

CAPITAL UNIVERSITY OF SCIENCE AND
TECHNOLOGY, ISLAMABAD



**Diversifier, Hedge and Safe
Haven Properties of Gold and
Bitcoin? Evidence From Next
Eleven Equity Markets**

by

Aiman Arshad

A thesis submitted in partial fulfillment for the
degree of Master of Science

in the

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To my beloved family



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Abstract

This study aims to investigate and compare the diversifying, hedging and safe haven properties of Gold and Bitcoin against the Next Eleven (N-11) equity markets. The data spans from October 2014 to March 2022, owing to the non-availability of earlier price data of Bitcoin. The study also examines the potential of gold and bitcoin during the recent economic and financial crisis caused by Covid-19. The study uses GARCH model proposed by [Baur and Lucey \(2010\)](#) in order to assess the hedge and safe haven characteristics of gold and bitcoin. The robustness of the results has also been tested using the model proposed by [Bouri et al. \(2017\)](#) based on DCC-GARCH Model. The findings of the study suggest that gold serves as a better safe haven than bitcoin, during the sample period, against the equity returns of Indonesia, Pakistan and Nigeria, thereby suggesting that investors may minimize or even avoid possible losses by adding gold in their investment portfolios during market turmoil. On the other hand, Bitcoin acts as a better safe haven than gold during times of market turbulence against the returns of equity markets of Bangladesh, South Korea and Turkey. Investors in these markets may protect their capital when faced with uncertainty in equity markets. Furthermore, the Bouri model indicates that gold is a strong hedge for Pakistan, South Korea and Vietnam whereas Bitcoin is a strong hedge against the Egyptian stock market. The results further indicate that bitcoin did not exhibit safe haven capabilities, during the Covid-19 crisis, against majority of the markets except for Bangladesh. Similarly, Gold cannot be regarded as a safe haven against extreme market movements, during the Covid-19 crisis, in almost all of the markets with the exception of Indonesia. These results are helpful for portfolio managers and risk professional in asset allocation and risk management.

Keywords: Safe Haven, Hedge, Diversifier, Gold, Bitcoin, DCC-GARCH Model

Contents

Author’s Declaration	iv
Plagiarism Undertaking	v
Acknowledgement	vi
Abstract	vii
List of Figures	x
List of Tables	xi
1 Introduction	1
1.1 Theoretical Background	6
1.2 Gap Analysis	8
1.3 Research Questions	8
1.4 Research Objectives	9
1.5 Significance of the Study	9
1.6 Plan of Study	10
2 Literature Review	11
2.1 Gold and Stock Markets	11
2.2 Bitcoin and Stock Markets	20
2.3 Hypothesis of the Study	28
3 Research Methodology	29
3.1 Sample of the Study	29
3.2 Econometric Model	30
4 Results and Discussion	35
4.1 Descriptive Statistics	35
4.2 Gold as a Diversifier, Hedge or Safe Haven	37
4.2.1 Diversifying, Hedge and Safe Haven Properties of Gold using Baur Model	40

4.2.2	Time Varying Correlation between Gold and N-11 Stock Markets	43
4.2.3	Diversifying, Hedge and Safe Haven Properties of Gold using Bouri Model	45
4.3	Bitcoin as a Diversifier, Hedge or Safe Haven	47
4.3.1	Diversifying, Hedge and Safe Haven Properties of Bitcoin using Baur Model	47
4.3.2	Time Varying Correlation between Bitcoin and N-11 Stock Markets	50
4.3.3	Diversifying, Hedge and Safe Haven Properties of Bitcoin using Bouri Model	51
4.3.4	Role of Gold as a Safe Haven during Covid-19	53
4.3.5	Role of Bitcoin as a Safe Haven during Covid-19	55
5	Conclusion and Recommendations	57
5.1	Conclusion	57
5.2	Recommendations	59
5.3	Limitations and Directions for Future Research	60
	Bibliography	60

List of Figures

4.1	Figure 4.1A and 4.1B (Gold)	37
4.2	Figure 4.2A and 4.2B (BITCOIN)	37
4.3	Figure 4.3A and 4.3B (Bangladesh - DSEX Composite)	38
4.4	Figure 4.4A and 4.4B (Egypt – EGX 30)	38
4.5	Figure 4.5A and 4.5B (Indonesia – JKSE Composite)	38
4.6	Figure 4.6A and 4.6B (Mexico – S&P)	38
4.7	Figure 4.7A and 4.7B (Nigeria – NSE 30)	39
4.8	Figure 4.8A and 4.8B (Pakistan – KSE 100)	39
4.9	Figure 4.9A and 4.9B (Philippines – PSEI Composite)	39
4.10	Figure 4.10A and 4.10B (South Korea – KOSPI Composite)	39
4.11	Figure 4.11A and 4.11B (Turkey – BIST 100)	40
4.12	Figure 4.12A and 4.12B (Vietnam– VN 30)	40

List of Tables

4.1	Descriptive Statistics	36
4.2	Diversifying, Hedge and Safe Haven Properties of Gold using Baur Model Mean Equation	40
4.3	Variance Equation	42
4.4	Estimates of Dynamic Conditional Correlation between Gold and Sample Equity Markets	44
4.5	Diversifying, Hedge and Safe Haven Properties of Gold using Bouri Model	45
4.6	Diversifying, Hedge and Safe Haven Properties of Bitcoin using Baur Model Mean Equation	47
4.7	Variance Equation	48
4.8	Estimates of Dynamic Conditional Correlation between Bitcoin and Sample Equity Markets	50
4.9	Diversifying, Hedge and Safe Haven Properties of Bitcoin using Bouri Model	51
4.10	Safe Haven Properties of Gold during Covid-19	54
4.11	Safe Haven Properties of Bitcoin during Covid-19	55

Chapter 1

Introduction

For investors, uncertainty has become an integral of asset management activities. Due to the increased market volatility and the subpar performance of financial instruments, investors are now looking for alternative assets that don't fall under the conventional asset classes like stocks and bonds, have unique characteristics, and little or no correlation with other traditional assets, in order to build a portfolio that offers diversification and hedging benefits. Every investor's basic objective is to maximize return for any degree of risk, or, to put it another way, to minimize risk for a specific return. The uncertainty and volatility in the financial markets, in recent years, has prompted the need to search for different investment instruments in order to protect investor's wealth and manage risk accordingly. Assets that provide a safe haven are particularly sought after when the economy and financial system are in turmoil. For instance, the recent financial and economic crisis caused by Covid-19 outbreak, caused a lot of volatility and uncertainty in the market and shattered the confidence of market participants.

In order to optimize this risk and safeguard their wealth, investors have used different asset classes, mainly Gold and Bitcoin among others, for diversification purpose. Gold and Bitcoin are all different investment vehicles that are being widely used for diversification and hedging purpose all over the world despite the fact that they have different characteristics and attributes. They vary in many key

aspects including Price, Tangibility, Volatility, recognition as a global monetary reserve to name a few.

Markowitz portfolio theory propounds that an efficient investment requires diversifying into different assets and the benefit of diversification can be maximized by combining investments that are negatively correlated with each other. The extent to which an asset contributes to reduce portfolio risk can be divided into three different levels; a diversifier, a hedge and a safe haven, as defined by [Baur and Lucey \(2010\)](#). An asset that has a weak positive correlation, on average, with another asset is known as a diversifier. On the other hand, an asset that is not correlated, on average, with other asset is known as weak hedge whereas a strong hedge is an asset that is negatively correlated with another asset during calm market conditions. A hedge may show a positive correlation in extreme market movements and a negative correlation in other times, which could result in a negative correlation on average. This means that a hedge does not necessarily have the property of minimizing losses in periods of declining market returns.

A weak safe haven is an asset that is not correlated with other asset during times of stress, while a strong safe haven is an asset that is negatively correlated with other asset during market unrest. If the asset has negative correlation with another asset when the market is going through turbulence, then it acts as a safe heaven. A safe haven is of critical importance during uncertain times because it provides a means for shielding or even increasing the capital when one market is under extreme pressure. A hedge or a safe haven significantly reduces portfolio risk as the movements of the returns of negatively correlated assets offset each other.

Gold, as an investment vehicle, has always garnered significant attention from the financial community as well as researchers owing to its ability to generate an attractive risk adjusted return ([Gorton and Rouwenhorst, 2006](#)). Throughout its history, Gold has been seen as a suitable investment and wealth preservation option due to its widespread acceptance and inherent value. First off, because of its extensive history as a unit of exchange in the global monetary system throughout the centuries, gold is still seen by the public and investors as an ultimate resort

in difficult circumstances. It is regarded as a store of value during crisis period. In addition, gold is relatively easy to trade in spot as well as future markets, highlighting its importance as a liquid asset. It has been recognized as a global asset that is neither dependent upon performance of a company nor on the ability of state to pay back its debt obligations. Therefore, when other investment instruments are on the verge of collapsing, one can rely on gold, since it generally retains its purchasing power over a long period of time and can be easily resold when required.

Gold is also considered as an effective portfolio stabilizer since it maintains its liquidity when market is going through extreme movements (Shahzad et al., 2020). Due to these attributes, Gold can be classified as international money (Goodman, 1956). These are some of the properties that make investors and scholars consider gold a good investment alternative for diversification purpose and sometimes a hedge against other assets particularly equity stocks. In contrast to other financial instruments, gold seems to benefit from downside market swings. For instance, real gold prices reached an all-time high in 1980 amid a backdrop of rising prices and the speculation of a global recession in wake of the 1970s oil shocks. Moreover, gold prices increased significantly following the 2008 Financial crisis (Baur and McDermott, 2010).

The high volatility and uncertainty in equity markets combined with the appreciation in gold price encourages researchers to explore gold behavior and its hedging properties against equity. The gold has displayed weak or negative correlation with stock market indices, especially during periods of market turbulence, which helps investors in offsetting market losses. (Shahzad et al., 2020)

However, over the past decade, Bitcoin, a relatively new asset class, also termed as ‘digital gold’ of new era, has piqued interest of the academicians, researchers, media and financial world and its role as a diversifier and hedge is increasingly being explored. Bitcoin is a virtual currency and digital payment mechanism that is introduced in 2008 by Nakamoto. Bitcoin is a completely decentralized digital mechanism i.e. it is not controlled or regulated by any central bank or government

and has the potential to disturb existing payment and monetary system. It is created through a mining process of cryptography using blockchain technology and depends upon sophisticated protocols. These features differentiate bitcoin from conventional currency as the latter is regulated by State banks or Central governments.

In 2011, Bitcoin began to acquire popularity as Wikileaks began taking donations in Bitcoin. Financial scandals, numerous publications, conferences, and the development of cryptocurrency wallets all occurred between 2011 and 2012. Interest was also sparked by the creation of online exchanges and wallets for cryptocurrencies. In 2014, the Internal Revenue Service classified Bitcoin as an asset rather than a currency, and a number of merchants started to accept it.

The bitcoin client base has grown progressively over the years and it has had a significant price appreciation, with bitcoin presently exchanged on numerous global trading platforms and is thus subject to close watch by global financial community. The popularity of Bitcoin has incited the launch of various new virtual currencies, including Litecoin, Bit share, Dogecoin, Ripple, Solana, Monero, Byte coin, Digibyte, and many more. Majority of these coins depend on similar blockchain technology as Bitcoin to carry out transactions over the internet without the oversight of any central regulatory body. The listing and subsequent trading of these cryptocurrencies on multiple global exchanges such as trading economies, binance, yahoo finance proves that this financial innovation has been acknowledged and recognized as an investment tool. To add further, the Mercantile Exchange of Chicago introduced future contracts in December 2017 with Bitcoin as an underlying asset.

The ubiquity and increasing popularity of bitcoin among investors raises the question whether investors have begun using bitcoin as a hedge against market losses. Bitcoin is the emerging investment alternative that is now widely being used to hedge the equity stocks. The current debate is centered on its capability to mimic or even beat the hedging properties of gold against equity markets. Moreover, the number of bitcoins is restricted to 21 million makes it an anti-inflationary asset

just like gold. Therefore, it is natural that efficiency of bitcoin is being investigated for its diversifying, hedging and safe haven properties.

The academic and professional interest in investigating the ability of different financial assets to serve as a safe haven has resurged following financial and economic crisis caused by Covid-19 outbreak. Amid the starting days of the COVID-19, stock markets all over the world crashed to new lows, resulting in huge losses for investors. For example, the SP 500 plummeted 9.5%, Dow Jones Industrial Average dropped by 10%, the Nasdaq Composite fell by 9.4% and the FTSE 100, CAC 40, and DAX among others also lost on March 11, 2020 when Covid-19 was declared pandemic by World Health Organization. This shattered investors' confidence in equity markets and panic selling began following the spread of coronavirus. Circuit breakers were activated numerous times after that as investors panicked and started divesting their stocks leading to continued downfall of stock markets. The stock market crash and following losses have motivated conventional investors to explore different safe-haven assets to shield themselves from losses and protect their wealth ([Mariana et al., 2021](#)).

This is especially true in the case of market crisis as investors look forward to replace their risky and volatile assets with more secure assets that retain their value. This phenomenon is called 'flight-to-safety'. Indeed, during times of market turbulence, rational investors dispose of risky investment, for example stocks and switch to more stable instruments that are less likely to lose their value while stock returns decline. For example, when stock markets were crashing following the covid-19 spread, during the first quarter of 2020, on the other hand, international gold prices rose by approximately 6% during the same period ([Yousaf et al., 2021](#)).

The properties of gold and bitcoin as a diversifier, hedge, or haven, particularly amid the Covid-19 outbreak, which appears to be one of the worst economic and financial crises among history, is, however, largely unstudied in the case of Next Eleven (N-11) markets. Next eleven markets are also known as pre-emerging markets. After the BRICS countries, the next eleven, or N-11, are the eleven nations that possess the potential to become big economies of the world by the

21st century. Goldman Sachs coined the term ‘N-11’ in his 2005 paper based on exploring the potential of Next Eleven countries. Investors seeking significant long-term profits are attracted to the Next Eleven Markets because they have the capacity to become considerably more stable and attractive over the next few decades. In short, the next eleven equity markets are sought after by investors looking for potential high returns. These markets typically at the forefront of urbanization which creates an opportunity of growth for the investors since there is plenty of room for economic development in the country.

