

CHAPTER I

INTRODUCTION

1.1 Background

Volatility is a key indicator in financial markets, because it measures how much an asset's price fluctuates over a specific period. High volatility indicates greater market uncertainty, while low volatility reflects price stability. In the context of investment decisions, volatility affects the strategies taken by investors. Riskier investors often seek high-volatility assets to make big profits, while conservative investors prefer low-volatility assets to minimize the risk of significant losses.

The impact of volatility is also crucial in risk management, where diversified portfolio management and hedging strategies are used to mitigate potential losses due to sharp price fluctuations (Le, 2023). In addition, economic policies taken by governments or central banks often take into account the level of volatility in the market to regulate monetary and fiscal policies. In the context of cryptocurrencies and traditional assets, volatility analysis has high relevance even though these two markets have very different characteristics. Traditional assets like stocks or bonds are usually more stable, while cryptocurrencies tend to experience bigger price swings, mainly because of speculation and how investors feel about the market (Zhang et al., 2023). In recent years, cryptocurrencies have become more popular in the global financial system. Since Bitcoin was introduced in 2009, the cryptocurrency market has grown quickly, with more than 25,000 different cryptocurrencies available by May 2025. Although the cryptocurrency market carries a lot of risk, these digital currencies are becoming appealing to investors.

This is because they offer the chance for high returns, are decentralized, face fewer government rules, and have tax benefits. As a result, cryptocurrencies provide new options for investors to broaden their portfolios (Aydoğan et al., 2024).

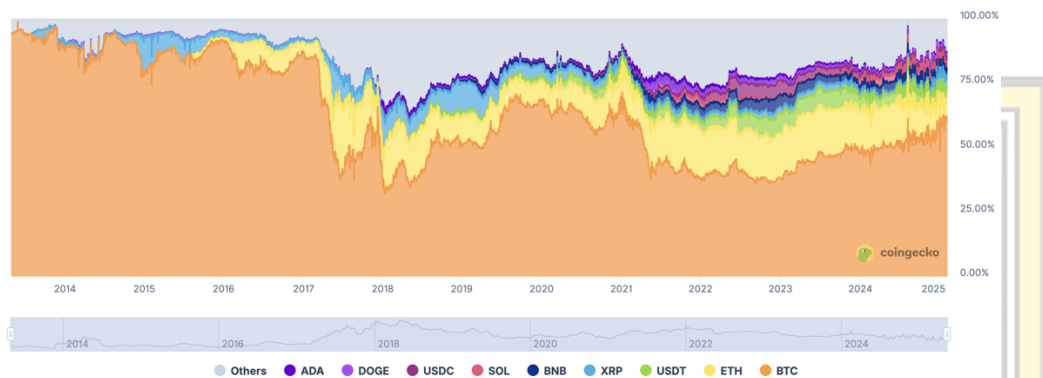


Figure 1 Bitcoin (BTC) Dominance Chart

Source: www.coingecko.com

Bitcoin and Ethereum are two cryptocurrencies that played a significant role in the growth of the global crypto market. As of May 2025, Bitcoin and Ethereum collectively dominate approximately 70% of the global cryptocurrency market capitalization, with Bitcoin dominating approximately 61,5% of the market, and Ethereum with 9,3%. Bitcoin is undoubtedly the most popular cryptocurrency with an estimated market capitalization currently being worth \$2,07 trillion, as of May 11, 2025 (coinmarketcap.com). Bitcoin, which was first launched in 2009, has become a symbol of digital currencies and value-storing assets that is widely adopted by large investors and individuals. Bitcoin share characteristics with both commodities, making it a hybrid commodity currency (Baur et al., 2018a). Despite its relatively recent launch, Ethereum is now the second largest cryptocurrency by market capitalization, which is currently estimated at \$304,76 billion, as of May 11, 2025 (coinmarketcap.com). Ethereum, which is more complex with smart contract

features and decentralized applications, offers broader potential in the development of blockchain technology.

