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THE EFFECT OF CLIMATE CHANGE ON STOCK MARKET INDICES IN IRAQ

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Abstract
Climate change can have a significant impact on stock market indices, with both direct and indirect effects. Direct effects include physical damage to infrastructure and property caused by extreme weather events such as hurricanes, floods, and wildfires. Such events can disrupt supply chains, reduce productivity, and increase costs, leading to lower profits for companies and, in turn, lower stock prices.
Indirect effects of climate change can be seen through changes in regulations and consumer behavior. For example, as governments and consumers become increasingly concerned about the environment, they may demand stricter regulations on carbon emissions and other environmental practices. This can lead to increased costs for companies that do not comply, and a shift in consumer behavior towards more sustainable products and services. Companies that are slow to adapt may see a decline in their stock prices.
Temperature and precipitation were taken as independent variables for the research, against the trading volume index and the price per share as dependent variables, for the purposes of verifying the research hypotheses. Climate change is likely to have a significant impact on stock market indices over the coming decades, as the effects become more pronounced and governments take more action to address the issue. Investors will need to carefully consider the risks and opportunities presented by climate change when making investment decisions.

Keywords :- climate change , stock market indices , Temperature , precipitation , trading volume index , market value index.

Introduction

The Iraqi stock market, known as the Iraq Stock Exchange (ISX), is a relatively small market compared to those of other countries in the region, but it is an important source of investment and financing for Iraqi companies. The ISX is dominated by the financial and banking sectors, which account for a significant portion of the market capitalization.
One of the most direct effects of climate change on the Iraqi stock market is likely to be through extreme weather events such as Temperature and precipitation. These events can disrupt key sectors of the economy, such as agriculture, and lead to lower profits for companies operating in these sectors. This, in turn, can lead to lower stock prices for these companies and potentially for the stock market as a whole.
The high temperatures in the summer and the rain in the winter are among the reasons that contribute to the unwillingness of investors to go to the Iraqi market for securities, and thus the decrease in trading volume or the number of investors wishing to invest.

In addition to direct impacts, climate change is also likely to have indirect effects on the Iraqi stock market. For example, as governments and consumers become increasingly concerned about the environment, they may demand stricter regulations on carbon emissions and other environmental practices. This can lead to increased costs for companies that do not comply, and a shift in consumer behavior towards more sustainable products and services. Companies that are slow to adapt may see a decline in their stock prices.

On the other hand, companies that are well-positioned to benefit from the shift towards sustainability, such as those in the renewable energy sector, may see their stock prices increase. In Iraq, there is significant potential for investment in renewable energy, particularly in the solar and wind power sectors. Investing in these sectors could provide opportunities for investors while also helping to mitigate the effects of climate change.

The impact of climate change on the Iraqi stock market is likely to be significant in the coming years, as the effects of climate change become more pronounced and governments take more action to address the issue. Investors will need to carefully consider the risks and opportunities presented by climate change when making investment decisions in Iraq.

Research Problem

The effect of temperature and precipitation change on stock market indices in Iraq is an important research problem that requires further investigation. As climate change continues to impact the country, it is expected to have significant implications for the Iraqi stock market, both in the short and long term.

Temperature and precipitation changes can directly impact key sectors of the Iraqi economy, such as agriculture and energy. Extreme weather events, such as droughts and floods, can disrupt supply chains, reduce productivity, and increase costs for companies, leading to lower profits and potentially lower stock prices. Similarly, changes in temperature and precipitation patterns can also indirectly impact the stock market by changing consumer behavior and regulations, which can affect the profitability and value of companies.

Given the significant challenges faced by Iraq due to water scarcity, desertification, and increasing temperatures, it is critical to understand how these factors will affect the stock market and how investors can adjust their strategies accordingly. Additionally, as the country seeks to develop a national strategy to adapt to climate change, it is important to identify opportunities for investment in renewable energy and other sustainable practices that can help to mitigate the impacts of climate change while also providing economic benefits.

Therefore, further research is needed to explore the impact of temperature and precipitation changes on the Iraqi stock market, including the potential direct and indirect effects on key sectors of the economy, as well as the opportunities for investment in renewable energy and other environmentally-friendly technologies. This research can help investors make informed decisions and contribute to the development of a sustainable and resilient economy in Iraq.