However, the investors must be willing to bear greater risks than in developed and emerging markets. Political instability, lack of liquidity, poor regulatory framework, and significant currency swings are some of the risks that investors must be aware of when deciding to invest in next eleven markets. In order to hedge these risks, investors can diversify their portfolio by investing in alternative asset classes such as crypto currency i.e. bitcoin, gold market and others. Therefore, this study seeks to investigate and compare the diversifying, hedging and safe haven properties of gold and bitcoin against the Next eleven markets. This study further aims to explore the role gold and bitcoin play as a safe haven during Covid-19 pandemic.

1.1 Theoretical Background

This research work is carried out under the framework of Markowitz Efficient Portfolio Theory, proposed by Harry Markowitz in 1952. The Markowitz Portfolio Theory is based on the notion that investors are risk-averse and favor a portfolio with a lower degree of risk in exchange for a certain rate of return. Markowitz theory works under the assumption that one should not put all eggs in one basket, rather go for diversification. The correlation between assets of the same class make it impossible to completely eliminate the risk associated with any investment. However, the Portfolio Theory suggests that investors and portfolio managers should form a well-diversified portfolio of various investment tools since

it propounds that there should be an efficient portfolio relative to the risk of the assets in the portfolio. The theory states that the benefits of diversification are not related to the number of investment instruments but the correlation between them. When assets are negatively correlated, portfolio diversification advantages are at their highest.

According to this theory, diversification is essential to an investor's strategy for managing risk. Since different sectors are impacted differently by the same economic circumstances, an investor may be able to stabilize a portfolio or even increase returns by investing in different sectors or multiple industries that exhibit low correlation. This risk can be reduced by diversifying a portfolio through investment in uncorrelated or negatively correlated assets classes such as stock market, crypto currency e.g. bitcoin and gold among others.

Furthermore, following the Efficient Market Hypothesis (EMH), stock prices and change in stock prices represent all information that is readily available in the market. Although there is much discussion about whether or not the market is completely efficient. Even then, intelligent and wise investors attempt to foresee and predict potential future scenarios in order to gather pertinent data that will help them decide which assets to buy or sell. According to [Fama \(1970\)](#), the market's efficiency can range from weak to semi-strong to strong form efficiency. Since all information is reflected in the stock price, there should not be any opportunities to obtain future large profits if the market is strong form efficient. The speed at which new information is incorporated into an investment's current price determines these market efficiencies. Since market inefficiencies exist in reality, this market disorder prompts investors to use their sophisticated models, novel approaches, and strong investment expertise to use historical data for future forecasts and thereby exploit these market inefficiencies to gain significant positive returns.

1.2 Gap Analysis

There is limited literature available on comparing the diversifying and hedging properties of gold and bitcoin against the equity markets (Shahzad et al., 2019). This is especially true in the case of next eleven markets where little work is available on the subject. Furthermore, prior research suggests that the role of gold and bitcoin in stock markets is specific to the market under consideration (Beckmann et al., 2015) which prompts the need to investigate it for other markets such as next eleven markets as well. This research study is about exploring whether the addition of bitcoin or gold in the portfolio of equity stocks of next eleven countries can optimize risk. It is about investigating which of the following asset classes i.e. gold or bitcoin serves as a better hedge or diversifier against the stock markets of next eleven countries.

Investors are eager to learn about safe haven assets in order to protect their portfolios and preserve their capital following the Covid-19 outbreak and the ensuing worldwide financial hardship. However, the role of gold or bitcoin as safe-haven for Next eleven stock market during the catastrophic event of the COVID-19 remains largely unexplored. The study aims to examine the safe haven properties of gold and bitcoin against Next Eleven stock markets during the COVID-19. Therefore, in order to add to the literature, our study seeks to analyze the potential of Bitcoin and gold as a hedge against fluctuations in next eleven equity markets and their role as safe haven during the COVID-19.

1.3 Research Questions

This research will answer the following questions:

Research Question 1

Is Gold a diversifier, a hedge or a safe haven for Next Eleven Equity Markets?

Research Question 2

Is Bitcoin a diversifier, a hedge or a safe haven for Next Eleven Equity Markets?

Research Question 3

Did Gold or Bitcoin serve as a safe haven for Next Eleven Equity Markets during Covid-19 crisis?

1.4 Research Objectives

Objectives of the study are as follows:

Research objective 1

To examine that Gold is a diversifier, a hedge or a safe haven for Next Eleven Equity Markets.

Research objective 2

To explore that Bitcoin is a diversifier, a hedge or a safe haven for Next Eleven Equity Markets.

Research objective 3

To observe that Gold or Bitcoin served as a safe haven for Next Eleven Equity Markets during Covid-19 crisis.

1.5 Significance of the Study

First of all, the study makes theoretical and academic contribution to the literature available on investment and asset allocation. This study provides significant insights for equity investors of next eleven markets as well as other countries to devise diversification/hedging strategies of gold, and bitcoin against stocks during calm periods as well as during periods of market turmoil. It explains the hedging effectiveness of Gold and Bitcoin against Next eleven Market Stocks which is of great value for investors when deciding whether to buy, sell or hold on to any asset. During periods of stock market volatility, a crucial question is which investment vehicles act as a hedge or safe haven in times of market crisis.

It further helps in improving the understanding and performance of the investors in constructing their portfolios as this orientation is crucial for market participants' decision-making regarding inclusion of gold or bitcoin in their portfolios. It is also helpful for financial advisors who frequently look for unconventional assets that might shield stock portfolios from negative risk, particularly during times of market turmoil when protection pays off. Additionally, regulatory authorities and governments may find our research useful in further discussion of Bitcoin's place in the financial markets.

1.6 Plan of Study

The research thesis has been organized in five sections. The first chapter introduces and explains the research topic and provides details on the following topics: Background of the problem, Theoretical framework, Gap analysis, Research questions and objective and significance of the study. The second chapter reviews the previous literature available on the association between stock returns and gold and bitcoin respectively. The third chapter explains the sample of the study, data, its sources and the econometric model. The results and analysis have been provided in chapter 4. The last chapter includes the conclusion and recommendations.

Chapter 2

Literature Review

2.1 Gold and Stock Markets

For thousands of years, gold has been used as a value store and a medium of exchange. Sir William Petty, a British mercantilist from the 17th century, said that gold, silver, and gems were wealth “at all times and in all countries”. Gold is historically held as reserve by central banks and governments around the world. [Lawrence \(2003\)](#) provides a detailed account of the evolution of relationship between Gold and Equity returns. According to the author, unlike other commodities, gold seems to be isolated from the business cycle, which makes it more appealing as an investment vehicle. The author compared the returns of SP 500 index with the returns of different commodities including gold and oil among others and concluded that there is less correlation between returns of the Index and Gold as compared to the association with other commodities. Furthermore, the empirical results indicated that gold was not significantly affected by the macroeconomic events, while the impact was much more intense for other commodities under study. The findings suggest that gold may serve as an effective diversifier and hedge for the US stock market.

According to [James Ross McCown \(2006\)](#), during 1970 and 2006, gold and silver provide compelling evidence of their potential as an alternative investment asset. Because of ease of trading and liquidity in gold markets, gold trading may pick up

during uncertain times when investors are afraid to trade and different asset prices are volatile. Consequently, gold seems like a good investment, especially when the financial markets are turbulent. Gold was one of the original forms of money and wealth and has long been employed as an inflation hedge.

By analyzing data of daily returns of three precious metals including gold, platinum, and silver from 1976 to 2004, [Hillier et al. \(2006\)](#) investigated the investing function and potential of precious metals in the market. Due to their minimal correlations with stock index returns, all three precious metals have the potential to diversify large investment portfolios. Additionally, the statistics show that these metals are capable of providing some sort of haven, particularly during times of unusually high volatility. Precious metals-based portfolios outperform traditional equity portfolios by a large margin, according to the author.

[Conover et al. \(2010\)](#) extend prior research and provide additional data on the advantages of using precious metals in U.S. stock portfolios. They presented five key conclusions about the possible advantages of direct investment in precious metals through the commodity or indirect investment through shares. First, portfolio performance is significantly enhanced by increasing the allocation to precious metals companies' stocks by 25%. Second, the data shows that an indirect investment in precious metals outperforms a direct investment. Third, gold performs better on its own compared to platinum and silver, and it seems to offer a superior hedge against the negative impacts of inflationary pressures. Fourth, the advantages of precious metals are closely related to the state of the economy. Finally, despite significant variations over time, the advantages of including precious metals in an investing portfolio were predominant for the majority of the 34-year period.

Using daily data collected from 1995 to 2005, [Baur and Lucey \(2010\)](#) define the words "hedge" and "haven" and assess whether gold is a hedge or a safe haven. They particularly examined how gold functions in relation to stock market movement as a safe haven asset. They said that, on average, when the stock markets face unfavorable negative returns, gold maintains its value in the US, the UK, and Germany. According to their research, gold serves as a safe haven for about 15

trading days. [Baur and McDermott \(2010\)](#) test the hypothesis that gold serves as a safe haven for major emerging and developing markets for a 30-year time period spanning till 2009. The econometric analysis reveals that gold is a safe haven and a hedge for the US and major European stock markets, but not for emerging economies like the BRIC nations. When economies are in trouble, gold thrives, making it a good investment during recession. For example, during the 2008 financial crisis, gold finished the year with 5% gain.

According to [Jaiswal and Voronina \(2012\)](#), the association between stock returns and gold fluctuates throughout time and across different nations and economic sectors. Between 2001 and 2010, they used a VAR model to examine the volatility effects between gold and stock returns in the BRIC nations. In contrast to Russia, where gold and stocks move together, they confirmed that gold served as a hedge and safe haven in the majority of industries in Brazil, India, and China during the financial crisis. In times of uncertainty, Russian investors do not choose gold as they do in China, India, and Brazil.

The literature is extended to Malaysia by [Ibrahim and Hamid \(2011\)](#), who examine whether gold investment benefits Malaysian investors i.e. whether it offers diversification, hedging, or safe haven benefits. The findings show that gold is, at best, a diversifier for the investors of Malaysian equity market. They also report that gold's role as an investment avenue has changed in recent years amid global financial uncertainties. Further, the extreme market conditions tend to weaken the role of gold and reduce it to a diversifier only.

[Coudert and Raymond \(2011\)](#) examine the gold returns and monthly returns of market indices of developed countries including the G7 and others by using bivariate GARCH model. They define crisis period by recessions and bear market trends. They discover that against majority of these stock indexes, gold qualifies as a safe haven. Correlation is reported to be negative or nil, this conclusion applies for crises that are defined as recessions or bear markets, thereby suggesting that Gold can help protect against stock market losses.

The correlation between the returns of various investment tools is examined by [Chan et al. \(2011\)](#), in the context of financial markets of United States. The sample includes returns of stocks of US, real estate as well as the returns of commodities including Gold and Oil. This study reveals that at times of tranquility, defined by low uncertainty, stability in the financial market and positive stock returns, there is a flight from gold to the stock market. On the other hand, during period of crisis, defined by high uncertainty and volatile price swings in stock markets, investors shift their portfolios to risk free assets such as T-Bills in US.

[Ziaei \(2012\)](#) examines how the price of gold affects domestic equity and debt market in the ASEAN+3 countries using the GMM model. The countries in the analysis include China, Indonesia, Japan, Malaysia, Philippines, Thailand, Singapore and South Korea. The findings show that the price of gold has a considerable impact on the bond and equities markets, particularly when any negative changes in stock market have a positive impact on gold prices. The impact of the gold price on domestic credit, however, is not significant. The findings demonstrate that gold is more appropriate for investment during economic downturns.

[Mulyadi et al. \(2012\)](#) compare the advantages of investing in gold versus the benefits of investing in stock markets. The sample data of the study ranges from 1997 to 2011. The final results of the econometric model demonstrate that investing in gold is preferable to investing in stocks. This is due to the fact that stocks, as an investment tool, are subject to a greater degree of macroeconomic and global risks, thus making them a risky instrument.

[Ciner et al. \(2013\)](#) explore the role of stocks, bonds, oil, gold, and the US dollar against each other using data from US and UK. The study reports that gold is not a shelter for US stocks and highlights its role as a haven for exchange rates. [Hood and Malik \(2013\)](#), using data of daily returns from 1995 to 2010, report that VIX (Volatility Index) acts as a very powerful safe haven and hedge than gold for the stock market of US. Whereas gold is only a weak hedge in this case. Additionally, they report that gold does not exhibit a negative association with the US market during times of exceptionally uncertain markets.

Beckmann et al. (2015) investigate if gold serves as a hedge against 18 equities markets of the world. They claim that gold exhibits hedging properties for Turkey, Russia, and Indonesia but not for the World index. Gold displays a safe-haven characteristic for both India and the UK. Overall, their findings show that gold plays different roles in emerging and developed economies. Grgn and nalma (2014) studied the daily returns stock markets of 28 emerging countries and gold. They reported that local investors in emerging markets preferred gold and for both local and foreign investors, the safe haven quality of gold was stronger during periods of equities market losses.

Khan et al. (2014) also investigates the correlation between the returns of Gold, from the commodity market and equity market of India. The sample period of the study ranges from 1991 to 2013, using spot prices of gold and BSE Sensex Index. The empirical findings suggest that there is a low negative correlation between these markets, thus highlighting its potential as a tool for diversification. This suggests that markets participants in Indian stock market may include gold in their portfolio to diversify their investments, on average. The study also highlights that gold is preferred by Indian investors during unfavorable market conditions.

Arouri et al. (2015) investigate the relationship between gold and Chinese stock market returns from March 2004 to March 2011 using GARCH framework. It also examines the best weights and hedge ratios for holdings in specialized gold-stock portfolios and illustrates how empirical findings may be applied to create successful diversification and hedging strategies. The study found that adding gold to a portfolio of Chinese stocks increased its return. Over time, gold served as an efficient hedge against stocks as well. They further reported that gold provided shelter to Chinese investors in market unrest times.

Bredin et al. (2015) examine the role of gold for investors with different time horizons. With the aid of wavelet analysis, they discover that gold functions as a hedge for numerous worldwide markets for time horizons up to a year. Gold is demonstrated to minimize losses for equities investors for long-term time frames of up to one year, further establishing its safe haven qualities during financial

crises. [Shalini and Prasanna \(2016\)](#) investigate how several commodities and stock markets interact. The study reveals that precious metals and gold always had an inverse relationship. Additionally, the volatility of metal prices changed during times of market crisis but quickly returned to the previous level of volatility.