Although Bitcoin and Ethereum have significant differences in terms of purpose and functionality, both have recently experienced massive price fluctuations and are increasingly being used for investment and speculation, despite warnings from various financial institutions (Katsiampa, 2019). The crypto market, particularly with Bitcoin and Ethereum, is known for its high volatility, which shows the uncertainty surrounding these assets, even though they play a key role in the digital financial world. As these two cryptocurrencies evolve, factors like their adoption by big institutions, changes in regulations, and new technological advances also contribute to big swings in their prices. The price of cryptocurrencies are expected to increase as big companies start to adopt cryptocurrencies and the regulations become more defined in some countries. However, they will still be at risk of fluctuations due to changes in policies and market sentiment.

Cryptocurrencies are becoming more popular and having a big impact on global financial markets. As they grow, traditional banks are facing new challenges. Financial market also adjusting to the new and more efficient payment system. However, the way cryptocurrencies are adopted varies across countries. In some regions, unclear or unstable regulations are holding back the growth of cryptocurrencies growth and shaking investor confidence. Despite these challenges, cryptocurrencies offer a more open and accessible way to manage money and transactions with the potential to change the global financial system. But for that to happen, issues around regulation, technology, and security need to be addressed.

Traditional assets like the S&P 500 index, crude oil, and gold price can also affect the volatility of cryptocurrency when their prices change. The connection between these markets is complex and can vary based on trends and global events. When traditional assets have a sharp increase, investors often move into cryptocurrencies to diversify or protect their investments. This can reduce liquidity in traditional markets and causing the volatility of traditional assets to rise. On the flip side, if traditional markets decline, investors may turn to cryptocurrencies as a safer option. This can increase the volatility of the crypto market.

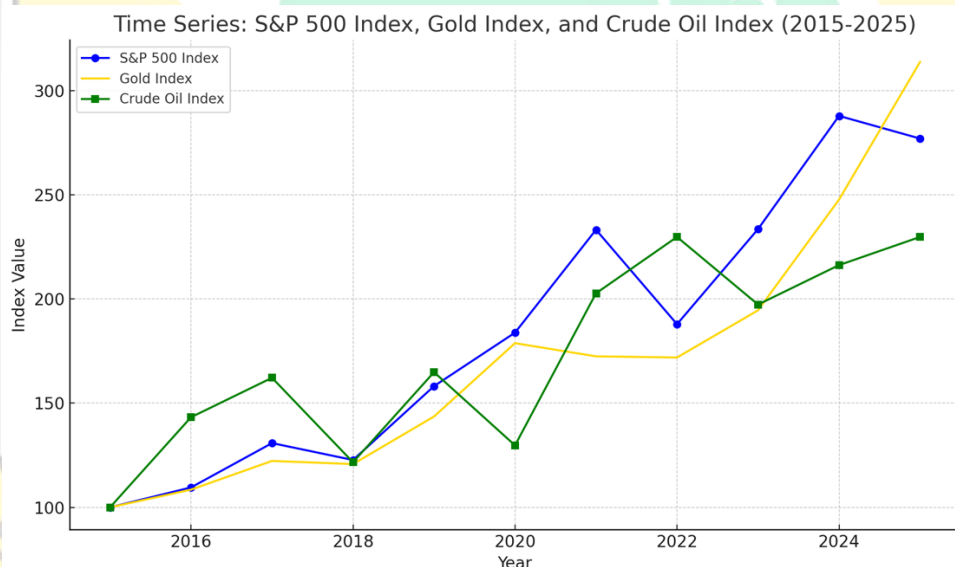


Figure 2 S&P 500 Index, Gold Index, Crude Oil Index Time Series (2015-2025)

Traditional assets includes stock indices and commodities, such as the S&P 500, crude oil, and gold. The S&P 500 tracks the performance of 500 large U.S. companies and is an important indicator of the U.S. stock market and economy (Zhang et al., 2023). It includes companies from industries like technology, finance, healthcare, and consumer goods. Changes in the S&P 500 often show how investors feel about the economy, influenced by government policies, economic conditions,

and company earnings. Because of its stability, the S&P 500 is used by investors to evaluate risk and potential returns. Research by Nham mentions that the stock market affects oil and gold prices, but its relationship with cryptocurrencies is more flexible and adapts to changing market conditions (Nham, 2022).

