philippines.

The literature remains divided. For example, Adom (2024) found that rising temperatures reduce stock returns in developing economies, while Apergis (2023) observed that temperature shocks can influence global stock returns. Similarly, Peillex et al. (2021) noted that extreme heat events affect trading volume and volatility. However, Kathiravan et al. (2021) found no significant association between daily weather and market movement, emphasizing that broader macroeconomic factors dominate investor decision-making.

This divergence highlights the need for context-specific evidence. Hence, this research focuses on the Philippine setting to determine whether temperature, as a component of weather, meaningfully correlates with stock market prices between 2014 and 2023.

This study draws upon two behavioral-economic theories. First is the Theory of Reasoned Action by Fishbein and Ajzen. This theory posits that behavior is driven by intention, which is influenced by attitudes and subjective norms. In the context of this study, weather conditions may influence investors' moods and attitudes, thereby shaping their trading behavior and decision-making. Unfavorable weather conditions, such as heatwaves or storms, can induce pessimism, leading to reduced trading activity or increased risk aversion. Second is the

Rational Expectations Theory by Muth and Lucas. This theory asserts that individuals make forecasts based on all available information. Investors, therefore, incorporate both current and expected future conditions, including weather, into their market expectations. For instance, if investors anticipate typhoons affecting agricultural or tourism sectors, they may adjust stock positions accordingly.

Together, these theories explain both the psychological and informational channels through which weather may influence financial decisions. However, empirical testing is essential to determine whether such relationships hold in practice—particularly in emerging markets like the Philippines.

Methods

Research Design

The research paper used a quantitative and correlational method to describe and determine the effect of weather conditions on stock market prices. Quantitative approaches emphasize the use of objective measures and the application of statistical, mathematical, or numerical analysis to data collected through polls, questionnaires, surveys, or pre-existing statistical data (Chonody, 2023). Meanwhile, correlational research is conducted to examine the relationship between two variables (Cherry, 2023). This process analyzes the data to determine a connection or relationship between the variables of interest.

Research Data

The paper utilized secondary data. This technique provides access to an extensive dataset pertinent to the research study. According to Martins, da Cunha, and Serra (2018), the use of secondary data in research has demonstrated its efficacy as a valuable method for obtaining relevant data that aligns with one's research objectives. The study's independent variable, the weather conditions, was measured by the minimum and maximum temperatures. The data source for the minimum and maximum temperatures was collected from PAGASA's database website, which is available online and posted on the Philippine Statistics Authority website. Regarding the data on stock market prices, the annual stock market return

was obtained from Yahoo Finance, which is also available online. The data was dated from 2014 to 2023.

Data Analysis Procedure

In terms of the statistical treatment, Pearson correlation was utilized. According to Turney (2022), the Pearson correlation coefficient is a descriptive statistic, meaning that it summarizes the characteristics of a dataset. Specifically, it describes the strength and direction of the linear relationship between two quantitative variables. The study used this to compute the relationship between weather conditions and stock market prices. In addition, the research paper employed a 0.05 level of significance to determine if there is a significant

relationship between weather conditions and stock market prices, serving as the basis for rejecting or accepting the hypothesis of no significant relationship between weather conditions and stock market prices in the Philippines.

Ethical Considerations

This research was conducted with strict adherence to ethical principles. Since the study exclusively utilized secondary data, no human participants were directly involved in the research process. Weather patterns and stock market performance data were sourced from publicly accessible online databases and archives. Therefore, concerns regarding participant anonymity, confidentiality, and informed consent did not apply to this investigation.

Result and Discussion

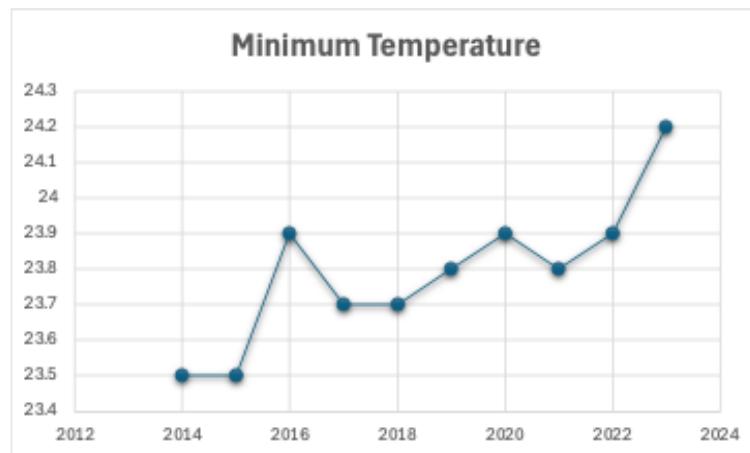


Figure 1. Minimum Temperature in the Philippines 2014-2023

The line graph illustrates the change in the lowest temperature in the Philippines over a ten-year period, from 2014 to 2023. The data show a noticeable upward trend, indicating a general warming pattern during this period. The minimum temperature in 2014 and 2015 began the decade at a consistent 23.5°C. The temperature decreased to 23.7°C in 2017 and 2018 following a significant increase to 23.9°C in 2016. Following 2018, the temperature rose gradually, reaching a high of 23.9°C in 2020 before slightly dropping in 2021. The most significant finding is the sharp increase over the previous two years, culminating in the lowest

temperature of 2023 (24.2°C), the highest of the decade.