[Chkili \(2016\)](#) uses data from the BRICS countries to analyze the dynamic links between the gold and stock markets. The author applies the Asymmetric DCC-GARCH model using data of daily and weekly returns. This research study examines how well gold works as a hedge for equities markets. The empirical findings show that across the study period, the correlations (DCC) alternate between positive and negative market swings. These low to negative correlations, during the most significant financial crises, indicate that gold can protect against volatile market swings. The research findings indicate that gold returns show resistance against the downside price swings in the stock markets, thus providing investors with a haven to shield their wealth.

[Raza et al. \(2016\)](#) study the impact of changes in returns and volatility of two main commodities i.e. Gold and Oil on the stock returns, in the context of emerging economies including BRICS Countries. The data of returns ranging from 2008 to 2015 is used in the study. The authors report the findings that gold returns affect the markets of BRICS nations positively, while the impact is negative in the case of some Asian markets such as Malaysia and Indonesia. The authors further report that equity markets of majority of the sample market are affected by the changes in volatility of gold markets. Thus, investors in these markets may add gold in their portfolios to diversify their risks.

[Iqbal \(2017\)](#) empirically investigate the potential of gold against negative swings for India, Pakistan, and the US. This research initially uses daily and monthly data from 1990 to 2013 and EGARCH model to analyze the data. The research also examines if the gold market's hedging potential is still as strong under both bearish and bullish scenarios. It was discovered that there is some solid evidence that in Pakistan and India, gold acts as a safe haven. However, given various gold market situations, the evidence of gold hedging stock market risk is not consistently

significant in the countries under consideration. The empirical evidence suggests that gold needs to be assessed in light of the current state of the gold market. Likewise, [Shakil et al. \(2018\)](#) evaluate the relationship between Saudi Arabia's gold price and significant six other variables including stock market returns, by using autoregressive distributed lag model (ARDL). The study concludes that a specific amount of gold in portfolio may help to reduce the overall portfolio risk.

[Shahzad et al. \(2020\)](#) extend the analysis to G7 stock markets and find that Gold and Bitcoin have varying characteristics and properties in each of the markets. Gold has a substantially higher hedging and safe haven efficiency than Bitcoin for markets under study. Whereas, Bitcoin replaces gold in Canada as the superior safe haven and hedge. Additionally, the benefits that gold provides as a haven are significantly more visible in bearish market trends.

The research work of [Ghazali et al. \(2020\)](#) aims to evaluate the role of gold against the crash of the stock market in five nations. The results indicate that gold is a strong hedge for Indian and US Stock markets and a diversifier for Chinese stocks. Regarding its function as a safe haven, gold continues to be a significant investment, notably in India, where it has significant cultural significance, as well as in the US and the UK. On the other hand, gold has a far less impact in developing nations like Malaysia. The huge demand for gold by Indian investors is not simply driven by the cultural and social sentiments, it also helps the investors in preserving their capital during recessions and economic downturns owing to the perception that it is not entirely dependent on macroeconomic variables and business cycle. Whereas, British investors can only view gold as an attractive investment alternative following a stock market crash.

[Ming et al. \(2020\)](#) study the data of Chinese Stock Market, from the time period spanning from 2008 to 2017 including two periods of market crisis i.e. GFC 2008 and stock market crash 2015, in order to examine the potential role of gold in portfolio diversification. The empirical findings reveal that gold provides a shelter and haven to market participants against severe losses and downside swings in equity market. This suggests that investors of Chinese stocks should include gold

in their portfolios to preserve their wealth during crisis. However, the results indicate the hedging capability of gold, on average, is limited.

The research goal of [Uyar et al. \(2021\)](#) is to examine three distinct issues: do the safe haven qualities of precious metals (gold, silver, platinum, and palladium) vary among different crises? How do the strength and duration of shocks affect the precious metals? and whether or not precious metals have the ability to hedge various stock markets under regular circumstances. According to the research, there are more safe haven precious metals than there were during the Great Financial Crisis, during the COVID-19 epidemic. Additionally, if shocks get more severe and last longer, there are more precious metals that serve as safe havens. Finally, the only asset with significant hedging asset features is gold.

Similarly, [Yousaf et al. \(2021\)](#) investigate the prospect of inclusion of gold in portfolio, in the context of 13 Asian countries. The study concludes that gold can be used by investors in a number of markets including China, Indonesia and Pakistan in order to preserve their wealth from extreme market shocks. The findings indicate that during times of crisis and recessions, investors may shift to gold to minimize their losses from equity market.

However, the findings regarding the potential of gold to preserve wealth during times of financial upheaval are mixed. The potential of gold is supported by [Baur and McDermott \(2010\)](#); nonetheless, the study concludes that this behavior is only temporary. [Mensi et al. \(2014\)](#) investigates the return relationships between the SP 500 and the commodity index by using a VAR-GARCH model. They report that gold serves neither as a hedge nor a safe haven in these markets using daily prices data from 1997 to 2013. Likewise, A dynamic correlation model is used by [Klein \(2017\)](#) to demonstrate that gold did play a hedging function for the stock markets of United States and Europe, but that this role seems to have diminished after 2013.

[Mei and McNown \(2019\)](#) look at how returns and volatility varied across the Chinese and American stock markets with respect to gold from 1996 to 2018. The study explain how gold's capacity as a hedge changed throughout time. Prior to

the 2008, it is a strong hedge for U.S. stocks, but it deteriorated following the crisis and became a weak hedge.

By using GARCH model for the daily returns data of US Stock market for a period of 10 years, spanning from 2007 to 2017, [Shrydeh et al. \(2019\)](#) seeks to examine the dynamic transmission mechanisms between US stock prices and gold since the global financial crisis of 2007. It also seeks to assess the efficiency of gold and stock hedging in major financial market of US. The findings reveal that gold's effectiveness as a hedge tends to decline as market capitalization rises, suggesting that a little amount of risk exposure is reduced given the disproportionately large amount of money that must be put in gold as a hedge against stocks.

[Manuj \(2021\)](#) reports that long-term investors are interested in the stock markets of US and India. This is because US is an example of Developed market and India possesses the characteristics of Emerging Market. The study analyzes monthly return series data for the SP 500, the BSE Sensex, and gold prices using GARCH approach. It reveals that gold has not provided a hedge or safe haven for long-term investors in the American or Indian stock markets within the time frame of study, 1980–2020. This is valid even when considering different subperiods of our study period.

[Chiang \(2022\)](#) investigates whether gold or silver can be used by Chinese investors to optimize their risk and protect their wealth in times of crisis. In order to evaluate hedging behavior, this study uses monthly data on gold and silver prices spanning from 2002 to 2021. The gold return and Chinese stock returns move in the same direction during volatile swings, according to estimated results. This finding implies that while gold can be used to protect against general uncertainty, it cannot be utilized to protect against a drop in the stock market of China. In contrast, silver moves in opposite direction of stock returns, highlighting its role as an alternative asset to add to the portfolio.

There has also been an increasing debate to explore the role of gold as a safe haven during the Covid-19 crisis. The financial and economic crisis that followed the outbreak of coronavirus shattered investor's confidence and stock markets crashed

all over the world. Given that gold has historically been able to appreciate in value during recessions and bearish trends in stock markets, they searched for shelter there (Shahzad et al., 2020). Due to the relative easiness of gold markets, gold may become more alluring during uncertain times when asset prices are unclear as a result of investors' reluctance to trade. When the financial markets are turbulent, gold has emerged as a desirable alternative investment because it gives investors more security.

Ji et al. (2020) answers the question if the ability of gold and exchange rates to diversify portfolio risk is still valid in the wake of the COVID-19 epidemic, when investors are increasingly turning to safe-haven assets due to the unprecedented level of risk and uncertainty in the financial markets. They conduct the study in the most infected regions of China, Europe, and the United States from the first of December 2019 to the last day of March 2020 as a testing period. The overall conclusion suggests that the exchange rate's function as a safe haven has declined, although gold has remained as a stable safe haven having time-varying properties.

Salisu et al. (2021) analyze the ability of four well-known precious metals—gold, palladium, platinum, and silver—to hedge against market risks brought on by pandemics. The COVID-19 pandemic, which multiplies health risks and causes related worries for financial markets, informs the research purpose. Their findings confirm that gold was the only asset that served as a safe haven before and during the outbreak. However, its potential as a safe haven was reduced during the said period. Although a number of studies have been done in this backdrop, comparing different investment instruments and asset classes, research gap prevails in the case of Next Eleven Equity Markets which needs to be filled.

2.2 Bitcoin and Stock Markets

The Bitcoin is introduced in 2008 under the pseudonym Satoshi Nakamoto to provide a decentralized peer-to-peer electronic payment mechanism as a substitute for traditional money and payment methods Weber (2016). The underlying

technology of Bitcoin is called "Blockchain," which enables this currency to be transacted anonymously and securely without the use of any central party. Bitcoin has evolved into an investment asset because of its capacity to be traded on specialized exchanges, despite the fact that its returns are frequently accompanied by significant levels of volatility. The largest cryptocurrency now has more legitimacy as a result of recent events, making it more difficult to disregard it as a potential investment vehicle. It has been deemed to be a commodity, much like crude oil or gold by the Commission of Commodity Futures Trading. Since its introduction as a digital currency in 2009, the market has expanded gradually. Bitcoin continues to be the most popular virtual currency and the most valuable in terms of capitalization of the market.

Additionally, financial headlines frequently draw comparisons between the benefits of gold and Bitcoin¹, asserting that the latter is likewise given its resistance to crisis situations like the European debt crisis of 2010–2011. (Luther and Salter, 2017). In recent years, Bitcoin and other cryptocurrencies have been referred to as the "New Gold" by a number of news organizations and data companies. Although Gold and Bitcoin differ from each other in a number of ways, including history, tangibility, inherent value, low volatility, consumption, and usage in manufacturing, both of them are being used by market investors globally. The properties of cryptocurrencies make them a unique class of assets. Numerous of these characteristics, including decentralization, little regulation, low transaction costs, and anonymity, are regarded as a significant breakthrough in the financial sector. More importantly, the literature asserts that Bitcoin is only weakly related to other conventional assets (Luther and Salter, 2017).

The lack of emphasis on the role of bitcoin as an investment tool in earlier research was addressed by Briere et al. (2015) and Bouri et al. (2017). Briere et al. (2015) examine Bitcoin from the perspective of a U.S. investor with a diverse portfolio that includes both conventional assets as well as alternative investments, utilizing weekly data from the 2010–2013 timeframe. The characteristics of a bitcoin investment that stand out the most are its extraordinarily high average return and

volatility. It has an incredibly low correlation with other assets. The results show that investing in bitcoin provides benefits of diversification. The author saw a definite advantage to adding a little amount of bitcoin to a well-diversified portfolio. Low correlations with other assets make up for Bitcoin's high risk.

[Dyhrberg \(2016\)](#) examines the prospect of using bitcoin as an investment vehicle. The results indicate that some properties of bitcoin are comparable to the characteristics of gold and dollar, thus highlighting its capacity to serve as a hedge and a medium of exchange. Since Bitcoin has a low correlation to other traditional financial assets, it is regarded as an interesting and unconventional investment instrument for reducing portfolio risk. Therefore, investors may include bitcoin in their portfolios for diversification purposes. According to the author, Bitcoin has hedging capabilities that are comparable to the dollar and gold, and can therefore be used for risk management. The increasing acceptance and trust of Bitcoin, as well as the lowering of transaction costs and investor uncertainty, all contribute to the cryptocurrency's investment appeal, according to [Ciaian et al. \(2016\)](#).

[Bouri et al. \(2017\)](#) examines whether Bitcoin has negative correlation against major asset classes including bond, equity, gold, oil and other commodities indices using DCC-GARCH model on daily and weekly data till 2015. The empirical findings suggested that Bitcoin is only useful for diversification. However, Bitcoin can act as a potential safe haven against weekly sharp declines in Asian stock markets. Bitcoin only demonstrates hedging features against Asian stock markets and not against stock markets outside of Asia. Bitcoin has advantages in terms of diversification over a number of other assets but its use only appears in specific circumstances and market conditions.

Bitcoin, according to [Bouoiyour et al. \(2014\)](#), has the ability to mitigate the downside risk associated with market shocks in US Market. They further report that precious metals have lost their ability to serve as a safe haven over time, thereby suggesting that there is a need to look for other non-conventional assets that can help investors in preserving their wealth.

Using data from January 2013 to January 2017, [Lim and Masih \(2017\)](#) examine the connection between Bitcoin returns and the Malaysian stock market. The findings reveal there is a negative correlation between the two and thus, bitcoin can serve as a hedge for stock market. The use of Bitcoin as a portfolio optimization tool for Islamic Fund managers is further assessed in this study. The findings strongly incline to show that Bitcoin and Shariah stock indices have a low and negative correlation, indicating that Islamic stock investors can gain from using Bitcoin as a form of diversification and that it is possible to further investigate the fundamentals of such cryptocurrencies for the benefit of Islamic capital markets.

In fact, Bitcoin's low correlation with traditional assets makes it an appealing tool for diversification and portfolio management. ([Bouri et al., 2017](#)). Additionally, neither the European debt crisis nor the banking crisis had an impact on Bitcoin, rather it thrived during the said period ([Luther and Salter, 2017](#)).[Guesmi et al. \(2019\)](#) examines the characteristics of Bitcoin in the financial markets. Analysis of the efficacy of inclusion of Bitcoin in portfolio of stocks considers the type of interaction between Bitcoin and financial variables. The research indicates that portfolios made up of gold, oil, equities and Bitcoin significantly reduce the portfolio risk as compared to portfolios made entirely of gold, oil and equity only. This highlights the diversifying role of Bitcoin in the stock markets.

The research study of [Kurka \(2019\)](#) examines how shocks are transmitted asymmetrically between the most liquid examples of traditional asset classes, such as commodities, foreign exchange and stocks and cryptocurrencies, such as Bitcoin. The findings imply that there is little unconditional correlation between cryptocurrencies and conventional assets. Conditional analysis, however, reveals instances of significant shock transmission between Bitcoin and conventional assets during times of market turbulence. This finding undermines Bitcoin's ability to serve as a hedge against traditional assets and demonstrates how market disturbances in Bitcoin can affect the traditional economy.