The relationship between the S&P 500 and cryptocurrencies is complex, involving both short-term and long-term price changes. Bitcoin and the S&P 500 have different risk and return patterns. Bitcoin tends to have larger price swings, making it riskier than the S&P 500, which usually offers more stable returns (Nzokem, 2023). A study using fractional cointegration analysis found that there is no long-term balance between cryptocurrencies and U.S. stock indices. According to Caporale et al. (2024), this indicates that cryptocurrencies can be an effective way for investors to diversify their portfolios.

Oil plays a key role in the global economy, much like stocks. Its prices are influenced by factors like supply and demand, OPEC policies, and political events in countries that produce oil. Changes in oil prices can affect production costs, inflation, and the overall stability of the economy. Fluctuations in oil prices can signal shifts in demand or supply. This often caused by political conflicts. Generally, high oil prices are associated with economic growth, while lower prices can suggest weaker demand or the beginning of a recession.

Crude oil prices and cryptocurrencies are connected in a way that is influenced by external factors like economic crises and geopolitical events. These factors can change the strength and direction of their relationship. Some research shows that there is a two-way connection between the price of oil and

cryptocurrency market. This uncertainty can also affect oil prices, creating a cycle between the two (Zhang et al., 2024). During COVID-19 pandemics, this connection shifted with cryptocurrencies starting to have a bigger impact on the oil market than before. The highlights that the relationship between oil and cryptocurrencies is not fixed and can change depending on the market environment (Foroutan & Lahmiri, 2024).

Gold is often considered a safe haven during inflation and economic instability (Zhang et al., 2023). Its price tends to rise when the economy faces uncertainty or crises, as investors turn to gold to protect their wealth. The price of gold is also influenced by real interest rates. When interest rates are low or negative, gold becomes more attractive since it does not have interest costs and can act as protection against inflation. As a reliable asset, gold usually moves in the opposite direction of stocks and other commodities, especially when the economy is in trouble.

Gold is widely recognized as a stable investment, especially during market uncertainty. It helps protect against the price swings of cryptocurrencies, particularly in economic crises like the COVID-19 pandemic. Research has shown that gold can act as a hedge for cryptocurrencies such as Bitcoin and Ripple in the short to medium term, and for Bitcoin and Dogecoin over the long term (Barson et al., 2022). Recently, gold-backed cryptocurrencies have been introduced. It combines the stability of gold with the benefits of cryptocurrencies. These assets are becoming a popular choice for diversifying investments and managing risk, especially when the economy is unstable (Manzli & Jeribi, 2024).

Investing in cryptocurrency can offer great opportunities, but it also comes with some serious risks. One of the biggest challenges is their high volatility that can cause a wild price swing. This can make investors nervous about the possibility of market crashes if something unexpected happens in the crypto markets (Kumar & Ajaz, 2019). On top of that, the lack of clear regulations adds more uncertainty and making it harder to manage risks in the long run. However, cryptocurrencies have a lot of potential, especially when it comes to diversifying an investment portfolio. They can provide higher returns in unpredictable markets and even act as a safety net during tough economic times. With the right risk management approach, cryptocurrencies can be a solid option for long-term growth.

This study is important for portfolio managers who work with both cryptocurrencies and traditional assets. To protect investment and maximize returns, they need to carefully consider volatility in both markets. Research has shown that as Bitcoin becomes more closely linked with traditional assets, its ability to help diversify risk decreases (Gorman & Hughen, 2024).

Understanding the changes in the volatility between cryptocurrencies and conventional assets over time helps to make better investment decisions. The M-GARCH model shows how volatility changes and how it influences the link between several assets. Research applying this model have revealed that the link between cryptocurrencies and traditional markets is always shifting, thus flexible risk management techniques are needed (Ahmed et al., 2023). This helps one to better grasp the interaction between traditional assets and cryptocurrencies since their interaction depends on the state of the markets.

