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EXPLORING THE LINK BETWEEN DIGITAL CURRENCY USE AND
COMMERCIAL BANKS LIQUIDITY PERFORMANCE

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
LIST OF ABBREVIATIONS	v
LIST OF TABLES	vi
ABSTRACT.....	vii
ÖZET	viii
INTRODUCTION	1
1.1. Research Background	1
1.2. Research Aim and Objectives	4
1.3. Research Questions	4
1.4. Research Problem	4
1.5. Structure of the Research.....	5
CHAPTER 2 : LITERATURE REVIEW	6
2.1. Theoretical Background.....	6
2.2. Exploring the current trend and use of digital/cryptocurrencies globally	8
2.3. Commercial Banking	13
2.4. Relationship between Digital Currency and Commercial Banking Performance	14
2.5. Digital Currency and the Economy	20
CHAPTER 3 : RESEARCH METHODOLOGY	23
3.1. Research Philosophy	23
3.2. Research Approach	23
3.3. Research Design	24
3.4. Sample Size and Sampling Technique.....	24
3.5. Data Collection	25
3.6. Description of variables.....	26
3.6.1. Independent Variables.....	26
3.6.2. Dependent Variables.....	26
3.6.3. Control Variables	27
3.7. Hypothesis	27

3.8. Data Analysis.....	27
3.9. Statistical Model.....	28
3.10. Summary of Research Methodology	28
CHAPTER 4 : FINDINGS AND ANALYSIS	29
4.1. Descriptive Statistics	29
4.1.1. Country Table.....	29
4.1.2. Year Wise	32
4.1.3. Descriptive Tests.....	33
4.2. Correlation Statistics.....	34
4.3. Regression Analysis.....	37
CONCLUSION	42
5.1. Summary of the Study.....	42
5.2. Main Deductions	44
5.3. Limitations and Future Research.....	45
REFERENCES	47

LIST OF ABBREVIATONS

ICO	Initial Coin Offering
BTC	Bitcoin
GDP	Gross Domestic Product
SET	Social Exchange Theory
BIS	Bank of International Settlements
ROE	Return on Equity
INR	Inflation Rate
US	United States
UK	United Kingdom
OLS	Ordinary Least Squares
PBC	People's Bank of China

LIST OF TABLES

Table 4.1.1. 1 Variable description country-wise.....	30
Table 4.1.2. 1 Variable description year-wise.....	32
Table 4.1.3. 1 Descriptive Statistics	33
Table 4.2. 1 Pearson Correlation	34
Table 4.3. 1 Regression Analysis	38
Table 4.3. 2 Regression Model 3 (including dummy variable).....	40

ABSTRACT

The aim of this paper is to explore the relationship between the use of digital currency and commercial banks liquidity performance. The present study adopts the quantitative research approach, which states that the analyzation would be based on statistical data. The research uses secondary sources i.e. the database of the World Bank for data collection. It uses statistical tools such as OLS regression and correlation analysis. These tests prove that there is an insignificant yet negative relationship of Bitcoin volume on commercial banks' liquidity thus reject the hypotheses formulated by the study. Moreover, the results of the research imply that commercial banks must not take digital currency as a threat to their financial or nonfinancial performance. Rather work on trying to partner with the latest technology used in the development of virtual currency to be more efficient.

Key Words: Cryptocurrency, Bitcoin, Commercial Banking, Bank Liquid Reserves, Bank Capital to Asset Ratio