[Shahzad et al. \(2019\)](#) examines whether Bitcoin demonstrates a safe-haven property for stock market investments under turbulent market, and whether such a

feature is comparable to or distinct from that of gold and the commodity index, is the subject of this study. They focus on multiple stock market indices over a period of 8 years, which runs from 2010 to 2018 and includes developed and emerging economies. The key findings demonstrate that, at best, Bitcoin, can be regarded as weak haven and shelter for US equities. Moreover, they report that the capacity of these asset classes, especially gold and bitcoin, to off-set or minimize the losses in stock markets varies across different time period and different markets under investigation.

This analysis has been supported by [Kliber et al. \(2019\)](#) as well. The said author reports that bitcoin and gold, among other commodities, may prove some protection to investors against the downside swings and shocks in the stock market. However, their potential effectiveness changes with the market circumstances of any specific country or asset market. The key finding include that Bitcoin has a significant potential for portfolio diversification and hedging, but it is still too volatile to be part of a portfolio with low risk.

The research study by [Stensås et al. \(2019\)](#) examines whether Bitcoin may be used by market participants in different markets. The study takes into account 10 commodity series, 5 regional indexes, 7 developed and 6 developing markets. The research work is based on the framework of GARCH Model. According to the findings, Bitcoin serves as a hedge for investors in the majority of developing nations but solely as a diversifier for those in developed nations and those investing in commodities. Additionally, for all 10 of the commodities examined here, Bitcoin serves as a diversifier.

[Wang et al. \(2019\)](#) examines the hedging effectiveness of Bitcoin against a number of other investment vehicles including equities and gold among other variables. It uses VAR-GARCH model to investigate whether bitcoin has the potential to off-set downside risk in different financial assets. The sample includes daily return data for Chinese financial markets from a period spanning from 2013 till 2017. The authors report that bitcoin can be used to off-set losses in the Chinese equity and bond market when the financial market has strong price swings.

[Susilo et al. \(2020\)](#) research study sought to determine whether bitcoins functions as an effective hedge against the returns of ETF MSCI World, Indonesian, Malaysian, Vietnamese, Thai, and Philippine equity indexes. The five different cryptocurrencies including Bitcoin, are employed in this study. One cryptocurrency could not consistently and significantly hedge stocks, according to the asymmetric generalized DCC-GARCH Model, but five equally weighted cryptocurrencies could. The classical minimal variance model, meanwhile, reveal that the positive hedging effectiveness of cryptocurrencies is negligibly small. Overall, commodities are a better hedge for Southeast Asia's emerging markets.

The prospect of using Bitcoin and Ethereum as a safe-haven asset for the SP 500 index is mentioned by [Mariana et al. \(2021\)](#), nevertheless. They author reports that during extreme market movements in the US stock market, both Bitcoin and Ethereum function as safe-haven investments. The dynamic conditional correlation model reveal that during the pandemic, their daily returns tended to inversely correlate with the performance of the SP 500. The findings are also supported by the regression results, which also show that Ethereum might be a superior safe haven than Bitcoin. They do highlight that both currencies have high volatilities and subsequently, high risk as compared to other investment options.

[Fakhfekh et al. \(2021\)](#) look at the dynamic correlations that continue to exist between five cryptocurrencies, four stock markets, and the WTI, Gold, and VIX prices. Furthermore, it also investigates the appropriate optimal hedging technique. In order to derive the dynamic optimal hedge ratios, three multivariate GARCH model variants—DCC, ADCC, and GO-GARCH—are put into practice. The results show that both Bitcoin and Gold exhibit impressive commodity hedging characteristics, whilst the other assets seem to show a tendency to serve as diversifiers. Additionally, the results demonstrate that the VIX is the most efficient tool for hedging several associated stock market indexes. The data also show that in the case of FTSE and NIKKEI stock, the findings were indifferent.

[Bandhu Majumder \(2021\)](#) compares the Indian equities market to gold, cryptocurrencies, and commodities to assess their hedging capabilities. The authors

begin by estimating the correlation and co-movements between the returns of gold, cryptocurrencies, and commodities in the market of India. They then check to see if these features vary across different stock market indexes and levels of market volatility. Second, to compare the hedging characteristics of these investment tools, the authors compute dynamic hedge ratios and hedging efficiency using the multivariate GARCH framework. The majority of commodities, cryptocurrencies, and gold all have strong hedging capabilities. While, the only materials with safe haven properties are aluminum and oil. As a safe haven asset, neither gold nor cryptocurrencies are acceptable.

The research has been extended to African Stock Markets by [Kumah and Odei-Mensah \(2021\)](#). The study examines the relationship between the returns of equity markets of Africa and cryptocurrencies including bitcoin. The empirical findings suggest that investors may diversify their risk, by using bitcoin, in the short term. However, this property diminishes in the medium to long term time frame. The study further highlights that market shocks affecting the Bitcoin and other virtual coins could have an impact that translates to stock markets of Africa, therefore undermining its potential as a haven. Therefore, inclusion of bitcoin may only be fruitful for short term investors.

By examining a number of characteristics of Bitcoin's volatility relative to other asset classes, [Murty et al. \(2022\)](#) seek to comprehend the dynamic relationships and financial asset possibilities of the cryptocurrency in the case of Indian stock market. The goal of this study is to evaluate the volatility dynamics of Bitcoin return rates. An asymmetric GARCH model is used to examine whether Bitcoin may be advantageous for risk-averse investors and effective for risk management in the event of market shocks. Using a multivariate DCC GARCH model, this study also investigates Bitcoin as a hedging option to gold and NSE NIFTY. DCC GARCH models are also used to evaluate returns and volatility spillovers between markets, as well as to determine whether correlation (co-movement) between the markets is time-varying. The fact that Bitcoin and gold rose along during the COVID-19

epidemic indicates that investors thought Bitcoin was a relatively secure investment. Overall analysis reveals that Indian investors did not view Bitcoin as a secure hedge or investment choice during the study period. It is evident from the previous literature that the role of Bitcoin as a diversifier, hedge or safe haven is still controversial, due to the mixed findings. The past research falls short in examining how Bitcoin might function in the Next Eleven markets.

Academicians and professionals have shown great interest in safe haven properties of bitcoin after the outbreak of Coronavirus. The attention has been diverted from conventional safe-haven investments like gold and government bonds towards Bitcoin, which has been nicknamed the "digital gold" of the modern era. Since Bitcoin exhibits a variety of appealing and alternative investment characteristics, it is acknowledged as a useful instrument for portfolio risk differentiation and diversification owing to its weaker correlations to other conventional financial assets (Dyhrberg, 2016).

Conlon and McGee (2020) look into the capacity of bitcoin to serve as a safe haven during the crisis brought on by Covid-19 pandemic. Since the trading and active investment has started in Bitcoin, Coronavirus pandemic has been the first catastrophe that has affected the markets all over the globe. The study report that Bitcoin is not a shelter or haven against the severe bearish trend in the SP500 brought on by the COVID-19 pandemic. This means that investors could not seek shelter in bitcoin to protect their capital against losses. Rather, even a small investment to Bitcoin significantly increased the portfolio downside risk, when added in a portfolio comprising to stock of SP 500.

Bahloul et al. (2022) seeks to determine whether Islamic indices, Bitcoin, and gold continue to function as "safe-haven" assets or hedges during the catastrophe and havoc brought by the coronavirus. This study investigates the use of gold, bitcoin, the Islamic index, and the MSCI world index against the returns of the global stock markets. This research study seeks to examine which of above-mentioned investment vehicle can prove to be fruitful in off-setting the losses during the pandemic. The sample period of the study ranges from 2015 to 2017. According

to empirical findings, during the current coronavirus outbreak, the Islamic index was neither a hedge nor a safe haven asset. The authors discover that gold is a strong hedge for the entire era, but this property diminishes with the onset of the coronavirus crisis. Since bitcoin is not a safe-haven asset but rather a weak hedge, it exhibits unique characteristics.

[Kamran et al. \(2022\)](#) examine the prospect of using Bitcoin as an investment tool, during the outbreak of coronavirus, in the backdrop of Australian Stock Market. However, the results indicate that bitcoin is nothing more than a diversifier against the index returns of equity market of Australia. The findings suggest that virtual coin i.e. do not provide any shelter to the investors amid the turbulence caused by Covid-19.

The role of Bitcoin during the havoc brought on by coronavirus has also been examined by [Cocco et al. \(2022\)](#). The analysis is based on dynamic conditional correlations and a regression model with dummy variables defined around several pivotal periods of covid outbreak. The study uses daily data of the returns ranging from 2019 through 2021 to examine the safe-haven characteristics of Bitcoin versus losses in 13 different stock markets in an effort to model the actual dynamics of the markets. For Ethereum, a comparable analysis is also conducted. Although the results indicate that this pandemic affects Bitcoin's status as a safe haven, we are still a long way from being able to classify Bitcoin as a safe haven. There is limited literature available on exploring the role of bitcoin as a safe haven during the coronavirus catastrophe which means that there is a need to explore it further.

2.3 Hypothesis of the Study

H1: *Gold is a diversifier, a hedge or a safe haven for Next Eleven Equity Markets.*

H2: *Bitcoin is a diversifier, a hedge or a safe haven for Next Eleven Equity Markets.*

H3: *Gold or Bitcoin serve as a safe haven for Next Eleven Equity Markets during Covid-19 crisis.*

Chapter 3

Research Methodology

This section explains the sample of the study, data range and the econometric model used to evaluate the role of Gold and Bitcoin against the stock markets of Next Eleven countries.

3.1 Sample of the Study

The sample of the study includes the price index values of Bitcoin, gold, and the stock markets of the next eleven countries from 1st October 2014 to 31st March 2022. The Next Eleven (or N-11) include the following eleven countries—Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey, and Vietnam. The timespan of data is constrained by the non-availability of Bitcoin price data. As the bitcoin data is available since 2014 so the data of all the research variables ranges from October 2014 to March 2022. Moreover, Iran has been dropped from the sample because of economic sanctions being faced by Iran. The study uses daily data obtained from the respective markets. Gold and bitcoin are denominated in USD and their spot prices are used. The closing index values of each stock exchange are used in case of stock returns. The natural log returns have been used in order to capture the effect of continuous compounding. The formula used to determine the natural log returns for Bitcoin, Gold, and stock market return is as follows:

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right)$$

Where

R_t = Return of Bitcoin, Gold and stock markets compounded continuously.

P_t = Price/Index value of Bitcoin, Gold and stock markets at current time period "t".

P_{t-1} = Price/Index value of Bitcoin, Gold and stock markets at previous time period "t - 1".

3.2 Econometric Model

The following econometric models are used to analyze the role of gold and bitcoin as a diversifier, hedge or a safe haven. It is assumed that stock returns are affected by the changes in the returns of gold and bitcoin and vice versa. Moreover, one of the key features of equity returns is that they are dynamic and time-varying in nature. Therefore, it is assumed that the relationship between stock returns and gold and bitcoin respectively may be non-linear in nature. The two prime model include [Baur and McDermott \(2010\)](#) and [Bouri et al. \(2017\)](#).

The econometric model proposed by [Baur and McDermott \(2010\)](#) is based on the GARCH framework. When data is heteroscedastic i.e. the variance of the error term is not constant, GARCH models are employed. Heteroskedasticity refers to the unpredictably varying behavior of an error term or variable in a statistical model. In GARCH models, it is assumed that the error term variance varies systematically depending on the average size of the error terms during the preceding periods. It is a function of the average of its own prior values, or, in other words, dependent on its own lag term.

Equation (3.1) models the relationship of stock returns and Gold and Bitcoin respectively. The R_t represents the returns of gold and bitcoin respectively. In this case, it is assumed that Gold or Bitcoin prices are dependent upon the changes in stock prices.

The mean equation is as follows:

$$R_t = b_0 + b_1 r_{stock,t} + b_2 D(r_{stockq10,t}) + b_3 D(r_{stockq5,t}) + b_4 D(r_{stockq1,t}) + \mu_t \quad (3.1)$$

$$h_t = \lambda_1 \mu_{t-1}^2 + \lambda_2 h_{t-1} \quad (3.2)$$

The Dummy variables of $r_{stockq10}$, $r_{stockq5}$, $r_{stockq1}$ represent the 10%, 5% and 1% quantile of the return distribution of stocks in order to capture extreme market movement. If the stock market drops below the predetermined level of 10%, 5%, and 1% quantiles of the return distribution, they become equal to one. For the market under consideration, Gold or Bitcoin functions as a weak safe haven if the parameters b_2 , b_3 , and b_4 are closer to zero. Gold or Bitcoin serves as a strong safe haven when the variables are negatively correlated. If the parameter b_1 is zero, Gold or Bitcoin act as a weak hedge and if it is negative then serve as a strong hedge and a diversifier if there is low positive correlation ([Baur and McDermott, 2010](#)). The error term is represented by μ_t .

Equation (3.2) estimates the variance equation where h_t is the conditional variance; λ_0 is the constant; $\lambda_1 \mu_{t-1}^2$ is the parameter that captures the past price behavior i.e. whether past price behavior affects current volatility or the ARCH effect; and $\lambda_2 h_{t-1}$ represents the persistence of volatility or the GARCH effect. If the sum of Arch and Garch term is closer to 1, it indicates long term persistence of volatility.

The robustness of the results has also been tested using the model proposed by [Bouri et al. \(2017\)](#) based on DCC (Dynamic Conditional Correlation) framework proposed by [Engle \(2002\)](#). The DCC GARCH model provides a simpler method of capturing dynamic correlations across many assets with fewer computational errors and complexities. It has been used to test the role of gold and bitcoin as a diversifier, hedge and safe haven against Next Eleven Equity Markets. The DCC model is estimated for pairs of return series independently for the purposes of this study rather than for all the return series at once. This is done because of the large number of return series involved. As a result, there will be less of a chance of generating inaccurate estimations of parameters ([Bouri et al., 2017](#)).

Two steps are taken in the estimation of the DCC GARCH model. A univariate GARCH (1,1) model is estimated in the first step. The second method uses the standardized residuals from the first-step estimation to generate a time-varying correlation matrix.

The mean equation of the DCC model is as follows:

$$R_t = \beta_0 + \beta_1 R_{1-t} + \mu_t \quad (3.3)$$

The R_t represents the returns of stock market, gold and bitcoin respectively. The R_{t-1} represents the lagged term of return of the assets. The error term is represented by μ_t .

