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# Theoretical Framework on Analyzing the Relationship and its Mechanism Between Stock Markets and Bitcoin Market with Specialization in Vietnam

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## Abstract

The article focuses on studying the theoretical framework of the connectedness between many stock markets and the Bitcoin market with a specific review in Vietnamese market. With a desk-based approach, content aspects are focused on including a research overview of financial contagion and inter-market relationship. The majority of the related researches confirmed that the contagion between Bitcoin and stock market existed in many different contexts. The two most popular mechanisms for the spillover effect analyzed in these studies were safe-haven characteristic and investor behavior. If Bitcoin could serve as a safe – haven, investors tended to shift the portfolio from stock to this crypto in case of a downtrend leading to the movement of cash flow out of stock market. On the other hand, when investors had sentiment on Bitcoin value, they would prefer investing more in this crypto to holding only securities, which also results in a contagion between two markets.

**Keywords:** Bitcoin, Stock Market, Contagion, Spillover, Safe-Haven, Investor Sentiment

## 1. *Research overview of financial contagion and the relationship among markets*

The concept of the contagion among markets and financial assets had received more attention when global crises tended to occur more frequently. In the early stages, researches about contagion focused mainly on the impulses of critical shocks across countries. The sign of contagion among markets had been identified for a long time. Until 1997, Asian economics crisis occurred to be considered as a significant wake-up call for economists to pay attention on market connectedness. Many examples of market contagion could be listed, such as, the most typical one – The Great Depression in 1929-1933. In September 1929, originating in the United States, global financial risks began to expand rapidly. Goods and products were mass-produced but difficultly consumed and sold to the market. After that, the crisis put a significant impact on other capitalist countries. Many countries such as France and Great Britain would also be affected, leading to reduction of trade and production. In 1930 in Germany, industrial output fell by 77%, and Italy, Poland, Japan, and Romania all suffered the damage from financial crises. The origin of the crisis is explained by many economists. However, in terms of the contagion of the crisis from the US to global, the issue was not really considered at that time.

Economic scientists took strong notice of contagion and connectedness after the significant consequences of Mexican crisis in 1994, Asian crisis in 1997 and the collapse of Russian monetary system in 1998. Studies during this initial period concentrated on the fundamental opinion that explained the mechanism of shock spillover across economies. **Basically, this perspective supported that the reason for contagion would be the influence of international trade on exchange rates among countries.** The stronger two nations cooperated, the more considerably their relationship would be affected. Case study by Zhang et al. (2003) analyzed the contagion from the public debt crisis in Argentina in 2002 spread to Brazil. The author used Bayesian test to show that a contagion existed between Argentina and Brazil from by an economic crisis. The reason was explained that because of the devaluation of the Argentine Peso, the balance of payments became noticeably unbalanced and public debt structure between these two countries also changed. Argentina debt to Brazil became worse, potentially lead to a budget deficit in Brazil.

However, this viewpoint did not comprehensively explain extensive crises, between geographically distant countries and narrow trade relations. It was further extended with explanations of the common market, the similarities between monetary policies, and macroeconomic factors in the studies of Corsetti et al. (1999), Gerlach and Smets (1994) and Corsetti et al. (2005). During the Asian crisis in 1997, many developing Asian countries experienced vulnerable characteristics in macro-economic management and financial system operations such as: weak domestic currency and exchange rate peg to the USD, huge public debt, poor control of the banking system, high NPL ratio and low capital adequacy. Corsetti et al. (2005) used the correlation coefficient calculation and Fisher test to measure the correlation of the Hong Kong stock market with developing Asian stock markets. The results show that there was shock spillover during the 1997 crisis from Hong Kong to Singapore and the Philippines markets.

The second point of view explains the spread of shocks among various markets from a financial perspective. **This financial view aimed attention at the limitations and inefficiencies in the banking management and international capital markets.** Researchers on this view proposed several theories such as common lenders (Goldstein et al., 2000), margin calls or wealth effect (Calvo, 1999) to explain financial contagion. Basically, this group of theories suggests that contagion was triggered when there was a financial intermediary lending or investing in two countries. When a crisis in one country occurred, this financial intermediary tended to suffer losses, which forced them to stop lending or sell off assets in the other country. With two different markets, this explanation became similar in the situation that one market suffered crisis, its banking system would invest in another ones or move assets from that market to compensate. A new research direction of this argument referred to the involvement the financial institutions network. Allen and Gale (2000) suggested that when a shock occurs, members of the financial network would together share risks and adjust their portfolios, which created spillover among the community.