ÖZET

Bu araştırmanın amacı, yıllara sari kripto para kullanım hacmi ile ticari bankaların likidite performansı arasındaki ilişkiyi analiz etmektir. Araştırma, doğası gereği niceliksel ve araştırma problemini değerlendirmek için korelasyonel bir tasarıma sahiptir. Bununla beraber, çalışma Dünya Bankası Veritabanı'ndan kaynakları kullanmaktadır. Veri analizi sırasında başvurulan yöntemler başlıca normallik testi, OLS regresyonu ve korelasyon testi olmuştur. Çalışmanın bulguları araştırmaya konu ülkelerin kripto para hacminin bankaların likiditesi üzerinde olumlu bir etkisinin olmadığını, aralarındaki ilişkinin anlamsız olduğunu ortaya çıkarmıştır. Araştırma, bankaların kripto paraları bir tehdit olarak görmemelerini, aksine birlikte çalışarak en yeni teknolojilerin bankacılık sektörüne tanıtılması ve karşılıklı fayda ilkesinin benimsenmesini önermektedir.

Anahtar Kelimeler: Kripto para, Bitcoin, Ticari Bankacılık, Banka Likit Rezervi, Sermaye Yeterlilik Oranı

INTRODUCTION

1.1. Research Background

The increasing pace of technology and rapid digitalization of monetary and financial systems have paved the way for digital currencies which include cryptocurrency and virtual money. There are many cryptocurrencies nowadays, but 'bitcoin' and 'ether' are undoubtedly the most popular one. Bitcoin was released in 2009 largely as a digital asset and a medium of exchange using cryptography to secure transactions, to validate the transfer of assets and to control the creation of additional units (Cocco, Pinna and Marchesi, 2017). Although bitcoin has been useful in quick transactions so far, it poses challenges in technology and banking systems. The distributed database and security of an information system that aid bitcoin is a huge challenge (Jović, 2016). According to Schich (2019), bitcoin competes with the bank in terms of the transaction, and it enables peer-to-peer exchange of money without any intermediary that may negatively impact continuing transactional relationships. Cryptocurrencies are not considered legal in many countries; nevertheless, there is a probability of a significant challenge to banking and payment systems once cryptocurrency becomes widely accepted.

This research looks to explore the relationship between the use of digital currency and commercial banks' liquidity performance. It is observed that the banking industry is reluctant to adopt the new process because of the atypical culture of the institution. Nevertheless, their failure to adapt quickly to changes in the increasingly changing technology is adversely impacting the operations in the banking industry (Joseph and Mensah, 2018). As per Evans (2015), digital currencies and similar systems are the suitable media of exchange in different financial systems, particularly in Islamic Banking and Finance as compared to interest-based bank fiat currency, mainly among the small-scale and unbanked cross-border trade. Partanen (2018) points out that digital currency signifies an alternative way of managing financial issues. These alternative methods operating in the blockchain network provide disintermediation in the digitalized business environment where users are anonymous. The presence of such currencies is considered to be a threat to banking

and financial institutions, and authorities are working on plans to manage their usability.

There is a lack of empirical evidence to support the impact of digital currency and the bank system and its stability. Nevertheless, it is observed that bitcoin can potentially have an impact on central banks. It can affect the conduct of monetary policy and can risk price stability. Also, it may interface between payment systems and banking (Nabilou and Prüm, 2019). Further, Wearn (2016) highlight that more 600 bank branches in the United Kingdom were shut down in 2016 due to a smaller number of people visiting their branches. Similar has been reported by HSBC that a 40% reduction was noted in the number of people going to their branches (HSBC, 2016). It is understandable after considering all this that some banks are worried about the effect digital currencies could have on the banking sector (Godart-Van der Kroon and Vonlanthen, 2018). If this trend persists for long, then it is likely that banks would become obsolete. Analysts believe that banks are threatened by alternative methods of finance provide by cryptocurrencies (Hafner, 2020). There is a possibility of banks becoming redundant and outdated if they do not consider the use of cryptocurrencies. On the contrary, The Swift Institute (2018) reported that cryptocurrencies are still in their early stage and not omnipresent enough to be considered a threat to the banking industry, as there is a chance of its interference in the future.