The variance equation is:

$$h_t = \lambda_0 + \lambda_1 \mu_{t-1}^2 + \lambda_2 h_{t-1} \quad (3.4)$$

Equation (3.4) estimates the variance equation where h_t is the conditional variance; λ_0 is the constant; $\lambda_1 \mu_{t-1}^2$ is the parameter that captures the past price behavior i.e whether past price behavior affects current volatility or the ARCH effect; and $\lambda_2 h_{t-1}$ represents the persistence of volatility or the GARCH effect. If the sum of ARCH and GARCH term is closer to 1, it indicates long term persistence of volatility.

The DCC (1,1) equation is given by Q_t , which is a square positive-definite matrix such as:

$$Q_t = (1 - \alpha - \beta)Q + \alpha \mu_{t-1} \mu_{t-1}' + \beta Q_{t-1} \quad (3.5)$$

where Q_t is the time-varying unconditional correlation matrix of μ_t . μ_t represents the standardized residuals obtained from the first-step estimation of the GARCH (1,1) process; and α and β are parameters that represent, respectively, the effects of previous shocks and previous DCCs on the current DCC.

The DCC between assets i and j is calculated by:

$$DCC_{ij,t} = \frac{Q_{ij,t}}{\sqrt{Q_{ii,t}}\sqrt{Q_{jj,t}}} \quad (3.6)$$

The DCC Model looks at the correlation between the residual terms of both the assets or in other words, correlation between the error terms of the assets. First, the dynamic conditional correlations are extracted from the DCC model into distinct time series, and then they are regressed on dummy variables (D) that reflect market shock movements in the lower 10%, 5%, or 1% of the return distribution. In the last step, the DCC matrix series becomes the independent variable and extreme stock market movements become the dependent variables in order to examine the impact of extreme market movements on the correlation between the residual terms of the assets. If this correlation increases, the assets may not be a strong hedge or safe haven in investor's portfolio.

$$DCC_t = b_0 + b_1D(r_{stockq10,t}) + b_2D(r_{stockq5,t}) + b_3D(r_{stockq1,t}) + \mu_t \quad (3.7)$$

where DCC is the pairwise conditional correlation between Gold or Bitcoin and stock returns of each of the market under study. The Dummy variables of $r_{stockq10}$, $r_{stockq5}$, $r_{stockq1}$ represent the 10%, 5% and 1% quantile of the return distribution of stocks in order to capture extreme market movement and μ_t is the error term. Bitcoin or Gold is a diversifier against stock returns if the β_0 is positive. They are a weak hedge against movements in stock market if β_0 is zero and a strong hedge if it is negative. Gold and Bitcoin are a strong safe haven if the parameters b_1 , b_2 , and b_3 are negative and a weak safe haven if they are significantly closer to zero (Bouri et al., 2017).

The study also examines the safe haven properties of gold and bitcoin during the recent economic and financial crisis caused by Covid-19. World Health Organization (WHO) declared coronavirus as a pandemic on March 11, 2020. On the other hand, most of the countries started easing the coronavirus-related restrictions regarding business hours, indoor and outdoor gatherings, re-opening of

schools, markets and international travel, following declining rate of infections and increased vaccination rates in the start of 2021. By the end of March 2021, all of the next eleven countries had received vaccination doses with Philippines being the last one to receive the first batch of vaccine on March 1, 2021. According to the statistics shared by Our World in Data (2021), approximately 5% of the world population had received first dose of vaccination and 1.8% of the world population had received full dose of vaccination by March 2021. The ease in Covid-19 restrictions helped in paving the way for economic revival. Therefore, the Covid-19 period was assumed to span from March 11, 2020 to March 31, 2021. In order to investigate the safe haven role of Gold and Bitcoin against extreme stock market movements, dummy variable of Covid-19 was created and tested empirically.

$$\begin{aligned}
 DCC_t = & b_0 + b_1D(r_{stockq10,t}) + b_2D(r_{stockq5,t}) + b_3D(r_{stockq1,t}) \\
 & + b_4D(Covid) * D(r_{stockq10,t}) + b_5D(Covid) * D(r_{stockq5,t}) \quad (3.8) \\
 & + b_6D(Covid) * D(r_{stockq1,t}) + \mu_t
 \end{aligned}$$

where DCC is the pairwise conditional correlation between Gold or Bitcoin and stock returns of each of the market under study. The Dummy variables of $r_{stockq10}$, $r_{stockq5}$, $r_{stockq1}$ represent the 10%, 5% and 1% quantile of the return distribution of stocks in order to capture extreme market movement and the Dummy variable of Covid represents the Covid time period. The error term is represented by μ_t .

Chapter 4

Results and Discussion

This section reports the descriptive statistics for Gold, Bitcoin and Next-Eleven stock markets and estimated results of the proposed models for each of the market. Finally, the results are discussed.

4.1 Descriptive Statistics

The descriptive statistics has been reported in Table 4.1. The Table contains the name of each market, symbol of each market, mean, standard deviation, the maximum and minimum return for each market, skewness and kurtosis. The mean return of the bitcoin (0.0021) is higher than the mean return of the gold (0.0002) during sample period. Moreover, the standard deviation of returns of bitcoin (0.0466) is also much higher than that of gold (0.0098). This finding is also reflected in the maximum and minimum values. Bitcoin exhibits more extreme negative values (-0.464) than the gold returns (-0.0511) and also more extreme positive values (0.2251) compared to the Gold (0.1121). This leads to the conclusion that markets that have higher returns also have higher risk (Standard deviation). This is also true in the case of stock markets of Pakistan, Turkey and Vietnam. Turkey exhibited the highest mean average returns during the specified time period. Egypt and Philippines were the most volatile markets with the highest standard deviation during the time span of the data under study. Moreover, these

TABLE 4.1: Descriptive Statistics

Country	Index	Mean	Maximum	Minimum	Std Dev	Skewness	Kurtosis
Bitcoin	-	0.0021	0.2251	-0.4647	0.0466	-0.6824	11.9925
Gold	-	0.0002	0.1122	-0.0511	0.0098	0.4821	14.7007
Bangladesh	DSE Composite	0.0001	0.0980	-0.0905	0.0101	-0.1480	20.7527
Egypt	EGX 30	0.0000	0.1118	-0.1716	0.0161	-1.0352	17.4861
Indonesia	JKSE Composite	0.0002	0.0970	-0.0681	0.0101	-0.2089	11.4747
Mexico	S&P Mexico	0.0000	0.0474	-0.0664	0.0101	-0.4561	6.7784
Nigeria	NSE 30	0.0000	0.0842	-0.0570	0.0109	0.4239	8.4307
Pakistan	KSE 100	0.0002	0.0468	-0.0710	0.0109	-0.6097	7.3763
Philippines	PSEI Composite	-0.0001	0.0717	-0.1432	0.0126	-1.3237	17.7396
South Korea	KOSPI Composite	0.0001	0.0825	-0.0877	0.0104	-0.2540	11.4541
Turkey	BIST 100	0.0006	0.0581	-0.1031	0.0145	-0.9779	8.4588
Vietnam	VN 30	0.0004	0.0517	-0.0696	0.0121	-0.8828	7.6055

two markets also had negative mean returns over the period of study whereas other markets exhibited positive mean returns. Bangladesh was the most stable market that exhibited lowest standard deviation. The maximum (0.1117) and minimum returns (-0.1716) were also observed in Egyptian stock market. Data appears to be non-normal as data is skewed and leptokurtic in general. The graphical representation of the data below depicts the volatility of the returns of Gold, Bitcoin and each of the N-11 markets respectively. Figure 4.1 and 4.2 represent the progression of gold and bitcoin prices and returns respectively, from 2014 to 2022.

The prices of gold appear more stable as compared to bitcoin which experienced significant upward and downward market swings over the period of study. The key feature of equity returns is that they are dynamic and time-varying in nature. The variation in returns of the Next Eleven Countries, as expected, are not static over the sample period i.e. there are periods of significantly high and low volatility, as illustrated in the graphs. The markets of Vietnam (Fig 4.12), Turkey (Fig 4.11), Nigeria (Fig 4.7) Mexico (Fig 4.6), and Pakistan (Fig 4.8) exhibit more volatile behavior whereas Bangladesh (Fig 4.3) and South Korea (Fig 4.10) appear relatively calm. In 2019 and 2020, the shock arising as a result of COVID-19 are high.

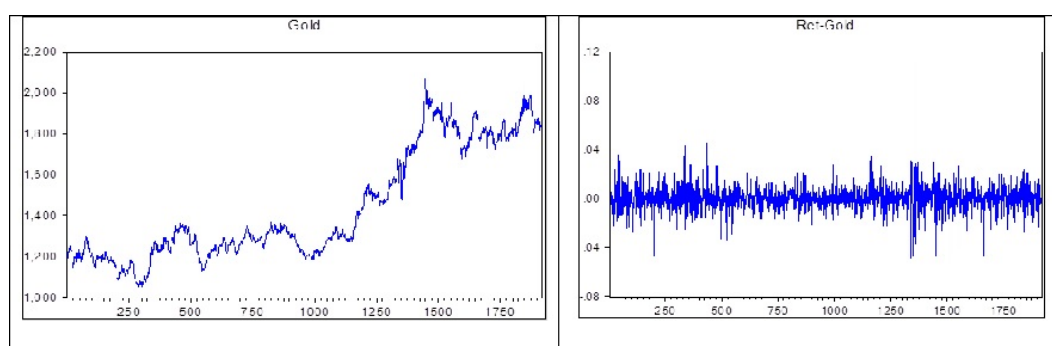


FIGURE 4.1: Figure 4.1A and 4.1B (Gold)

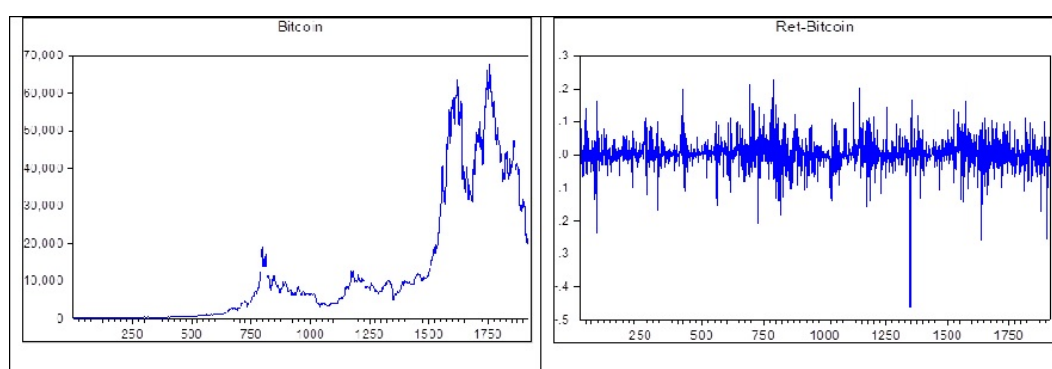


FIGURE 4.2: Figure 4.2A and 4.2B (BITCOIN)

4.2 Gold as a Diversifier, Hedge or Safe Haven

This section reports and interprets the empirical results to analyze the diversifying, hedge and safe haven capabilities of Gold in respect of Next-Eleven equity markets.

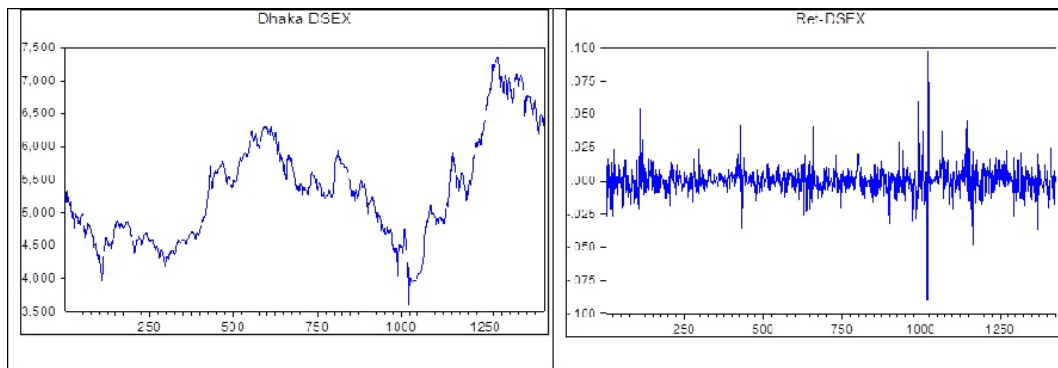


FIGURE 4.3: Figure 4.3A and 4.3B (Bangladesh - DSEX Composite)

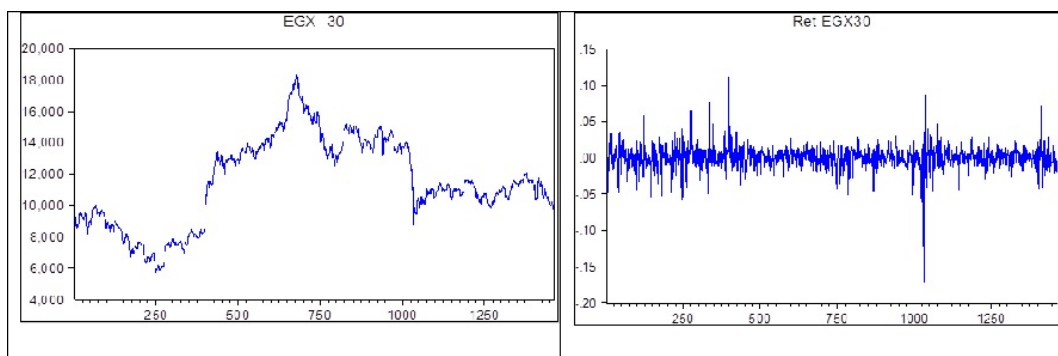


FIGURE 4.4: Figure 4.4A and 4.4B (Egypt – EGX 30)

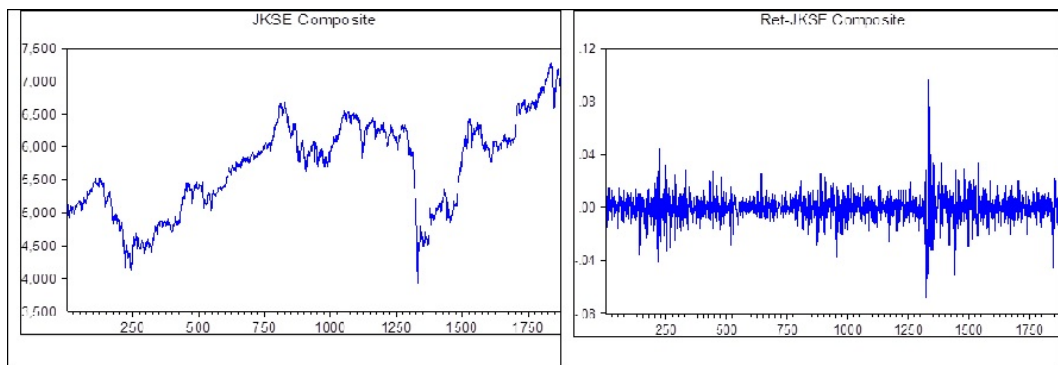


FIGURE 4.5: Figure 4.5A and 4.5B (Indonesia – JKSE Composite)