**The final view referred to the coordination of the market on many macro and micro perspectives.** The two main research topics of this view are investor behavior and policy makers' reactions. This coordination viewpoint has been considered as the main research direction recently because obtained results can clarify the contagion and spillover not only on the macro level among countries or economies; but also shows the connectedness of different markets or asset classes in many countries simultaneously. The studies in this topic tended to take some regular subjects such as gold market, oil market, and stock market as in the research of Hussain and Riaz (2019), Asad et al. (2020) and Kocaarslan et al. (2019). Some new relationship perspectives were introduced such as the contagion between financial markets and commodity market such as (Khan and Masih, 2021) or (Khan et al., 2015); the linkage of banking and energy industry in study of Ayadi et al. (2021). The common point of all these studies could be recognized that they seemed to be interested in the contagion of the financial market, notably the stock market, with other ones. The coordination view emphasized the impacts that asymmetric information problems drove different market participants to make different decisions about their assets, even there would no significant influences on the market. As a result, when the adjustment of financial assets took place, the spillover could occur to the others.

## **2. *Studies on the relationship of the stock market and Bitcoin***

Bitcoin can be considered as the most typical cryptocurrency. The definition of cryptocurrencies by Bank for International Settlements recognized cryptocurrency with 3 basic elements originated from the characteristics of Bitcoin. These concepts became standardized for all cryptocurrency later. First, a set of rules called “protocols which consists of many computer codes that specifies how participants can make transaction thanks to the crypto. Second, there will be a ledger storing the history of all transactions in the system. Finally, a decentralized network of participants will be constructed, whose information would be updated, stored and secured in the ledger and subject to every rules of the protocol. In the IMF Fintech report conducted by Tobias Adrian and Tommaso Mancini Griffoli (2019), cryptocurrency can be considered as a Also known as cryptocurrency, a private sector digital asset that depends primarily on cryptography and distributed ledger or similar technology..

Bitcoin was first establish in November 2008 by the time of the global financial crisis. That crisis was not the main reason causing the origin of Bitcoin but the strong motivation of its appearance. The financial crisis in 2008 was originated from the progressive collapse of real estate bubbles and banking system in the United States. Quickly shock transmissions would be spread globally to Europe and Asia, which made serious damage to these economies. The failure of centralized management of governments was blamed for the consequences of the crisis by the Bitcoin creator. As a result, an idea of a decentralized financial system – DeFi has found. DeFi would be recognized as a form of distributed ledger that was not under control of any government or organization. The system will decentralize peer-to-peer authorization for all members which allows transactions among parties to be executed without depending on any financial institutions. By the support of Blockchain, members on the network will be guaranteed with informative transparency, cyber security and completed anonymity on the transactions. Any actions arising on the system such as updating data, repairing system, and information extraction will be notified simultaneously to all members. Actions will be taken place only when more than 51% of the members approve. Bitcoin is the cryptocurrency that is traded on this system and conventionally used as a token of value for participating in validating activities, as well as extending blockchains. Bitcoin will be simultaneously issued and accepted right after the decision by all members.

### **2.1 *The impact of Bitcoin on stock markets.***

These studies considered Bitcoin as part of cryptocurrencies group that make impacts on country's stock markets.

To be more specific, Dorfleitner and Lung (2018) conducted research on the impact of cryptocurrencies on investment activities in the financial markets. The study built a portfolio with two components and took place from August 2015 to August 2018. The first one contained 8 cryptocurrency including Bitcoin and some major crypto in the market. The second one was gathered from European stock market. The results demonstrated that the addition of cryptocurrency to an effectively diversified portfolio would make rate of return and risk ratios of the entire portfolio simultaneously increase in the growth market conditions. In recession scenario, additional investment in cryptocurrencies did not benefit investors and also did not make any negative effects on the portfolio return as a whole.