Objectives of the Research

The objectives of the research on the effect of temperature and precipitation change on stock market indices in Iraq are as follows:

1. To identify the current and potential impacts of temperature and precipitation changes on key sectors of the Iraqi economy, including agriculture, energy, and infrastructure.
2. To analyze the direct and indirect effects of temperature and precipitation changes on the Iraqi stock market, including the impact on individual companies and the market as a whole.
3. To assess the opportunities and challenges presented by the shift towards sustainable practices, including investments in renewable energy and other environmentally-friendly technologies.
4. To explore the potential for private sector investment in renewable energy and other sustainable practices in Iraq, including the barriers to investment and strategies for overcoming them.
5. To provide recommendations for investors and policymakers on how to address the challenges and capitalize on the opportunities presented by climate change in Iraq, with a focus on promoting sustainable economic growth and resilience.

Hypothesis

H_0 = Climate change has a negative impact on stock market indices in Iraq**.**
H_1 = Climate change has a Positive impact on stock market indices in Iraq**.**

Iraq climate

Iraq is a country located in the Middle East, characterized by a hot and arid climate, with significant variations in temperature and precipitation throughout the year. The country is particularly vulnerable to the impacts of climate change, which is expected to exacerbate the existing challenges faced by the country due to water scarcity, desertification, and increasing temperatures.

The summer months in Iraq are characterized by high temperatures, often exceeding 45°C (113°F), with low humidity. The winter months are cooler, with temperatures ranging from 5°C to 15°C (41°F to 59°F). The country receives very little rainfall, with most of it occurring between November and April, and annual precipitation averaging around 100 to 200 mm (3.9 to 7.9 in) in the central and southern parts of the country, and up to 700 mm (27.6 in) in the northern mountainous regions.(Adamo,2018:32)

One of the biggest challenges facing Iraq is water scarcity, which is expected to worsen due to climate change. The country relies heavily on the Tigris and Euphrates rivers for its water supply, but these rivers are increasingly threatened by droughts and reduced flow caused by climate change. This has led to a decline in agricultural productivity, which is a major sector of the Iraqi economy.

Another challenge facing Iraq due to climate change is desertification, which is caused by a combination of factors such as overgrazing, deforestation, and land degradation. Desertification is expected to increase due to the increasing temperatures and decreasing rainfall caused by climate change, leading to a loss of biodiversity and further reducing the productivity of the land.(World Bank,2013:129)

In addition to these challenges, Iraq is also at risk of extreme weather events such as dust storms, floods, and droughts, which can have significant impacts on the economy and society.

These events can disrupt supply chains, damage infrastructure and property, and lead to food and water shortages.

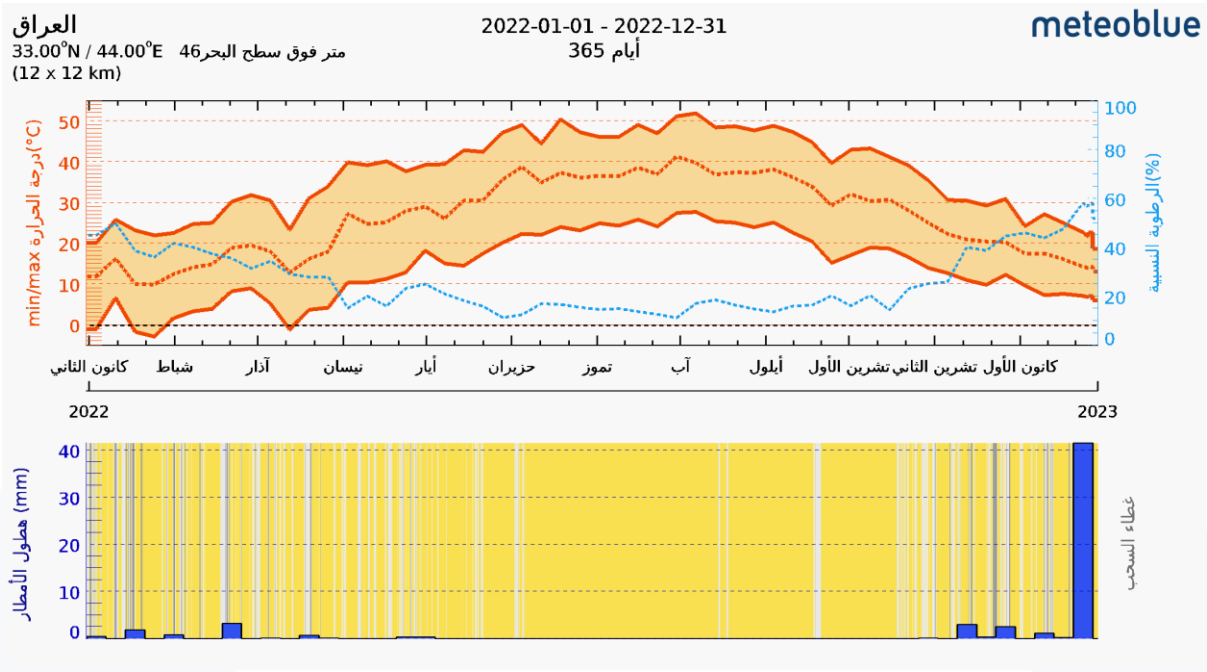
The climate of Iraq is characterized by significant challenges and vulnerabilities, which are expected to be exacerbated by climate change. The country will need to take action to adapt to these changes and mitigate their impacts, including investing in water management, sustainable agriculture, and renewable energy.