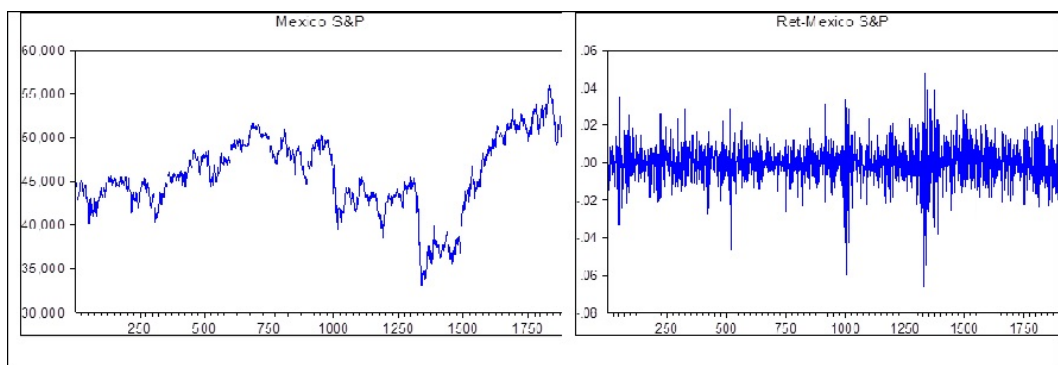


FIGURE 4.6: Figure 4.6A and 4.6B (Mexico – S&P)

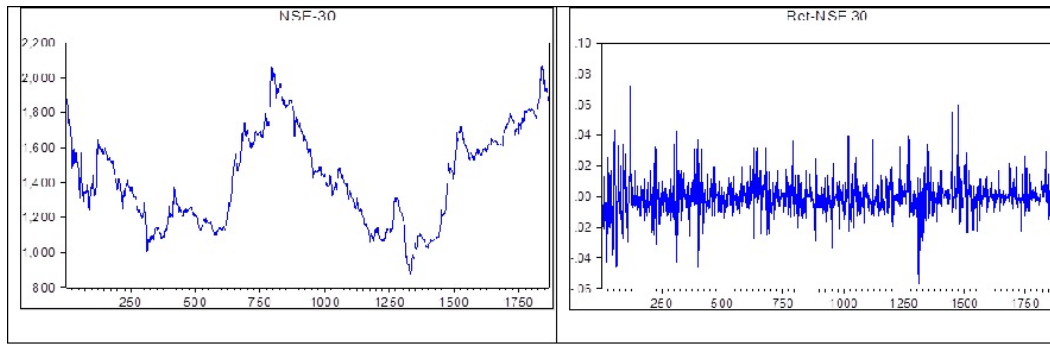


FIGURE 4.7: Figure 4.7A and 4.7B (Nigeria – NSE 30)

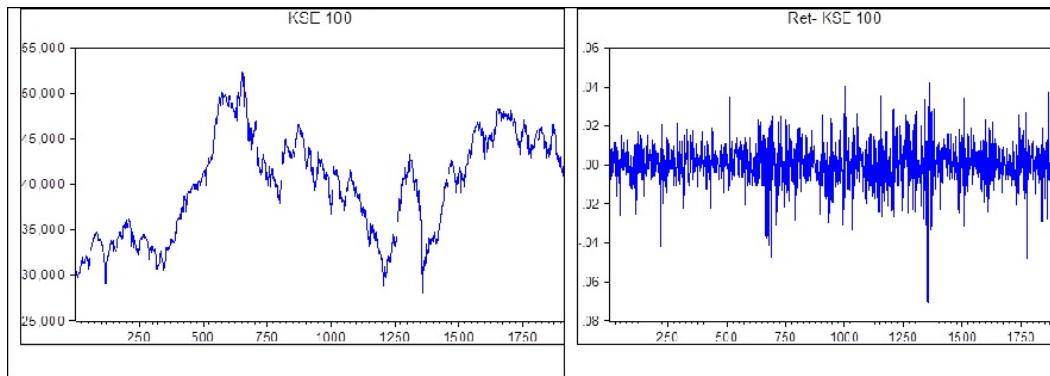


FIGURE 4.8: Figure 4.8A and 4.8B (Pakistan – KSE 100)

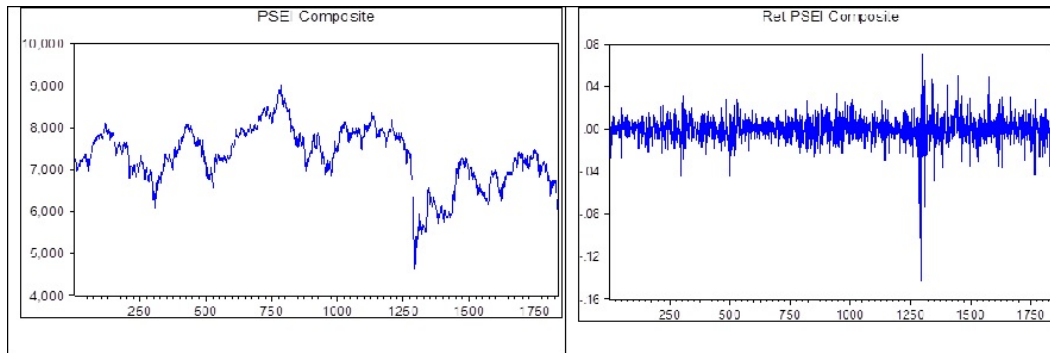


FIGURE 4.9: Figure 4.9A and 4.9B (Philippines – PSEI Composite)

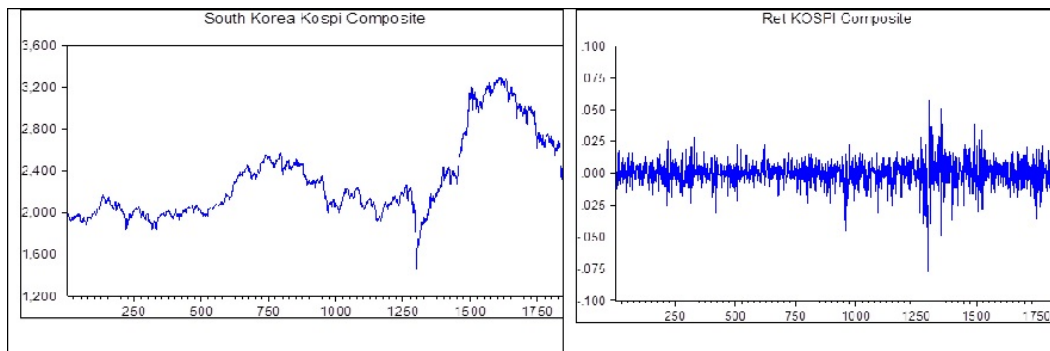


FIGURE 4.10: Figure 4.10A and 4.10B (South Korea – KOSPI Composite)

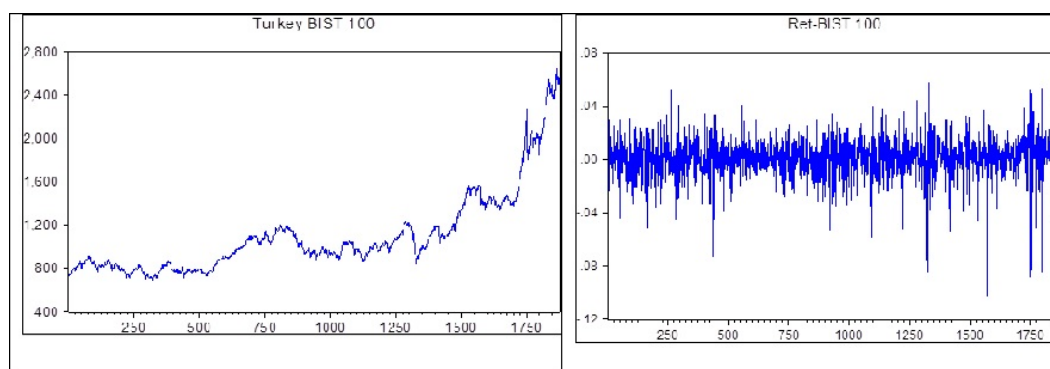


FIGURE 4.11: Figure 4.11A and 4.11B (Turkey – BIST 100)

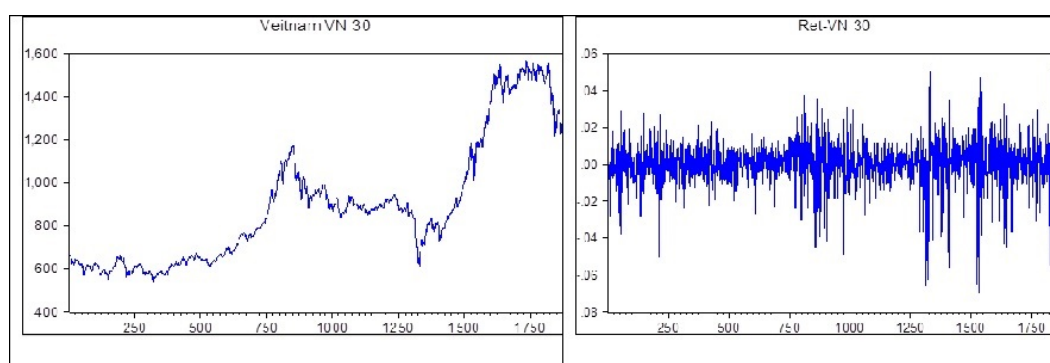


FIGURE 4.12: Figure 4.12A and 4.12B (Vietnam– VN 30)

4.2.1 Diversifying, Hedge and Safe Haven Properties of Gold using Baur Model

Table 4.2 shows the estimates for Gold and Next-Eleven equity markets as per Baur Model. The tables contain the estimates of b_1 (stock market returns) and the estimates for extreme market conditions, that is, the b_2 for the 10% quantile, b_3 for the 5% quantile and the b_4 for the 1% quantile. The table further reports the variance equation as well.

TABLE 4.2: Diversifying, Hedge and Safe Haven Properties of Gold using Baur Model Mean Equation

Country	Constant	RM	Q10	Q5	Q1
Bangladesh	0.0001	-0.0210	0.0002	-0.0010	0.0021

	(0.0003)	(0.0243)	(0.0013)	(0.0015)	(0.0017)
Egypt	-0.0002	0.0047	0.0024	-0.0012	0.0087***
	(0.0003)	(0.0172)	(0.0013)	(0.0018)	(0.0018)
Indonesia	0.0002	0.0074	0.0006	-0.0010	-0.0047***
	(0.0002)	(0.0291)	(0.0009)	(0.0012)	(0.0018)
Mexico	0.0001	0.0626	0.0007	0.0004	-0.0022
	(0.0005)	(0.0515)	(0.0020)	(0.0026)	(0.0056)
Nigeria	0.0000	0.0137	0.0019**	-0.0022	0.0021
	(0.0002)	(0.0242)	(0.0009)	(0.0013)	(0.0023)
Pakistan	0.0001	-0.0073	0.0011	-0.0001	-0.0039**
	(0.0002)	(0.0274)	(0.0010)	(0.0013)	(0.0019)
Philippines	0.0001	-0.0091	-0.0011	0.0022	-0.0029
	(0.0002)	(0.0210)	(0.0009)	(0.0013)	(0.0017)
South Korea	-0.0000	0.0540**	0.0015	0.0003	0.0023
	(0.0002)	(0.0286)	(0.0009)	(0.0011)	(0.0016)
Turkey	0.0000	0.0269	0.0013	-0.0022	0.0011
	(0.0002)	(0.0185)	(0.0009)	(0.0012)	(0.0031)
Vietnam	0.0001	-0.0103	0.0011	-0.0016	-0.0020
	(0.0002)	(0.0245)	(0.0008)	(0.0013)	(0.0021)

***1% significance level , **5% significance Level

Table 4.3 reports the results of variance equation. The ARCH term is significant in all cases indicating the past price behavior influences the current returns. The GARCH term is also significant in all cases indicating the persistence of volatility on all sample markets. The sum of coefficients of ARCH and GARCH term are closer to 1 indicating that persistence is long run in nature.

The results indicate that Gold is a safe haven for a number of Next Eleven equity markets including Egypt, Indonesia, Nigeria and Pakistan. However, the strength of the safe haven effect varies across market conditions (quantiles).

TABLE 4.3: Variance Equation

Country	Constant	ARCH	GARCH
Bangladesh	0.0000 (0.0000)	0.0263 (0.0031)	0.9676 (0.0038)
Egypt	0.0000 (0.0000)	0.0513 (0.0069)	0.9193 (0.0105)
Indonesia	0.0000 (0.0000)	0.0180 (0.0019)	0.9765 (0.0023)
Mexico	0.0001 (0.0000)	0.1500 (0.0476)	0.6000 (0.1091)
Nigeria	0.0000 (0.0000)	0.0530 (0.0062)	0.9248 (0.0100)
Pakistan	0.0000 (0.0000)	0.0299 (0.0027)	0.9579 (0.0042)
Philippines	0.0000 (0.0000)	0.0532 (0.0061)	0.9265 (0.0093)
South Korea	0.0000 (0.0000)	0.0325 (0.0035)	0.9594 (0.0044)
Turkey	0.0000 (0.0000)	0.0527 (0.0061)	0.9282 (0.0093)
Vietnam	0.0000 (0.0000)	0.0373 (0.0039)	0.9535 (0.0052)

Figures in parentheses represents standard error

The results are statistically significant and negative for Pakistan (-0.003889) and Indonesia (-0.00469) for the 1% quantile of return. Gold exhibits the strong potential to provide shelter in very extreme market conditions (1% quantile) for daily returns in stock markets of Indonesia and Pakistan. It serves as a weak safe haven in the case of Egyptian stock market. Faced with significant losses or extreme

levels of volatility in the respective market, investors may sell stocks and buy gold in order to preserve their capital. This is in line with the proposition that gold has historically been able to appreciate in value during times of market turmoil when equity prices are unclear as a result of investors' reluctance to trade. This implies that investors can seek shelter in gold during extreme market turbulence and uncertainty.