The results of Sami and Abdallah (2021) demonstrated more specifically the influence of cryptocurrencies on the stock market. Two authors conducted research in the Middle East and North Africa market - MENA for the period from 2014 to 2018 with 2000 observations collected from CoinMarketCap. The authors tested 3 hypotheses including: the cryptocurrency market had considerable impacts on stock markets in MENA region; the impact of the cryptocurrency on the stock market depended on regulational framework and state structure. Countries which executed strict policies or did not pay much attention in cryptocurrencies would receive negative impacts on stock market. Conversely, countries which run flexible policies will get positive influences. The paper applied multivariable regression model to estimate the intergration between stock index in MENA region as dependent variable and 5 independent variables including: national GDP, oil production, protective index when parties involved in a financial transaction, volume of cryptocurrencies traded and the rate of return in the cryptocurrency market. It came to a clear conclusion that cryptocurrency market has a strong impact on stock market in the MENA

region. For countries that banned cryptocurrencies, every 1% increase in cryptocurrency market value would cause a decrease by 0.15% in stock market. Meanwhile 1% crypto growth led to an increase by 0.13% in stock index in countries that allowed the circulation of cryptocurrencies. According to this result, positive impacts would only take place in the countries which executed flexible and soft policies for cryptocurrency. However, the two authors also emphasized that the extreme volatility of the cryptocurrency market also brought a lot of risks to the stock markets in MENA region.

Research by Moritz Holtmeier and Philipp Sandner (2019) also shared the same conclusion about the impacts of cryptocurrencies on the stock market according to the degree of regulatory rigidity. In their research, the two authors point out that the origin of the price volatility of Bitcoin or other cryptocurrencies was due to a lack of flexibility in the supply and lack of regulation. The most positive impact of cryptocurrencies on the financial system would be recognized as promoting the development of international payments. However, this impact tended to decrease based on 2 factors, decreasing familiarity with cryptocurrencies and increasing strictness of cryptocurrency regulation in countries. The authors' research was conducted in developing countries. The results show that the impact of Bitcoin on these countries seemed not to be large because the openness to cryptocurrencies was narrow and the desire for exposing to this currency was not very popular.

Regarding the risk management in the Bitcoin market, Srokosz and Kopyscianski (2015) did a research with empirical evidence which pointed out that Bitcoin's high volatility and related regulatory issues could easily lead to instability. Research by Gulled et al. (2018) also confirmed that the extreme price volatility of Bitcoin not only made the financial sector unstable, but also limited the number of people using Bitcoin as a means of payment. The research was conducted by using qualitative methods such as in-depth interviews with experts in finance, economics, and technology; synthesis analysis of the answers based on several case studies; comparison and contrast.

The common point of these studies could be summarized that impact from Bitcoin on the stock market had certainly existed. However, the impact was not very clear. Sometimes it only took under several specific conditions related to policy, state management or market characteristics. The impact of Bitcoin on markets could be considered to be inconsistent across studies demonstrating both negative and positive significance. In addition, these studies were conducted mainly on developed markets or markets with wider openness to Bitcoin such as the Middle East, Africa region. There were barely researches which have been examined in developing countries, typically in Southeast Asia – the location with a relatively large amount of Bitcoin ownership and cautious Bitcoin and cryptocurrencies management.

## *2.2 Safe-haven characteristics of Bitcoin with different financial assets in the market*

This research direction analyzed whether Bitcoin could benefit investors in diversifying risks when made investment in the stock market or other financial assets and could experience spillover effects from the fluctuation of separate financial markets. These studies were developed mainly from late 2016 to early 2021. That period witnessed the huge increase in Bitcoin price, which turned this crypto into an innovative, attractive, and profitable investment channel.