On the other hand, there are potential benefits of using digital currency as an enthusiast of digital currency highlights some significant benefits like low transaction costs, increased anonymity for release of sensitive data and speedy transactions (Dabrowski, and Janikowski, 2018). According to Badev and Chen (2014), digital currencies are useful quick transactions as compared to banking transactions. Other than potential benefits, digital currencies have certain disadvantages as well, as they create risks for regulators of the financial market, merchants, and users and overall financial stability. The units of digital currency can be exchanged or stolen from e-wallet, cyber-attack (hacking) misconduct, etc. The prime example of this can be of Mt Gox's bankruptcy in 2014, a company based

in Tokyo. It recorded a loss of approx. \$.05 billion, which was the total value of 850,000 bitcoins (Hals, 2014; Badev and Chen, 2014). Mt Gox's liquidation was the consequence of fraud, corruption, and misconduct. Hence, the use of digital currency posed a threat of bankruptcy and theft due to corruption and other malpractices.

Many countries have adopted a strict policy against the use of digital currencies, for example, the Chinese authorities have taken action towards cryptocurrencies and its 7 government agencies such as China Insurance Regulatory Commission (CIRC), China Securities Regulatory Commission (CSRC), the People's Bank of China (PBC), and the China Banking Regulatory Commission (CBRC) have essentially banned the exchange and transaction using initial coin offerings (ICOs) (PBC, 2017). As per their policies, offering tokens like ethers and bitcoins is considered as illegal financing. China seems to have a highly stern regulation against the use of cryptocurrency among top leading economies. This is driven by the Chinese authorities to fight corruption and capital outflow (Nelson, 2018).

On the other hand, Switzerland is viewed to be a country that has adopted a friendly policy towards digital currencies. According to Diemers (2017), Switzerland has developed to be a center of numerous successful ICOs. The Financial Market Supervisory Authority of Switzerland have given out guiding principle for ICOs, and many organizations issuing digital currencies are required to acquire the permit from the authorities, or else the organization may be shut down for not having a valid license or issuing fake E-Coin. While analyzing the effect of digital currencies on monetary policy, the key argument is whether such currencies have the potential to challenge the currencies issued by banks (Milling, 2012). The advocates of free banking and private money are eager about such opportunities and anticipate seeing it happen. Nevertheless, there is limited hope, irrespective of the success of bitcoin in the financial market. After years of its creations, the role of digital currencies remains marginal, notwithstanding its strong market values and recognition by many digital platforms (Lietaer and Dunne, 2013). Nevertheless, future progress cannot be ruled out in the domain of technologies that can introduce easier, safer

and transparent use of different digital currencies. It may enhance the prospects for digital currencies to compete effectively with major sovereign currencies.

1.2. Research Aim and Objectives

This study aims to explore the link between digital currency use and commercial banks' liquidity performance. To examine and deeply investigate the topic, the following objectives are set for the readers to grasp the crux of the study.

1. To explore the current trend and use of digital/cryptocurrencies globally.
2. To investigate the impact of digital currencies volume and on the liquidity performance of commercial banks globally.

1.3. Research Questions

The following is the main question of this research:

What is the relationship between digital currency use and commercial banks liquidity performance?

The study forms the following sub-question, which more specifically addresses the problem.

Does the volume of a cryptocurrency influence liquid reserves of commercial banks?

1.4. Research Problem

The use of digital currencies since its creations has become prevalent in different digital platforms. It's easy, and speed transactions have attracted digital companies and even inspired many governments. Nevertheless, the validity, effectiveness, safety, and security of digital currencies are still under consideration by the central banks and governments. Although several studies have investigated the use of cryptocurrency in relation to central banks and financial systems (Cocco et al. 2017; Dabrowski and Janikowski, 2018; Joseph and Mensah, 2018; Schich, 2019), hence a significant research gap is found concerning the link between digital currency and liquidity performance of the commercial bank. There is an insignificant amount of literature available on the present research topic. Therefore, this research holds key

importance in investigating and arguing about the use and digital currency in commercial banking. Certainly, this research will provide new and updated information on this topic, and will contribute to the literature on digital currencies. Secondly, the outcome of the research will be pivotal for digital companies, and even for the policymakers to look into the usefulness or adverse effect of using digital currencies in commercial banking practices.