There are significant implications for the steady increase in the minimum temperature, particularly the 2023 peak. This pattern suggests a general warming of the Philippine climate, which may lead to warmer evenings and fewer cool spells. Because certain crops need colder temperatures to flourish, such a shift could harm agriculture. It could also affect public health by raising the risk of heat-related illnesses. Additionally, as temperatures rise, more energy may be needed for cooling, further taxing the country's electrical infrastructure.

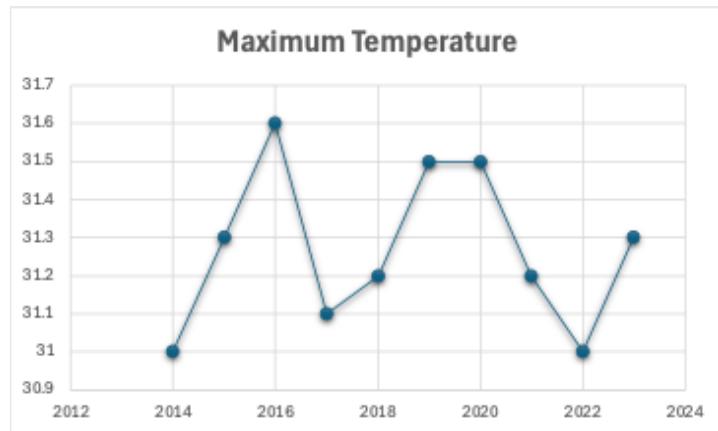


Figure 2. Maximum Temperature in the Philippines 2014-2023

The average maximum temperature in the Philippines from 2014 to 2023 is shown in Figure 2, which shows a pattern of notable volatility rather than a consistent trend. The maximum temperature for the period was 31.0°C in 2014, then rose rapidly to 31.6°C in 2016, the highest temperature of the decade. The temperature experienced a sharp decline to 31.1°C in 2017 after reaching this peak. Another upward trend occurred between 2018 and 2020, with 2019 and 2020 seeing a consistent high of 31.5°C. The temperature then dropped again, reaching its lowest point of the decade in 2022 at 31.0°C before rising to 31.3°C in 2023.

Extreme heat events are becoming more frequent, as evidenced by the wide range of

maximum temperature fluctuations, which were marked by notable peaks in 2016 and the 2019–2020 timeframe. There are significant ramifications for the nation from this volatility. Such extreme heatwaves can disrupt climate-sensitive industries, such as agriculture and fisheries, increase the risk of public health emergencies like heatstroke, and heavily burden the power grid due to increased demand for cooling. The public and private sectors find long-term planning more challenging due to the unpredictability of these maximum temperature swings, underscoring the need for robust climate adaptation plans.



Figure 3. Stock Market Prices in the Philippines 2014-2023

Two distinct phases are visible in Figure 3, which illustrates the performance of the Philippine Stock Exchange Index (PSEi) from 2014 to 2023. Beginning below the 7,000 level and consistently trading above it, the market demonstrated a period of general growth and strength from 2014 to 2019, peaking in 2017 and 2019 as it reached the 8,000 mark. In 2020, though, there was a notable decline as the index fell precipitously to just over 6,000. The market entered a period of decline and stagnation in the years that followed (2021–2023). However, it saw a slight rebound in 2021 but was unable to regain its prior highs and continued to decline, ending the decade at a level significantly below its peak years.

Changes in investor sentiment are directly reflected in the performance of the Philippine

Stock Exchange Index (PSEi). The growth period between 2014 and 2019 points to a generalized sense of optimism and bullishness, during which investors' confidence in corporate earnings and the state of the economy drove capital into the market. A significant external shock, such as the COVID-19 pandemic, which led to a massive sell-off, likely contributed to the sharp decline in 2020, representing an abrupt and severe shift from optimism to fear and uncertainty. The market's later inability to recover significantly between 2021 and 2023 suggests that investors have remained cautious or bearish, taking a more risk-averse approach as they may be concerned about inflation, ongoing economic difficulties, and global uncertainties.