Research by Bouri et al. (2017) analyzed the correlation between Bitcoin and some major stock market indices such as S&P500, UK FTSE 100, Germany DAX30, Japan Nikkei 225 and China MSCI along with several other markets such as the bond market, Forex and gold market. The authors wanted to evaluate Bitcoin's diversification and safe-haven relative to other markets. The results pointed out that Bitcoin could be considered as a suitable asset for diversification and a strong safe-haven asset in Asian stock markets during downturns phrase. Research by Bouoiyour et al. (2019) compared the safety of Bitcoin with gold and assessed whether Bitcoin could become an alternative safe-haven asset. The author applied the Markov transition model and moving average method to evaluate the risk correlation amongs gold, Bitcoin and other financial assets such as securities. The results proposed that Bitcoin shared many characteristics with gold such as being more reliable in recession, having its own intrinsic value, and being slightly affected by other financial assets. In particular, Bitcoin contributed for portfolio diversification more than gold. The authors concluded that Bitcoin was a safe-haven asset.

Kamran et al. (2022) confirmed similar results when conducted a study of Bitcoin as a safe-haven asset with the Australian stock market. The results showed that Bitcoin's safe-haven character has still presented on the Australian stock market. However, this feature seemed to be weak and unstable when Bitcoin was added to different stock portfolios. Weak safe-haven was also found in the study of Kumamoto and Zhuo (2021). The authors compared the characteristics of Bitcoin and gold in correlation with the US stock market. The results revealed that Bitcoin's safe-haven performance tended to be weaker than that of gold, providing only diversification for stock investors in the United States.

Contrary to the above review, some researches indicated that Bitcoin was not a safe-haven asset compared to the stock market. Study of Bouri et al. (2017), and Smales (2019) evaluated the correlation between Bitcoin and the stock market with the S&P500 index and S&P ETF. Both researches found the same conclusion that Bitcoin was not a safe-haven asset for stock investors. Smales observed that Bitcoin price remained highly volatile and less liquidity than the stock market even under crisis-free conditions. The result was similar to the study of Conlon and McGee (2020). Two authors analyzed Bitcoin's safe-haven during the Covid-19 crisis in 2020. The paper asserted that Bitcoin was not a safe-haven asset because Bitcoin increased the risk of portfolio loss and remained bearish when the S&P500 stock market declined.

The conclusions drawn from these researches were not homogeneity. The majority argued that Bitcoin seemed not to have the characteristics of a safe-haven asset, or exists at a weak level. However, these studies did not negate the benefits of portfolio diversification for stock investors. Besides, these researches direction barely referred to policy implications for administration and government agencies, but more towards investors in the market. Similar to the previous research direction, the context of this direction was mostly located in developed and influential markets such as the United States, Japan and China without much attention on the risk correlation between Bitcoin and stock markets in developing countries.

### *2.3 Spillover effect or market contagion – the relationship between Bitcoin and the stock market in global context*

This research direction got some opposite assumption to the previous above. The risk-correlation research argument wanted to determine whether Bitcoin reflected some aspects of a safe-haven asset which did not transmit or receive recessionary shocks in relationship with other assets. The third viewpoint wanted to examine and measure the existence of contagion in the relationship between Bitcoin and the stock market. Characteristically, Granger or Kyrtsov-Labys causality tests were often used to detect contagion before quantitative models ARGH and VAR were executed to measure the spillover effect. This topic tended to be more popular than the two previous one about Bitcoin and stock market.

Panagiotidis et al. (2019) measured the spread in the rate of return and volatility between Bitcoin and traditional financial assets including the stock market, foreign exchange market, gold and oil. The author applied an alternate VAR and FAVAR model to compute the impulse response among asset types. The results pointed out that there was a strong correlation between Bitcoin and the traditional stock market. In addition, Asian stock markets were increasingly receiving strong impacts from Bitcoin's price movement. However, the impacts gradually diminished after 2 years from the moment that some government such as China and India established some strict policies against this currency.

Elsayed et al. (2021) evaluated the spillover effect between Bitcoin and traditional financial assets under the impact of the Covid-19 pandemic. The model applied was the Time- Time-Varying Parameter VAR Model (TVP-VAR). The results demonstrated that, under the impact of the Covid pandemic, the level of contagion influence between Bitcoin and other financial assets increased significantly and remained at a high level. Bitcoin played as the transmitter of volatility to traditional financial assets, including the stock market. This is a one-way relationship. Bitcoin did not receive the shock transmitted from other assets. The only factor influencing Bitcoin volatility can be recognized as economic policy uncertainty (EPU index).