The Iraqi government has recognized the importance of addressing climate change and has taken steps to develop a national strategy to adapt to its impacts. For example, the government has launched initiatives to improve water management, increase the use of renewable energy, and promote sustainable agriculture practices.

In addition to government action, there is also potential for private sector investment in renewable energy and other sustainable practices in Iraq. The country has significant potential for solar and wind power generation, which could help to reduce greenhouse gas emissions and provide a reliable source of electricity for the country.(Kitoh,2008:48)

However, there are also significant challenges to investment in renewable energy in Iraq, including political instability, security concerns, and a lack of infrastructure. Investors will need to carefully consider these factors when making investment decisions in Iraq.

Overall, the climate of Iraq is characterized by significant challenges and vulnerabilities, which are expected to be exacerbated by climate change. However, there is also potential for investment in renewable energy and other sustainable practices, which could help to mitigate the impacts of climate change while also providing economic benefits for the country.



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Stock Market Indices

A stock market index is a measure of the performance of a group of stocks that are listed on a particular stock exchange. It provides investors with an overall view of the performance of the stock market and allows them to track changes in the market over time.

Stock market indices are usually calculated using a weighted average of the prices of the constituent stocks. The weights are typically based on the market capitalization of the companies, meaning that larger companies have a greater impact on the index than smaller companies.(Brown,2009:83)

There are many different stock market indices around the world, each representing a different geographical region or sector of the economy. Some of the most well-known indices include the S&P 500 in the United States, the FTSE 100 in the United Kingdom, and the Nikkei 225 in Japan.

Investors often use stock market indices as a benchmark for their own investment performance. For example, a mutual fund manager may compare the performance of their fund to the S&P 500 index to determine how well they are performing relative to the overall market.(Edward,2008:28)

In addition to serving as a benchmark for investment performance, stock market indices can also be used as indicators of the general economic conditions of a country or region. Changes in the index can provide insights into trends in the economy, as well as investor sentiment and confidence.

Stock market indices play an important role in the global financial system, providing investors with a snapshot of the performance of the stock market and serving as a barometer of economic conditions.

Stock market indices can also be used for various other purposes such as for investment analysis, risk management, and portfolio diversification. For example, an investor may use a particular index to track a specific sector or industry, such as the technology sector or the healthcare industry, to gain exposure to that sector or industry. This can help to diversify their portfolio and reduce their risk.

In addition to traditional stock market indices, there are also alternative indices that track different types of investments, such as exchange-traded funds (ETFs), commodities, and currencies. These indices provide investors with a broader range of investment options, allowing them to diversify their portfolios even further.(Eiteman,2002:101)

One potential limitation of stock market indices is that they may not accurately reflect the performance of the overall market or the economy. This can be due to factors such as market volatility, changes in investor sentiment, and other factors that can impact the performance of individual stocks and the market as a whole.

Despite these limitations, stock market indices remain a valuable tool for investors and analysts, providing a convenient way to track the performance of the market and make informed investment decisions. As the global economy continues to evolve and change, the importance of stock market indices is likely to remain significant, providing investors with a reliable benchmark and a means of measuring their own investment performance.(Elton,2006:45)

The Trading volume Index

A trading volume index is a measure of the number of shares or contracts that are traded on a particular stock exchange over a certain period of time. It provides investors with an insight into the level of trading activity in the market and can be used as an indicator of investor sentiment and confidence.