Whereas, in the case of Nigeria, gold serves as a weak safe haven during times of increased volatility (10% quantile), but loses this property for Nigerian stock exchange in times of extreme volatility (1% quantile). Investors in the equity market of Nigeria can use gold to diversify their risk during periods of volatility, however, the safe haven characteristics diminish during periods of extreme volatility i.e. 1% quantile. Investors will be protected by a weak safe haven to the extent that it does not react to market shocks by moving together with other assets. Whereas, during periods of crisis, the strong safe haven moves in opposition to other assets, minimizing overall losses for investors. However, gold does not provide any hedging benefits to investors, on average, in these markets.

Moreover, Gold can act as an effective diversifier against the movements in stock market of South Korea. This suggests that investors can diversify some of their portfolio risk by adding gold as an investment alternative. In contrast, gold does not play any role for the markets of Bangladesh, Mexico, Philippines, Turkey and Vietnam. This means that during times of market turmoil and economic uncertainty, investors of these markets are unable to seek shelter in gold to safeguard their wealth.

4.2.2 Time Varying Correlation between Gold and N-11 Stock Markets

The time varying correlation has been estimated between returns of Gold and sample equity market using Dynamic Conditional Correlation. Table 4.4 reports the estimates of α and β that represent, respectively, the effects of previous shocks and

previous DCCs on the current DCC. In case of dynamic conditional correlation, the stability condition of $\alpha + \beta < 1$ is met by all the series. The impact of past residual shocks is statistically significant in the case of Egypt, Pakistan and South Korea which indicates that there is an impact of past residual shocks on current dynamic conditional correlation (DCC). Likewise, the impact of lagged dynamic conditional correlation is statistically significant in the case of majority of the markets including Egypt, Mexico, Nigeria, Pakistan, South Korea, Turkey and Vietnam thereby indicating the impact of previous DCC's on current DCC. The purpose of DCC Modeling is not only to generate the estimates and identify time varying correlation, but also to derive the pairwise DCCs that will be later used in the model to assess the hedge and safe haven role of gold and bitcoin.

TABLE 4.4: Estimates of Dynamic Conditional Correlation between Gold and Sample Equity Markets

Country	α	β
Bangladesh	-0.0169	0.7820
	NA	NA
Egypt	-0.0139***	0.9911***
	(0.0025)	(0.0046)
Indonesia	-0.0044	0.6192***
	(0.0122)	(0.8815)
Mexico	0.0057	0.8752***
	(0.0109)	(0.1513)
Nigeria	0.0072	0.9006***
	(0.0144)	(0.3239)
Pakistan	-0.0172***	0.7995***
	(0.0024)	(0.1802)
Philippines	0.0419	0.2123
	(0.0270)	(0.6697)
South Korea	0.0202**	0.8787***
	(0.0105)	(0.0598)

Turkey	0.0161 (0.0146)	0.8904*** (0.1379)
Vietnam	0.0170 (0.0147)	0.8221*** (0.1342)

***1% significance level , **5% significance Level

4.2.3 Diversifying, Hedge and Safe Haven Properties of Gold using Bouri Model

The pairwise DCC's derived are further used in Bouri Model to check the robustness of earlier results. Table 4.5 reports the estimates of stock market returns and extreme market conditions as per the DCC GARCH Model proposed by [Bouri et al. \(2017\)](#).

TABLE 4.5: Diversifying, Hedge and Safe Haven Properties of Gold using Bouri Model

Country	Constant	Q10	Q5	Q1
Bangladesh	-0.0153*** (0.0014)	0.0067 (0.0059)	0.0061 (0.0087)	-0.0035 (0.0141)
Egypt	-0.0855*** (0.0028)	0.0186 (0.0123)	0.0040 (0.0179)	0.0794*** (0.0296)
Indonesia	0.0155*** (0.0002)	0.0002 (0.0007)	-0.0010 (0.0010)	-0.0028 (0.0017)
Mexico	0.0446*** (0.0003)	0.0010 (0.0013)	-0.0045** (0.0020)	-0.0060 (0.0033)
Nigeria	0.0209*** (0.0004)	-0.0044** (0.0018)	-0.0001 (0.0027)	0.0024 (0.0044)
Pakistan	-0.0028*** (0.0009)	-0.0056 (0.0039)	0.0099 (0.0058)	0.0109 (0.0094)
Philippines	-0.0238***	0.0059	0.0011	-0.0367***

	(0.0010)	(0.0044)	(0.0064)	(0.0105)
South Korea	-0.0102***	-0.0036	0.0008	-0.0063
	(0.0012)	(0.0052)	(0.0076)	(0.0125)
Turkey	0.0259***	0.0007	-0.0053	-0.0143
	(0.0009)	(0.0038)	(0.0056)	(0.0092)
Vietnam	-0.0311***	-0.0008	0.0007	0.0055
	(0.0007)	(0.0032)	(0.0047)	(0.0078)

***1% significance level , **5% significance Level

The results of Bouri Model indicate that Gold is a strong hedge against the movements in stocks markets of Bangladesh, Egypt, Pakistan, Philippines, South Korea and Vietnam. The results are statistically significant and negative for Bangladesh (-0.0153), Egypt (-0.0855), Pakistan (-0.002826), Philippines (-0.0238), South Korea (-0.0102) and Vietnam (-0.0311). The results imply that gold can be used by investors, on average, to hedge their investment portfolio and minimize their risk in the respective stock market. The results indicate that investors can, on average, diversify their portfolios in these stock market by using gold as an investment alternative. This finding shows that Gold's hedging potential is fruitful in the case of these respective markets.

Regarding the potential of Gold as a haven, empirical results indicate that Gold acts as a safe haven against volatile movements in Nigerian stocks (10% quantile) and Mexican stocks (5% quantile), however, this characteristic diminishes in episodes of extreme volatility (1% quantile) for the respective markets. Gold only acts as a safe haven in volatile market swings against the returns of Philippines Stock Exchange. The results have been significant and negative (-0.036731) for the 1% quantile of the return. This means that investors of stock market of Philippines may invest in gold to preserve their wealth during extremely unfavorable market conditions. Further, Gold only serves as a diversifier in the case of Indonesia and Turkey. This suggests that gold is not the best alternative for investors, in this case, when seeking shelter in turbulent market times. However,

it does indicate that gold, on average, can be used by investors to diversify their investment portfolio in stock markets of Indonesia and Turkey.

4.3 Bitcoin as a Diversifier, Hedge or Safe Haven

This section reports and interprets the empirical results to analyze the diversifying, hedge and safe haven capabilities of Bitcoin in respect of Next-Eleven equity markets.

4.3.1 Diversifying, Hedge and Safe Haven Properties of Bitcoin using Baur Model

Table 4.6 shows the estimates for Bitcoin and Next-Eleven equity markets using [Baur and McDermott \(2010\)](#) Model. The table 4.6 contain the estimates of b_1 (stock market returns) and the estimates for extreme market conditions, that is, the b_2 for the 10% quantile, b_3 for the 5% quantile and the b_4 for the 1% quantile.

Table 4.7 reports the results of variance equation. The ARCH term is significant in all cases indicating the past price behavior influences the current returns. The GARCH term is also significant in all cases indicating the persistence of volatility in all sample markets. The sum of coefficients of ARCH and GARCH term are closer to 1 indicating that persistence is long run in nature.

TABLE 4.6: Diversifying, Hedge and Safe Haven Properties of Bitcoin using Baur Model Mean Equation

Country	Constant	RM	Q10	Q5	Q1
Bangladesh	0.0016 (0.0015)	0.2989*** (0.1226)	0.0077 (0.0051)	0.0164** (0.0071)	-0.0670*** (0.0108)
Egypt	0.0028 (0.0014)	0.1487** (0.0726)	-0.0089 (0.0048)	0.0213*** (0.0082)	-0.0437*** (0.0120)
Indonesia	0.0028 (0.0012)	-0.0153 (0.1256)	-0.0015 (0.0042)	-0.0098** (0.0049)	-0.0116 (0.0066)

Mexico	0.0024 (0.0011)	0.0895 (0.1169)	-0.0012 (0.0036)	-0.0003 (0.0047)	0.0405*** (0.0073)
Nigeria	0.0026 (0.0010)	0.0526 (0.1353)	-0.0047 (0.0048)	0.0125** (0.0055)	0.0462*** (0.0065)
Pakistan	0.0025 (0.0011)	-0.1306 (0.1102)	-0.0515 (0.2842)	-0.0732 (0.2590)	1.0981*** (0.1903)
Philippines	0.0015 (0.0011)	0.4731*** (0.0969)	0.0065 (0.0044)	0.0016 (0.0063)	-0.0488*** (0.0090)
South Korea	0.0021 (0.0011)	0.5582*** (0.1440)	-0.0040 (0.0043)	0.0126** (0.0062)	-0.0447*** (0.0066)
Turkey	0.0027 (0.0011)	-0.0130 (0.0942)	-0.0062 (0.0050)	0.0047 (0.0059)	0.0183*** (0.0067)
Vietnam	0.0022 (0.0011)	0.2350** (0.1047)	0.0035 (0.0045)	-0.0023 (0.0056)	0.0300*** (0.0061)

***1% significance level , **5% significance Level

TABLE 4.7: Variance Equation

Country	Constant	ARCH	GARCH
Bangladesh	0.0002 (0.0000)	0.0846 (0.0100)	0.8631 (0.0153)
Egypt	0.0002 (0.0000)	0.0762 (0.0097)	0.8631 (0.0158)
Indonesia	0.0001 (0.0000)	0.1116 (0.0093)	0.8379 (0.0125)
Mexico	0.0001 (0.0000)	0.1111 (0.0111)	0.8418 (0.0145)
Nigeria	0.0001 (0.0000)	0.1342 (0.0111)	0.8226 (0.0131)
Pakistan	0.0001	0.1279	0.8187

	(0.0000)	(0.0129)	(0.0163)
Philippines	0.0002	0.1669	0.7565
	(0.0000)	(0.0159)	(0.0195)
South Korea	0.0001	0.1149	0.8321
	(0.0000)	(0.0124)	(0.0162)
Turkey	0.0001	0.1063	0.8493
	(0.0000)	(0.0112)	(0.0146)
Vietnam	0.0001	0.1156	0.8382
	(0.0000)	(0.0116)	(0.0146)

Figure in parenthesis represents standard error

The results indicate that Bitcoin serves as a strong safe haven, in very extreme market conditions (1% quantile), for stock markets of Bangladesh, Philippines and South Korea. The results are statistically significant and negative for Bangladesh (-0.003889), Philippines (-0.048819) and South Korea (-0.044671) for the 1% quantile of return. For investors, this result indicates that Bitcoin's safe haven capabilities are fruitful in the case of Bangladesh, Philippines and South Korea. This means, during periods of extreme market turbulence, investors may include bitcoin in their portfolio for in order to preserve their wealth. If the financial system is unstable or volatile, investors may turn to Bitcoin since it is separate from the financial system and the underlying technology (Bouri et al., 2017). Similarly, Bitcoin serves as a safe haven in times of increasing volatility (5% quantile) in the equity markets of Bangladesh, Egypt, Indonesia and Turkey but loses this property for most markets, except for Bangladesh, during extreme market shocks. Investors in these markets may sell equities and buy bitcoin in order to protect their capital when faced with market turbulence but this safe haven characteristics diminishes in spells of extreme volatility (1% quantile).

Furthermore, Bitcoin acts as a diversifier against the daily returns on stocks of Bangladesh, Egypt and Vietnam. This suggests that investors can, on average, diversify their portfolios in the respective stock market by adding bitcoin in their

investment portfolios. However, the results indicate that bitcoin is neither a hedge nor a safe haven equity markets of Mexico, Nigeria and Pakistan. This implies that investors are unable to use bitcoin as a haven to protect their capital when the markets are volatile and the market conditions are uncertain.

4.3.2 Time Varying Correlation between Bitcoin and N-11 Stock Markets

The time varying correlation has been estimated between returns of Bitcoin and sample equity market using Dynamic Conditional Correlation. Table 4.6 reports the estimates of α and β that represent, respectively, the effects of previous shocks and previous DCCs on the current DCC. In case of dynamic conditional correlation, the stability condition of $\alpha + \beta < 1$ is met by all the series. The impact of lagged dynamic conditional correlation is statistically significant in the case of Bangladesh, Egypt, Mexico, Nigeria, Pakistan, South Korea and Vietnam, thereby indicating the impact of previous DCC's on current DCC.

TABLE 4.8: Estimates of Dynamic Conditional Correlation between Bitcoin and Sample Equity Markets

Country	α	β
Bangladesh	0.0140 (0.0157)	0.8139*** (0.1958)
Egypt	0.0414 (0.0245)	0.7668*** (0.1570)
Indonesia	0.0136 (0.0184)	0.6231 (0.3847)
Mexico	0.0039 (0.0053)	0.9724*** (0.0377)
Nigeria	0.0083 (0.0098)	0.9059*** (0.1095)
Pakistan	0.0416	0.6916***

	(0.0254)	(0.2119)
Philippines	-0.0035	0.6959
	(0.0122)	(0.5640)
South Korea	0.0078	0.9827***
	(0.0047)	(0.0132)
Turkey	-0.0057	0.5862
	(0.0066)	(0.6908)
Vietnam	0.0017	0.9906***
	(0.0032)	(0.0195)

***1% significance level , **5% significance Level

4.3.3 Diversifying, Hedge and Safe Haven Properties of Bitcoin using Bouri Model

Table 4.9 reports the impact of stock market returns and extreme market conditions on dynamic condition correlation between Bitcoin and specific stock market as proposed by [Bouri et al. \(2017\)](#).