Thai Hung (2022) adopted similar approach to analyze the relationship among Bitcoin, gold market, crude oil and US stock market. The study executed generalized VAR model and the Kyrtsov-Labys nonlinear causality test. The given results demonstrated that US stock market suffered from volatility spillovers of Bitcoin market. Bitcoin return was subject to a spread from the US stock market, gold and crude oil markets. Price drop of Bitcoin caused more impacts on stock market than price increase. The correlation between the return rate of Bitcoin and the US stock market was relatively strong. As the S&P 500 index rose, the rate of return of Bitcoin also increased.

Continuing to study the contagion between Bitcoin and other financial assets, Jiahong Li and Ping Li (2022) only measured the spillover effect between Bitcoin and other assets within China. There were 4 subjects chosen including stock market, foreign currency market, derivatives market, real estate market and commodity market. The results also confirmed that there was a spillover effect in the relationship between Bitcoin and these assets. Bitcoin tended to receive volatility spillovers more than transmitted it to other markets. This contagion seemed to be minor, but the magnitude would increase whenever an unexpected events occurred in the stock market.

#### *2.4 Literature review of spillover effect between Vietnamese stock market and Bitcoin market*

Contrary to the popularity in the perception of the Vietnamese market about Bitcoin as well as cryptocurrencies, the number of studies on the relationship between Bitcoin and Vietnamese economy, financial system, or stock market was still narrowed. Vietnamese researchers had done many studies about the relationship between Bitcoin and foreign stock markets instead of Vietnam such as Huynh et al. (2020), Thai Hung (2021), Thai Hung (2022), Khanh Quoc (2022), Ha and Nham (2022). These above studies have all taken place in the US or European stock markets. A minority of research examined in Vietnamese background within a very general scale.

Đang Vuong Anh (2018) approached from the definition of cryptocurrencies and judgments about the impact of this currency on the market. The study mentioned some most typical characteristics of Bitcoin such as instability, flexible conversion, and anonymity. The paper indicated that the government would face some challenges to statistic and manage the capital flows between cryptocurrency market and traditional markets.

Research by Tran Thi Xuan Anh and Ngo Thi Hang (2020) pointed out the fact that, although there would be still no specific legal provisions in trading and business activities with cryptocurrencies, Vietnamese investors had been trading cryptocurrencies very actively. From 2018 to 2023, the weekly Bitcoin transaction value has reached an average of nearly 1 billion VND. The volume peaked at 4 billion VND per week in August 2019 and reach approximately 2.9 billion VND per week in May 2020. The transaction was mainly executed in the form of buying and selling through smartphone applications. The study did not specify the possible effects of investors' shift to the cryptocurrency market in Vietnam. The most influenced market was the stock market. The report by Nguyen Kieu Giang and Youkyung Lee (2021) concludes that Bitcoin could be considered as one of the main causes of capital outflows from the Vietnamese stock market.

The report of IMF experts including Nada Choueiri et al. (2022) on the relationship between Bitcoin and the Vietnamese stock market drew some interesting conclusions. The correlation of rate of return and volatility between Bitcoin and the Vietnamese stock market ranked at first place in Southeast Asia and witnessed a strong increase after the impact of the Covid-19 pandemic. Specifically, the correlation of returns between Bitcoin and the Vietnamese stock market increased from 0.01 to 0.3 and the correlation of volatility increased from 0.19 to 0.46. The relationship between Bitcoin and Vietnam's stock market seemed to get stronger.

To et al. (2022) might be one of the rare studies aimed directly at the relationship between the Bitcoin market and the Vietnamese stock market. The research used the TVP-VAR model to analyze the relationship between some cryptocurrencies and the Vietnamese stock market. The results confirmed that large-cap coins such as Bitcoin and Ethereum put a strong impact on the Vietnamese stock market. In particular, the period with the strongest impact was the period when the Covid-19 pandemic broke out in Vietnam in 2020-2021. The influence became weaker than in the pre-Covid-19 period.