Table 1. Pearson Correlation Results

Stock Market Prices	Pearson's R	p-value	Interpretation
Min. Temperature	-0.47	0.16	Not Significant
Max. Temperature	0.35	0.32	Not Significant

Minimum Temperature. With a Pearson's R value of -0.47, the findings indicate a negative correlation between the lowest temperature and stock market prices. This indicates an inverse relationship: stock market prices typically rise as the minimum temperature drops and vice versa. However, given its statistical significance, this finding must be considered. This correlation's p-value is 0.1664. A result is usually deemed statistically significant in statistical analysis if the p-value is less than 0.05. The observed correlation is not considered statistically significant because the p-value of 0.1664 is significantly higher than this cutoff. This suggests that the negative relationship observed is likely due to chance and cannot be accurately distinguished from a situation without a relationship.

The lack of statistical significance impacts investor sentiment and decision-making. Investors should not consider warmer minimum temperatures a sign of a market decline or colder minimum temperatures a consistent indicator of a rising stock market, even though the correlation coefficient of -0.47 may appear significant at first. Acting on this correlation

would be speculative and unsupported by statistically significant evidence. As a result, changes in the minimum temperature should not significantly affect investor sentiment, and it would not be prudent to base any investment plans solely on this specific indicator.

Maximum Temperature. A Pearson's R value of 0.35 indicates a positive correlation between the maximum temperature and stock market prices. Higher maximum temperatures are associated with higher stock market prices, while lower maximum temperatures are associated with lower prices, indicating a weak to moderately positive relationship. As with the finding of the minimum temperature, the statistical significance of this correlation is important. The traditional 0.05 significance level is significantly exceeded by the p-value of 0.3261. This correlation is, therefore, not statistically significant. Instead of being a trustworthy and reliable association, the observed positive relationship is likely the result of random statistical noise.

This finding suggests that investors should not rely on variations in the upper limit of the

temperature as a reliable predictor of future stock market performance. Any apparent connection is coincidental, as indicated by the lack of statistical significance. As a result, when forming their market sentiment or choosing investments, investors should ignore changes in the daily maximum temperature. It would be foolish and financially detrimental to base trading decisions on such an erratic correlation. There is no way to confirm that any "hot" or "cold" market trends correspond to the real daily temperature.

The connection between weather and stock market performance is a topic of debate. Similar to the studies presented in the introduction, there is no consensus among experts or studies regarding its possible effect or connection. According to Hirshleifer and Shumway (2003), sunshine and investor mood may affect each other, where sunshine can lead to a more positive investor mood. This might be correlated with higher stock prices. Likewise, as Cho (2019) notes, extreme weather events such as floods or hurricanes can disrupt businesses and economies. This can impact the stock prices of affected companies. The results of the study are similar to those of Kathiravan et al. (2021), who also found no significant link between everyday weather and stock market movements. This is because the stock market is complex, and factors aside from weather can play a significantly larger role in influencing the stock market.

These findings challenge the notion that weather conditions have a significant impact on stock market performance. While previous literature has suggested potential links between weather and investor behavior, this study's results indicate that these effects may not hold in the context of the Philippine stock market. Factors beyond weather conditions, such as economic indicators, government policies, and global market trends, may significantly influence stock market prices in the Philippines. It is essential to acknowledge the limitations of this study, including the focus on specific weather variables and the use of aggregated data, which may overlook nuances in the relationship between weather and stock market prices.

Conclusion

From 2014 to 2023, this study investigated the potential correlation between Philippine stock market prices and weather, specifically minimum and maximum temperatures. The main conclusion of this study is that there is no statistically significant relationship between the performance of the Philippine stock market and the minimum or maximum temperature. Although there was a weak positive correlation for maximum temperature ($R = 0.35$), and a moderate negative correlation for minimum temperature ($R = -0.47$), the corresponding p-values (0.1664 and 0.3261, respectively) were significantly higher than the standard 0.05 threshold for statistical significance. This suggests that the observed relationships are probably due to random chance rather than a real, underlying connection.

As a result, the study concludes that daily temperature variations are not a good indicator of changes in the Philippine stock market. The evidence in this case does not support the theories of Reasoned Action and Rational Expectations, which suggest that outside variables, such as weather, may influence investor sentiment and choices. Significant changes in the Philippine Stock Exchange Index over the past decade appear to have been driven more by global and major economic events—such as the COVID-19 pandemic—than by fluctuations in the weather.

In light of the conclusion, the following suggestions are made for investors, financial analysts, and upcoming researchers. Investors and financial analysts should base their investment decisions on well-established financial and economic indicators, such as corporate profits, economic growth, inflation rates, and geopolitical developments. Additionally, technical analysis of market trends remains a more reliable method than environmental variables, such as temperature. Finally, to determine whether other weather factors—such as humidity, rainfall, barometric pressure, and typhoon occurrences—have a greater influence on market behavior, future research could examine these factors in addition to temperature. The study also utilized annual data. Studies that use daily or even hourly data for stock prices and

weather may uncover short-term correlations that are not apparent over the long term.

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