1.5. Structure of the Research

This study is categorized into five core chapters;

Chapter 1: A comprehensive overview of the research background is presented in this chapter, stating key aim, objectives, research question, significance and problem of the research. Basically, this chapter sets out the entire outline of the research.

Chapter 2: This chapter covers the previous literature on a similar topic and discusses how different scholars have perceived the said topic and, what their contributions were. That is, it provides a review of the previous empirical evidence. This chapter sets the foundation of the study as the previous findings will be useful in supporting or refuting the findings of this study.

Chapter 3: The appropriate research methodology is discussed in this chapter, highlighting the reasons for using a particular research method, and the data for the research was collected and analyzed.

Chapter 4: The statistical results and a discussion are presented in this study backed by previous literature.

Chapter 5: The conclusion is presented in this chapter and summarizes the entire research in this chapter while discussing the limitation and scope for further investigation.

CHAPTER 2

LITERATURE REVIEW

2.1. Theoretical Background

The invention of hybrid offerings coupled with improved technological capacity invites several scholars to provide their two cents regarding consumers and the banking system as a whole coming in contact with mainstream acceptance towards digital currencies (Gainsbury and Blaszczynski, 2017). Current advances in blockchain technology enable traditional scholars to question their theories about money and exchange, further facilitating a deep overview whether these notions still fit the recent adoption of virtual currencies and if not, what other theoretical developments may explain this phenomenon. This section of the literature review focuses on such theoretical pieces of writing.

The theory of Homan's five Behavioral Propositions matured into what is famously referred to as the Social Exchange Theory (SET) to make it relevant to the adoption of Bitcoin or any other cryptocurrency for that matter (Cook and Whitmeyer, 1992). The SET is employed to elaborate an array of behavioral micro-interactions including cooperation, influence and status, structures of sentiment, exercising power and authority and so on. It is based upon the premise that certain propositions such as success, stimulus and value use cryptocurrencies as outcome and incentive of incomes to engage in exchange behavior. Success defines that if the reward of undertaking a particular activity increases, the probability of performing that particular activity will increase simultaneously. For instance, earning quick profits while trading in cryptocurrency due to price volatility or undertaking a secure transaction of cryptocurrency to acquire goods or services will incentivize the individual to re-perform this behavior if successful. Stimulus elaborates that supporting environmental or situational conditions will promote engagement behavior. That is, a rapid increase in a number of users of cryptocurrency is likely to stimulate more use, formulating a network effect hence expanding the hybrid technology (Popper, 2015). Value describes that increased valuable outcomes derived from the agent's performance will increase the possibility of similar

performance to occur in the future. In the case of a merchant, decentralized mechanism surrounding virtual currencies possess value as it minimizes transaction charges while providing a shield against charge-backs (Villarreal, 2016).

Srokosz and Kopciaski (2015) identify that the acceptance towards digital forms of currency can be explained with reference to economic theories to identify a rational aspect. In this context, the Australian School of Economics stated that advanced currency interventions are actually the result of changes in the business cycle. Aggressive expansion of credit, fueled by the banking sector results in a rise in the supply of money with low-interest charges. Entrepreneur's exploit this by making investment decisions, often at odds of consumer choices, welcoming crises in the longer horizons. Monetary authorities have therefore come up with a remedy for crises in terms of switching citizens to virtual currencies that facilitates the elimination of conventional financial intermediaries while contributing towards smooth business cycles. The literature presented by Von Hayek (2009) makes use of the economic theory of money that can be effectively employed to understand the acceptance of virtual forms of money. In his book, 'Decentralization of Money' the author advises money should not be treated as a commodity, supplied monopolistically in a competitive banking regime. Instead, the formulation of a multi-currency economy where citizens possess the power to select the most convenient transaction commodity while not be constraint with only a single option. In other words, it demands the withdrawal of the government's monopoly oversupply of money and refers to non-interest-bearing certificates as an effective scheme to combat traditional currencies. These certificates in this context can be replaced with cryptocurrencies (Belliaivtsiv, 2019).