### *2.5 The explanation of the spillover mechanism between the Bitcoin market and the stock market*

From the literature review, it can be seen that the gap between scope, diversity, and conclusion of research on the relationship between Bitcoin and stock markets in many countries. This relationship seems to be attractive to investors, researchers and policy makers globally. Despite many argument around this concept, the majority of articles in this topics came to the same conclusion that contagion and spillover effect existed between Bitcoin and stock market.

However, the explanation for this spillover had received a little attention. The correlation between the Bitcoin market as an international market, and the stock market as a domestic market did not completely fall within the three fundamental explanations for the spillover mechanism of crisis shocks reviewed above. The Bitcoin market and the stock market seemed not to represent macroeconomics relationship as in the theory of international trade relations. Bitcoin and stock market linkage represented some aspects of contagion in the international interbank system and capital markets. Third line of study on market regulation in terms of micro/macro adaptation or investor behavior provided the most comprehensive explanations for the spillover mechanism between the Bitcoin market and the stock market.

The two most approved explanation for the contagion between Bitcoin and stock market could be considered as the safe haven feature of Bitcoin and investor sentiment analysis. The first direction of research was presented 2.2. When Bitcoin has the characteristics of a safe-haven asset, investors would restructure their portfolios to this crypto when the stock market crash, which caused the spillover effect between the two markets. The second research direction was based on an important valued characteristic of Bitcoin as well as cryptocurrencies - community. When Bitcoin was increasingly accepted and suggested by a large, more investors would tend to diversify their portfolios with Bitcoin. That action would potentially cause an impact on stock market through investment cash flows and risk spillover mechanism.

The first research direction could include Bouri et al. (2017), Bouoiyour et al. (2019), Kumamoto and Zhuo (2021) or Kamran et al. (2022). The mentioned studies all proved that Bitcoin contained all the characteristics of a safe-haven asset. However, the recent period of 2021 - 2023 witnessed a sharp decline in the price of Bitcoin as well as the cryptocurrency market, which pointed out that the safe-haven Bitcoin would be imperfect. Bitcoin was only considered a "safe haven" in each specific period and conditions. Research by Adjani and Husodo (2022) on the safe-haven of Bitcoin and gold with 5 ASEAN stock markets during Covid 2020 shown that the safe - haven Bitcoin only occurred in the short term in the relationship with JKSE (Indonesia), STI (Singapore) and PSEI (Philippines). Research by Chan et al. (2023) assessed the "safe haven" of Bitcoin and gold in the US stock market before and after the Covid pandemic. The results showed that Bitcoin did not present as a safe-haven during the time of the pandemic crisis. Research by Bahloul et al. (2023) on the safe - haven of Bitcoin with several international stock markets. According to the research, Bitcoin was highly hedging for the US and Chinese markets, only acted as a safe-haven for the Chinese market instead of US, UK and some other European countries. Yatie (2022) and Fabris and Jesic (2023) both concluded that Bitcoin was not a safe-haven asset to the European stock market. This currency could be owned only for hedging certain risks for investors' portfolios.

The second research direction proposed to analyze the relationship between the Bitcoin market and the stock market from the perspective of investor behavior. Bouoiyour et al. (2015) and Koutmos (2022) both argued that the value of Bitcoin or other cryptocurrencies tended to be influenced by investor sentiment and acceptance. Naifar and Altamimi (2023) conducted a study on the influence of investor sentiment and media attitudes on the profitability of Bitcoin. The results indicated that, in terms of stock market growth or decline due to the Covid-19 pandemic, investor sentiment had a negative impact on Bitcoin price. Jo et al. (2020) applied a 5-factor Fama-French valuation model to assess the impact of investor sentiment on Bitcoin price. The authors adopted the opinions of investors on global stock exchanges (AAII index and VIX index). The results concluded that the return of Bitcoin increases when investors' perception of the stock market was pessimistic and decreased when investors felt optimistic. In the opposite direction, the influence of investor sentiment on Bitcoin on the stock market has research by Budiarmo and Pontoh (2023) in the relationship of Bitcoin and the Indonesian stock market. The conclusion indicated that investors' preference for Bitcoin caused the Indonesian stock market to strongly fluctuate.

The volatility of Bitcoin would also have made this crypto become more attractive to the Indonesian investors.

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