Trading volume indices are often calculated using the total number of shares or contracts traded during a specific time period, such as a day, week, or month. The index is typically normalized to account for changes in the number of shares or contracts traded over time, allowing for meaningful comparisons across different periods.(Field,2009:67)

High trading volume can be an indication of strong investor interest in a particular stock or market, while low trading volume may indicate a lack of interest or uncertainty among investors. Changes in trading volume can also be used to identify market trends and to track changes in investor sentiment over time.

Trading volume indices can be used in combination with other indicators, such as stock market indices and price indices, to provide a more complete picture of the market. For example, a high trading volume index combined with a rising stock market index may indicate a bullish market, while a low trading volume index combined with a falling stock market index may indicate a bearish market.

Trading volume indices are an important tool for investors and analysts, providing valuable insights into the level of trading activity in the market and helping to identify trends and changes in investor sentiment.(Fabozzi,2009:228)

Market value Index

The market value index is a measure of the total value of a particular stock market or exchange. It is typically calculated by multiplying the number of shares outstanding for each component stock by its market price, and then summing up the total values of all the component stocks.

The market value index is often used as a benchmark for the overall performance of the market or exchange, providing investors with an indication of the total value of the stocks that are traded on the market. It can also be used to track changes in the market over time, and to compare the performance of different markets or exchanges.(Elton,2005:18)

The market value index is particularly useful in identifying changes in the composition of the market, such as changes in the market capitalization of individual companies or changes in the relative importance of different sectors or industries. It is also useful in identifying trends in investor sentiment and confidence, as changes in the index can reflect changes in the overall level of investor optimism or pessimism.

One potential limitation of the market value index is that it can be heavily influenced by a small number of large companies or highly valued stocks. This can skew the index and make it less representative of the overall market. To address this issue, some market value indices are weighted to give more importance to smaller companies or to adjust for the impact of individual stocks on the overall index.

The market value index is an important tool for investors and analysts, providing valuable insights into the overall value of the stock market or exchange and helping to identify trends and changes in investor sentiment. By tracking changes in the market value index, investors

can make more informed investment decisions and better manage their portfolios.(Gitman,2006:26)

Stock market in Iraq

The stock market indices in Iraq are represented by the Iraq Stock Exchange (ISX), which is the main securities exchange in the country. The ISX was founded in 2004 and is headquartered in Baghdad, with branches in Erbil and Sulaymaniyah.

The ISX is a relatively small market compared to those of other countries in the region, but it is an important source of investment and financing for Iraqi companies. The market is dominated by the financial and banking sectors, which account for a significant portion of the market capitalization.

The ISX index is the main benchmark for the Iraqi stock market, and it is calculated based on the performance of the top 50 companies listed on the exchange. The index is calculated in Iraqi dinars, and it is adjusted for corporate actions such as stock splits and dividends.(Mason,2013:87)

The ISX has faced significant challenges in recent years, including political instability, security concerns, and a lack of liquidity. The market has also been impacted by the global economic downturn caused by the COVID-19 pandemic. Despite these challenges, the ISX has shown resilience, with trading volumes and market capitalization increasing in recent years.

The stock market indices in Iraq are an important indicator of the country's economic development and provide opportunities for investors to participate in the growth of the Iraqi economy. However, the market is also subject to significant risks and challenges, which investors need to carefully consider when making investment decisions.(Al-Janabi,2013:45)

In addition to the challenges faced by the ISX due to political instability and security concerns, the market is also vulnerable to the impacts of climate change. As mentioned earlier, extreme weather events, such as droughts and floods, can disrupt key sectors of the economy and lead to lower profits for companies operating in these sectors, which can in turn lead to lower stock prices for these companies and potentially for the stock market as a whole.

Climate change also presents indirect risks to the ISX, such as changing consumer behavior and regulations, which can affect the profitability and value of companies. For example, as governments and consumers become increasingly concerned about the environment, they may demand stricter regulations on carbon emissions and other environmental practices. This can lead to increased costs for companies that do not comply, and a shift in consumer behavior towards more sustainable products and services. Companies that are slow to adapt may see a decline in their stock prices.(Al-Dabbagh,2006:29)

On the other hand, companies that are well-positioned to benefit from the shift towards sustainability may see their stock prices increase. This includes companies operating in the renewable energy sector, which has significant potential for investment in Iraq, particularly in the solar and wind power sectors.