The theory introduced by Milton Friedman, commonly referred to as the K-percent rule states that the supply of money should only be increased by a certain percentage each year. This percentage should equate the real economic variables of unemployment and output and therefore, growth in annual GDP, k% can be equal to the growth in money supply by k% (Salter, 2014). While initially the rule was formulated to be implemented on fiat currencies, Böhme et al., (2015) state that the

cryptocurrency network to adopt a similar mechanism to prevent inflationary pressures, by only allowing the supply of currency to grow at the cyclical rate. For instance, as the mining process facilitates the growth in money supply, the $k\%$ would be equal to the mining activity enabling growth to be at the same rate as money supply. Likewise, a negative $k\%$ would result in a massive loss of currency supply due to electronic storage corruption or theft again equating to negative growth with a reduction in money supply (Peters, Panayi and Chapelle, 2015).

2.2. Exploring the current trend and use of digital/cryptocurrencies globally

The digital age has created a necessity for low-cost, anonymous, and easily verifiable transactions to be used for online bartering, and as a consequence, fast settling money has emerged. E-money has filled this position for the most part, but a new kind of money has originated in the last few years named cryptocurrency. Cryptocurrencies aimed at removing the need for financial intermediaries via direct electronic payments through the peer-to-peer methods (Peters et al., 2015).

According to Mensah (2018), The advent of digital currencies, cryptocurrency like Bitcoin, Ethereum, Ripple, Bitcoin Cash, EOS, and Litecoin, just to name a few, has exacerbated the banking industry's situation evermore. The technology behind cryptocurrency assets like blockchain is an exciting development that will further revolutionize fields beyond banking, offering innovative low-cost payment options to those who lack bank accounts and inspiring millions of low-income countries throughout the process (Lagarde, 2018). Ironically, cryptocurrencies have also made their way into app trade. The possible benefits have prompted some central banks to entertain the concept of issuing digital currencies for central banks.

According to Thomson Reuter (2017), ever since the cryptocurrencies emerged after Global Financial Crisis of 2008, cryptocurrencies enjoyed some success. During the past few years, a number of trends have dominated the digital currency market, which has affected the acceptance, instability, regulation, and production of new coins. Bitcoin is now the biggest cryptocurrency, with the total number of Bitcoins currently estimated at around USD\$70 billion. According to the researches

carried out by Cambridge University, it is concluded this year that a crypto-currency wallet regularly uses between 2.9 million and 5.8 million unique users (2017).

As stated, above Bitcoin is not the only cryptocurrency; however, it accounts for more than 80% of the market capitalization of U.S. \$4.5 billion (Coin Market, 2020). It is worth noting that although Bitcoin trading was primarily in US dollars, it has now switched to Chinese Yuan mainly. It highlights the essence of Bitcoin as both a highly risky investment and a device for avoiding currency controls (Peters et al., 2015). Talking about the price movements of Bitcoin with the public interest, it is noted in one of the research papers that the relationship amongst the two variable is bidirectional. It can be summarized as if the public interest increases the price movement increases accordingly. So is the case in the trends of cryptocurrencies, especially Bitcoin, has increased over the years due to an increase in public interest and investment in it. It is stated by Kaya (2018) that the price of bitcoin depends upon its demand and popularity, which results in the formation of a speculative bubble. According to Partanen (2018), Bitcoin strives to become the digital world's leading currency and be regarded as the new "gold standard." Bitcoin mining is built on a mathematical algorithm that runs at a fixed rate, while the gold industry can regulate the rate at which it mines. Consequently, Bitcoin cannot react to demand changes by altering the accumulated number. As a result, bitcoin's price is unpredictable because even though demand increases, the only way to increase supply is by selling it accordingly.