Analyzing market volatility calls for the M-GARCH model, which provides more accurate means to examine traditional assets as well as cryptocurrencies. Examining how various assets interact helps investors and portfolio manager understand the risk involved and make wiser investment decisions. It also provides insightful analysis of how traditional assets might influence Ethereum and Bitcoin's pricing movements. What makes this study unique is that, to the best of the researcher's knowledge, no previous research has simultaneously examined the volatility linkages between Bitcoin, Ethereum, the S&P 500 Index, crude oil prices, and gold prices using the M-GARCH model.

Based on the research background, researcher is interested in conducting the research with title: **Analysis of Bitcoin and Ethereum Volatility on the S&P 500 Index, Crude Oil Prices, and Gold Prices Using the M-GARCH Model**

1.2 Research Questions

From the background explained above, the formulation for the problem in this study is:

1. Does the S&P 500 Index affect Bitcoin Volatility?
2. Does Crude Oil prices affect Bitcoin Volatility?
3. Does Gold prices affect Bitcoin Volatility?
4. Does the S&P 500 Index affect Ethereum Volatility?
5. Does Crude Oil prices affect Ethereum Volatility?
6. Does Gold prices affect Ethereum Volatility?

1.3 Research Objectives

From the background and problem that has been stated previously, the objectives of the research are:

1. To analyze how the S&P 500 Index impacts Bitcoin Volatility
2. To analyze how Crude Oil prices impacts Bitcoin Volatility
3. To analyze how Gold prices impacts Bitcoin Volatility
4. To analyze how the S&P 500 Index impacts Ethereum Volatility
5. To analyze how Crude Oil prices impacts Ethereum Volatility
6. To analyze how Gold prices impacts Ethereum Volatility

1.4 Contribution of the Research

1. Theoretical Contributions

This research makes a valuable contribution to theoretical knowledge by enhancing the understanding of market dynamics, especially in terms of the volatility between cryptocurrencies and traditional assets. This study looks at how Bitcoin, Ethereum, and traditional assets like the S&P 500, crude oil, and gold are related. Adding to current speculation on portfolio diversification, market integration, and asset price behavior. It also involves cryptocurrencies, adding to traditional risk and return models. The study presents new approaches to control risks in a market comprising both digital and traditional assets.

2. Practical Benefits

For portfolio managers and investors, this study offers insightful analysis that will help to enhance investment plans. Understanding how

traditional assets influences the volatility of Bitcoin and Ethereum helps investors to properly manage risks and produce a better-diverse portfolios.

1.5 Scope of the Research

This research investigates the relationships between traditional assets including the S&P 500, crude oil, and gold, and the volatility of cryptocurrencies like Bitcoin and Ethereum. The goal is to learn how variations in the value of traditional assets might influence the volatility of cryptocurrencies. The relationship between these variables over a specific period will be investigated using statistical technique. However, the scope of this research is limited to the interaction between the selected digital and traditional assets in the context of market volatility. It will not address other cryptocurrencies or broader economic factors, such as fiscal policies or macroeconomic variables.

1.6 Research Outline

The systematics of writing in this study consists of five chapters which have their perspective functions and purposes of writing. The systematics of writing are as follows:

CHAPTER I: INTRODUCTION

This chapter serve as an introduction, outlining the background, problem statement, research objectives, contributions of the study, scope of the research, and the structure of the paper.

CHAPTER II: LITERATURE REVIEW

This chapter presents the theoretical foundation, including literature review, conceptual framework, previous studies, and hypothesis.

CHAPTER III: RESEARCH METHODS

This chapter explains the data and data sources, data collection methods, population, research samples and variables, and data analysis techniques to be used by the author.

CHAPTER IV: RESULTS AND DISCUSSION

This chapter contains an explanation of the research results which will be described by the author based on the results obtained from data that has been processed using the system and hypotheses that have been made.

CHAPTER V: CONCLUSION

This chapter is a closing which contains the conclusions from the results of the analysis and puts forward some suggestions as improvements for further research.