Given these challenges and opportunities, it is important for investors to carefully consider the impacts of climate change when making investment decisions in the ISX. This includes

assessing the risks and opportunities presented by temperature and precipitation changes, as well as the potential for investment in renewable energy and other sustainable practices.
The stock market indices in Iraq reflect the challenges and opportunities facing the country's economy, including those presented by climate change. By carefully considering these factors, investors can make informed decisions that contribute to the development of a sustainable and resilient economy in Iraq.(Al-Najjar,2002:127)

Analysis of the Results

In this part of the research, the results obtained will be analyzed through the use of the simple regression equation to determine the effect of temperature and precipitation on trading indicators in the Iraqi stock exchange (trading volume index – market value index)

Table(1)shows the effect of temperature on the trading volume index and the market capitalization index

variables	Temperature (X1)				Notes
	R^2	F test	sig	Decision	
Trading volume Index (Y1)	0.813	221.727	0.000	Acceptance H1	
Market value Index (Y2)	0.781	181.876	0.001	Acceptance H1	

Table (1) shows the results of the effect relationships between temperatures (X1), trading volume index (Y1), and market value index (Y2), which can be summarized as follows:

1. The value of the interpretation coefficient (R^2) amounted to (0.813), which means that (81.3%) of the changes that occur in the trading volume index (Y1) can be explained through temperatures (X1), while the remaining percentage of (18.7%), it is due to other variables not included in the current study.
2. The value of (F) calculated for the simple linear regression model amounted to (221.727), which is greater than the value of (F) tabular amounting to (4.96) at a significant level (5%) and with a degree of freedom (1-51), and this means that the effect relationship between the variables has Statistical significance.
3. The value of the significance level (F) was (0.000), which is less than the level of significance of 5%, and this means that the results that have been reached can be relied upon by more than (99%).
4. The decision regarding the hypothesis of the effect relationship between temperatures (X1), the trading volume index (Y1), and the market value index (Y2) was reached by accepting the existence hypothesis (H1).

Table(2)shows the effect of precipitation on the trading volume index and the market capitalization index

variables	Precipitation (X2)				Notes
	R^2	F test	sig	Decision	
Trading volume Index (Y1)	0.679	107.878	0.000	Acceptance H1	
Market value Index (Y2)	0.573	68.437	0.000	Acceptance H1	

Table (2) shows the results of the effect relationships between Precipitation (X1), trading volume index (Y1), and market value index (Y2), which can be summarized as follows:

1. The value of the interpretation coefficient (R^2) amounted to (0.679), which means that (67.9%) of the changes that occur in the trading volume index (Y1) can be explained through temperatures (X1), while the remaining percentage of (32.1%), it is due to other variables not included in the current study.
2. The value of (F) calculated for the simple linear regression model amounted to (107.878), which is greater than the value of (F) tabular amounting to (4.96) at a significant level (5%) and with a degree of freedom (1-51), and this means that the effect relationship between the variables has Statistical significance.
3. The value of the significance level (F) was (0.000), which is less than the level of significance of 5%, and this means that the results that have been reached can be relied upon by more than (99%).
4. The decision regarding the hypothesis of the effect relationship between Precipitation (X1), the trading volume index (Y1), and the market value index (Y2) was reached by accepting the existence hypothesis (H1).

Conclusion

Temperature and precipitation changes can have significant impacts on the stock market indices in Iraq. As a predominantly oil-dependent economy, extreme weather events such as droughts and floods can disrupt key sectors of the economy, such as agriculture and energy, leading to lower profits for companies operating in these sectors and potentially lower stock prices for these companies and the stock market as a whole.

In addition, changing consumer behavior and regulations related to climate change can affect the profitability and value of companies, particularly those that are slow to adapt. Conversely, companies that are well-positioned to benefit from the shift towards sustainability, such as those operating in the renewable energy sector, may see their stock prices increase.

Investors need to carefully consider the impacts of climate change when making investment decisions in the Iraqi stock market, including assessing the risks and opportunities presented by temperature and precipitation changes, as well as the potential for investment in renewable energy and other sustainable practices.

Overall, as the global economy continues to shift towards sustainability, the Iraqi stock market and other emerging markets will need to adapt to changing consumer behaviors, regulations, and investor sentiment. By considering the impacts of climate change on the stock market indices in Iraq, investors can make informed decisions that contribute to the development of a sustainable and resilient economy.

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