Similarly, Pirus (2020) highlight that the world is moving towards digitalization of money, and Bitcoin may take on gold's store on value rule, as per experts on digital currency. There are possibilities of digital currencies replacing gold as the stiffest money for investors. Young people are more inclined towards digital money in a world where the economy is increasingly turning virtual and online. For example, it was noted in Venezuela that inflation had hit hard to its economy, and bitcoin became hugely popular in the midst of the crisis and cash troubles. It became more acceptable, and is likely to be used in financial transactions and might be approved

by several tax authorities. Ultimately, digital currency could interweave into the fabric of the global economy in years to come.

Considering the latest trend of digital currency, Chaudhury (2020) mentioned that China has recently conducted a test of digital Yuan in 4 urban centers for particular services in the midst of a global pandemic situation. The key cities of Xiong'an New Area, Chengdu, Suzhou and Shenzhen, will see the use of digital currency for specific services. The central bank of China, the PBOC, will be the only issuer of the digital yuan and will be offering the digital currency to specific operators and commercial banks. It is believed that the public, through digital yuan, would be able to convert currency in their respective bank accounts to the digital version and use electronic wallets for making deposits. Likewise, Roulin (2020) discussed that the Chinese government is planning to introduce a major trial of its digital currency in 2022 during the Winter Olympics. In April 2020, the head of China's central bank announced the test of its suitably if not creatively called DCEP (Digital Currency Electronic Payment) in 4 different cities of China, such as Shenzhen in the south, bordering Hong Kong and Suzhou in the eastern Jiangsu province. In contrast, other countries such as Singapore and the UK are considering the idea of independent digital currency. However, DCEP of China looks to become the first digital currency to be used by any country.

Axelrod (2020) discussed the authorities in China had picked the easy way to incorporate the implementation of digital currency using a budgetary and social sphere. To do this, the public must have a special app on their smartphones, an e-wallet that can be associated with a bank account. This digital currency is also useful for paying at Subway, Starbucks, McDonald's and other popular chains. This all reminds of how the Euro was announced into circulation, combining several European currencies into a single one. Further, national digital currencies can increase payments, enhance transactions and thus increase the GDP level, which has dropped sharply because of the on-going coronavirus pandemic. That is one example the economists' highlight regarding any possible digital dollar.

Nevertheless, the announcement of digital currencies will certainly transform the economy at different levels; from global to public finance.

Additionally, there are still strong and weak users of digital currencies that is there are a lot of countries, which uses cryptocurrencies more than the other few countries where they denied accepting it. For instance, Japan, which has passed a law accepting Bitcoin as a lawful tender, is the most prominent dissident. Bangladesh passed a law, at the other end of the scale, in 2014 claiming that anyone caught using the cryptocurrency could be imprisoned under the country's stringent anti-money-laundering rules. Whereas, the US being the most dominant country who has the highest number of cryptocurrency users, Bitcoin ATMs and Bitcoin transaction volumes internationally. Nevertheless, whatever the individual case for a nation is, the success of cryptocurrencies over the last couple of years has shown that this emerging technology is in robust growth (Thomson Reuter, 2017).

According to the Boston Federal Reserve's earlier cited 2016 study, it is reported that 0.87 per cent of US customers held cryptocurrency in 2015, which alone corresponds to around 2.8 million people in the US. Coin-base and ARK Research estimate, based on estimates using their own user data, that about 10 million people worldwide owned bitcoin in 2016 (Hileman and Rauchs, 2017). The amount has significantly increased after 2016 and is expected to increase even in 2020. Many researchers have forecasted and predicted future trends for cryptocurrencies.