TABLE 4.9: Diversifying, Hedge and Safe Haven Properties of Bitcoin using Bouri Model

Country	Constant	Q10	Q5	Q1
Bangladesh	0.0215***	-0.0068**	0.0036	0.0349***
	(0.0008)	(0.0035)	(0.0052)	(0.0084)
Egypt	0.0297***	0.0142	0.0065	0.0422**
	(0.0019)	(0.0082)	(0.0120)	(0.0198)
Indonesia	0.0542***	0.0029	-0.0030	0.0266***
	(0.0006)	(0.0024)	(0.0035)	(0.0058)
Mexico	0.0516***	-0.0001	0.0013	-0.0128***
	(0.0005)	(0.0021)	(0.0031)	(0.0051)
Nigeria	0.0415***	0.0017	-0.0003	0.0158***

	(0.0005)	(0.0021)	(0.0030)	(0.0050)
Pakistan	-0.0042***	0.0031	-0.0159	0.0860***
	(0.0015)	(0.0064)	(0.0094)	(0.0154)
Philippines	0.0581***	-0.0009	0.0011	0.0004
	(0.0001)	(0.0005)	(0.0008)	(0.0012)
South Korea	0.0948***	0.0059	0.0081	0.0021
	(0.0011)	(0.0049)	(0.0071)	(0.0117)
Turkey	0.0305***	-0.0002	-0.0014	0.0040**
	(0.0002)	(0.0008)	(0.0012)	(0.0019)
Vietnam	0.0736***	0.0003	0.0019	0.0046
	(0.0004)	(0.0016)	(0.0023)	(0.0038)

***1% significance level , **5% significance Level

The results from Bouri model indicate that Bitcoin is a safe haven for Bangladesh, Egypt and Mexico but the safe haven characteristics, however, vary in strength, depending on the condition of the market (quantiles). Bitcoin acts as strong safe haven during extreme market swings (1% quantile) against the daily returns of Bangladesh and Mexico. The results are statistically significant and negative for Bangladesh (-0.006841) and Mexico (-0.012772) for the 1% quantile of returns. The result for the 10% quantile (-0.006841) is significantly negative for Bangladesh as well, indicating its safe haven properties in times of increasing uncertainty. Whereas, it serves as a weak safe haven for Egyptian, Nigerian and Turkish equity markets. Investors may prefer Bitcoin in periods of extreme volatility because it is completely decentralized and independent of any central authorities, unlike conventional currencies. This means, during periods of extreme market turbulence, investors may include bitcoin in their portfolio to preserve their wealth. The results also reveal that bitcoin has hedging potential against the equity returns of Egypt and Pakistan. The bitcoin acts as a diversifier against the returns of remaining markets under study including Indonesia, Nigeria, Philippines, South Korea and Vietnam. This suggests that investors of the respective markets may add bitcoin

in their portfolio, to diversify their investment, during calm periods. However, they cannot seek refuge in bitcoin for safety during periods of market unrest and financial instability to preserve their capital. The role of Bitcoin is limited in the case of these markets.

4.3.4 Role of Gold as a Safe Haven during Covid-19

Finally, the safe haven properties of Gold are examined during Covid-19 and are results are reported as Table 4.6. The results illustrate that Gold does not play any significant role as a safe haven against extreme market movements, during the Covid-19 crisis, in majority of the markets under consideration, with the exception of Indonesia and Vietnam.

This means that investors were unable to seek shelter in gold in order to preserve their wealth during the period of coronavirus. Gold did not display any safe haven characteristics during market instability and excessive volatility induced by the pandemic. This could be attributed to the fact that Coronavirus outbreak resulted in unprecedented volatility and uncertainty in the financial markets all over the world which made it difficult to find shelter in any of the alternative asset classes. However, in the case of Indonesian stock market, Gold displayed strong safe haven characteristics in very extreme market conditions (1%) during the Covid-19 crisis against the returns of Indonesian Stock Market. Whereas, in the case of Vietnam, it displayed safe haven characteristics in times of rising uncertainty (5% quantile). This implies that gold provided a shelter to investors of Indonesian and Vietnamese Equity Market during the period of Covid-19 outbreak.

The empirical evidence suggests that bitcoin did not display any safe haven capabilities, during the Covid-19 crisis, against the extreme movements in almost all of the markets under study, with the exception of Bangladesh. Investors were unable to seek shelter in the Digital currency i.e. Bitcoin during the market turbulence and volatility caused by Covid-19 outbreak. However, Bitcoin displayed some weak safe haven properties in spells of extreme volatility i.e. 1% quantile, during the said period, against the returns of equity market of Bangladesh.

TABLE 4.10: Safe Haven Properties of Gold during Covid-19

Country	Constant	Q10	Q5	Q1	Covid*Q10	Covid*Q5	Covid*Q1
Bangladesh	-0.0153 (0.0014)	0.0068 (0.0060)	0.0000 (0.0093)	-0.0144 (0.0157)	-0.0038 (0.0286)	0.0346 (0.0329)	0.0535 (0.0353)
Egypt	-0.0855 (0.0028)	0.0249** (0.0129)	-0.0026 (0.0190)	0.0496 (0.0317)	-0.0647 (0.0406)	0.0674 (0.0561)	0.2234** (0.0867)
Indonesia	0.0155 (0.0002)	0.0005 (0.0008)	-0.0019 (0.0012)	0.0002 (0.0022)	-0.0010 (0.0017)	0.0040 (0.0025)	-0.0085** (0.0036)
Mexico	0.0446 (0.0003)	0.0005 (0.0015)	-0.0031 (0.0022)	-0.0071 (0.0046)	0.0022 (0.0031)	-0.0074 (0.0050)	0.0057 (0.0071)
Nigeria	0.0209 (0.0004)	-0.0053*** (0.0019)	-0.0008 (0.0028)	0.0003 (0.0048)	0.0089 (0.0057)	0.0039 (0.0081)	0.0107 (0.0122)
Pakistan	-0.0028 (0.0009)	-0.0064 (0.0042)	0.0140** (0.0062)	-0.0093 (0.0118)	0.0065 (0.0116)	-0.0295 (0.0168)	0.0652*** (0.0210)
Philippines	-0.0238 (0.0010)	0.0051 (0.0047)	-0.0015 (0.0071)	-0.0510*** (0.0130)	0.0056 (0.0122)	0.0098 (0.0168)	0.0324 (0.0226)
South Korea	-0.0102 (0.0012)	-0.0044 (0.0054)	-0.0026 (0.0085)	-0.0265 (0.0167)	0.0088 (0.0180)	0.0075 (0.0222)	0.0354 (0.0259)
Turkey	0.0259	0.0010	-0.0056	-0.0039	-0.0059	0.0062	-0.0397

	(0.0009)	(0.0039)	(0.0059)	(0.0106)	(0.0165)	(0.0200)	(0.0218)
Vietnam	-0.0311	-0.0023	0.0042	0.0083	0.0144	-0.0262**	-0.0034
	(0.0007)	(0.0034)	(0.0051)	(0.0093)	(0.0102)	(0.0138)	(0.0177)

***1% significance level , **5% significance Level

4.3.5 Role of Bitcoin as a Safe Haven during Covid-19

TABLE 4.11: Safe Haven Properties of Bitcoin during Covid-19

Country	Constant	Q10	Q5	Q1	Covid*Q10	Covid*Q5	Covid*Q1
Bangladesh	0.0215	-0.0069**	-0.0028	0.0232**	0.0016	0.0320	0.0574***
	(0.0008)	(0.0036)	(0.0055)	(0.0093)	(0.0169)	(0.0194)	(0.0208)
Egypt	0.0297	0.0137	-0.0102	0.0132	0.0050	0.1220***	0.2195***
	(0.0018)	(0.0084)	(0.0125)	(0.0208)	(0.0266)	(0.0368)	(0.0568)
Indonesia	0.0542	0.0016	-0.0014	0.0130	0.0062	-0.0072	0.0327***
	(0.0006)	(0.0027)	(0.0040)	(0.0075)	(0.0057)	(0.0085)	(0.0123)
Mexico	0.0516	-0.0015	0.0038	-0.0148**	0.0060	-0.0123	0.0081
	(0.0005)	(0.0024)	(0.0034)	(0.0071)	(0.0048)	(0.0078)	(0.0110)

Nigeria	0.0415 (0.0005)	0.0016 (0.0022)	-0.0026 (0.0032)	0.0119** (0.0054)	0.0015 (0.0065)	0.0169 (0.0092)	0.0217 (0.0139)
Pakistan	-0.0042 (0.0015)	0.0048 (0.0068)	-0.0165 (0.0100)	0.0304 (0.0191)	-0.0136 (0.0188)	0.0059 (0.0273)	0.1438*** (0.0341)
Philippines	0.0581 (0.0001)	-0.0007 (0.0006)	0.0011 (0.0008)	0.0010 (0.0015)	-0.0011 (0.0014)	0.0005 (0.0020)	-0.0012 (0.0027)
South Korea	0.0948 (0.0011)	0.0040 (0.0051)	0.0078 (0.0079)	-0.0167 (0.0156)	0.0221 (0.0168)	-0.0134 (0.0207)	0.0355 (0.0241)
Turkey	0.0305 (0.0002)	-0.0003 (0.0008)	-0.0021 (0.0012)	0.0013 (0.0022)	0.0028 (0.0034)	0.0020 (0.0041)	0.0082 (0.0045)
Vietnam	0.0736 (0.0004)	-0.0005 (0.0016)	0.0035 (0.0025)	0.0076 (0.0045)	0.0080 (0.0049)	-0.0121 (0.0066)	-0.0079 (0.0085)

***1% significance level , **5% significance Level

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

This research study analyzes the role of gold and bitcoin as a diversifier, hedge or a safe haven against the equity markets of Next Eleven countries using daily returns from October 2014 to March 2022. The study assesses whether gold or bitcoin offers protection to investors against the losses in stock markets of Next Eleven countries. As a result of prevailing financial market volatility and uncertainty and in order to safeguard investors' wealth and manage risk efficiently, it has become necessary to explore other investment avenues. Despite the fact that they have different characteristics, gold and bitcoin are both distinct investment vehicles that are frequently used for diversification and hedging purposes worldwide.

Over the course of its history, Gold has been considered as an appropriate investment alternative for preserving wealth having its own inherent value and global acceptance. However, Bitcoin, termed as 'digital gold' of new era, is now being increasingly explored for its diversification and hedging capabilities. The study also aims to examine the safe haven properties of gold and bitcoin against Next Eleven stock markets during the COVID-19 pandemic.

The results indicate that Gold provides a shelter in very extreme volatile conditions against the daily returns in stock markets of Indonesia and Pakistan and a weak safe haven in the case of Egyptian and Nigerian stock market. These findings imply that when faced with sudden and severe shocks, investors seek out gold as a safe haven. Thus, gold has the ability to operate as a stabilizing influence for the world financial system, when market is in crisis. The fact that gold has historically been more appealing in developing countries than bonds, stocks, and bank deposits is one explanation for why it has served as a safe haven. People in developing countries typically believe that gold is a better investment option ([Anand and Madhogaria, 2012](#)).

Moreover, Gold can act as an effective diversifier against the movements in stock market of South Korea. The Bouri model indicates that gold is a strong hedge for Pakistan, South Korea and Vietnam and displays safe haven characteristics for Mexican, Nigerian and Philippine stock markets. The results of Bouri Model are consistent with the findings of Baur Model in a number of instances. For example, results of both of the models indicate that gold is a safe haven for Nigerian stock returns.

The results reveal that Bitcoin serves as a strong safe haven, in very extreme market conditions for stock markets of Bangladesh, Philippines and South Korea. Investors in these markets may sell stocks and buy bitcoin in order to protect their capital when faced with market turbulence. However, it is to be noted that safe haven characteristics vary in strength, depending on the condition of the market. Furthermore, Bitcoin only acts as a diversifier against the daily returns on stocks of Bangladesh, Egypt and Vietnam. According to the results of Bouri Model, Bitcoin is a safe haven for Bangladesh, Egypt and Mexico and a hedge against the returns of Egypt and Pakistan. Bitcoin acts as a diversifier for remaining of the stock markets.

The results of Bouri Model support the findings of Baur Model in a number of cases. For instance, the findings of both of the models suggest that Bitcoin serves as a safe haven for the stock markets of Bangladesh, Egypt and Turkey and a

diversifier against the daily returns of Vietnam. Likewise, The Bouri Model supports the earlier results that bitcoin is not a safe haven for Pakistan, Nigeria and Vietnam.

The key results suggest that gold serves as a better safe haven than bitcoin, during the sample period, against the equity returns of Indonesia, Pakistan and Nigeria, thereby suggesting that investors may minimize or even avoid possible losses by adding gold in their investment portfolios during market turmoil. On the other hand, Bitcoin acts as a better safe haven than gold during times of market turbulence against the returns of equity markets of Bangladesh, South Korea and Turkey. Investors in these markets may sell equities and buy bitcoin in order to protect their capital when faced with market turbulence. The results further indicate that bitcoin did not display any safe haven capabilities, during the Covid-19 crisis, against majority of the markets except for Bangladesh. Similarly, Gold fails to provide haven to investors against extreme market movements, during the Covid-19 crisis, in almost all of the markets with the exception of Indonesia.

5.2 Recommendations

The findings suggest that Investors of the Indonesian, Nigerian and Pakistani equity markets may invest in Gold to seek refuge against significant losses during extreme volatile market swings. Moreover, portfolio managers may use gold as a hedging tool, for the markets of Bangladesh, Pakistan, South Korea and Vietnam, for risk management. On the other hand, Market participants of the stock market of Bangladesh, Indonesia and Turkey may include bitcoin in their portfolios to seek shelter during periods of increasing volatility. Furthermore, investors of Philippine and South Korean stock market may also include bitcoin as an investment alternative to off-set losses during extreme price swings. Bitcoin has also shown hedging potential against the returns of Egypt and Pakistan, thereby suggesting that portfolio managers and investors may use it as a tool for risk optimization. Investors of Egyptian and Mexican equity market may either invest in gold or bitcoin as both

of them display safe haven properties during market unrest caused by excessive volatility.

5.3 Limitations and Directions for Future Research

Despite the fact that the study's findings add to the body of current knowledge available on the role of gold and bitcoin, some limitations are also acknowledged, highlighting a potential area for further investigation. The research study focuses on Gold and Bitcoin against the returns of stock markets of Next Eleven (N-11) countries. The future research can extend the analysis to other markets and asset classes. For instance, future research could be interesting in the area of interactions between Bitcoin, gold, bonds, commodities such as crude oil, stock markets, real estate and foreign exchange rates. Moreover, considering other groups of markets may produce more insight about the diversifying, safe haven or hedging properties. Moreover, the time span of data was constrained by the availability of Bitcoin data, therefore, future research could be extended to a longer sample period using other variables. Moreover, future research may look into optimal amount of gold and bitcoin that should be added into the investment portfolios of Individuals and Institutional investors in order to diversify and hedge risks.

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