For the year 2020, one of the leading trends is and will be represented by cryptocurrency itself, said by Jonathan Swerdlow (Enigma Securities). It is suggested on the basis of the increase in the recent development of the overall popularity of coins, which not only made the access easier but is also approved as a means of payment by many industries and businesses. Moreover, in 2020, the first actual-world implementation of digital currencies supported by central banks, usually referred to as CBDCs will likely come. Reports have suggested that China is expected to launch a digital version of the Yuan in 2020 anytime. A similar incident is predicted to occur in Turkey, also by the end of the year. Beta work is

still underway in mainland China at this point in time. Bitcoin's advent has engendered a discussion about its existence and that of other cryptocurrencies. Although over the past few years, Bitcoin has faced some problems in attaining success; however, its popularity since its launch in 2009 has encouraged the development of alternative cryptocurrencies such as Litecoin, Ripple and MintChip. A crypto-currency seeking to become part of the normal financial system will have to follow very different requirements (Barone, 2019).

As per the ongoing development in applications of bitcoin technology, the blockchain could signify one of the significant features that can be implemented in several sectors. This is due to the fact that the use and the information of blockchain are more multipurpose as compared to cryptocurrencies (Giungato et al. 2017). Adams et al. (2017), assert that this innovation seems to signify an encouraging compound for accomplishing global sustainable development objectives. Blockchain technology, for example, may add to build a smart city via the development of collective economic services (Sun, Yan and Zhang, 2016). By observing the current trends, it is expected that blockchain technology will foster privacy, censorship resistance, DNS servers, security, and decentralization. In addition to this, the blockchain technology may be implemented to decentralize transport layer security (TLS) record authentication, supported by blockchain consensus (Giungato et al. 2017).

Houben and Snyers (2018) highlighted that at the European level, cryptocurrencies are significant to address tax evasion, terror financing, and money laundering. It is more applicable at the international level also, as it is not confined until the European borders. However, it is argued that international collaboration is significant to enforce and impose rules successfully on combating tax evasion, terror financing, and money laundering. From a regulatory viewpoint, the attention is paid by the G20 member states in regulating cryptocurrencies is something positive about this technology in the near future. On the other hand, Manta and Pop (2017), given a reference to the report of digital currencies of the Bank of International Settlements (BIS) and argued that digital currencies have a relatively

low rate of acceptance and usage and the ongoing challenges they encounter may impact their growth in future. Hence, their present influence on the economy and financial services can be considered insignificant, and it is probable that digital currencies will continue to be a product with restricted applicability to the boundary of traditional financial services.

Bitcoins are usually referred to as digital gold for over a period of years, however recently it became more realistic. The idea of bitcoin in fact as digital gold became widespread in 2019, and it was claimed by Brad Sherman, the US Congressman, that crypto assets would possibly become a threat to the dominance of the US dollar in the global economy. The use of digital gold is usually referred to as the core value proposition of bitcoin, so a closer relationship with gold could signify a higher level of acceptance and understanding of this point from market participants. In addition, the introduction of digital currencies issued by central banks could clarify the bitcoin's value proposition in the minds of the public (Torpey, 2020).

2.3. Commercial Banking

Commercial banks are financial institutions, which offer to check account services, accept deposits, and provide multiple types of loans, while also offering basic financial products such as savings account and certificates of deposit to companies and individuals (Fayman et al., 2019). Commercial banking is the most commonly used form of banking rather than investment banking. These banks earn by taking interests in the loans that they provide. The types of loans offered by commercial banks contain personal loans, auto loans, business loans, and mortgages (Gonçalves, 2018). A single bank is likely to specialize in one or more types of loans.

Furthermore, the different types of accounts that are in the bank provide them with the capital to offer loans. Customers that deposit money in these sorts of accounts are paid interest, however, the interest rate on borrow of a bank is generally lower than the lending interest rate of the bank (Buckland, 2018). In recent times, a

growing number of commercial banks have started online operations where the transactions are made electronically (Fayman et al., 2019).

Commercial banks play an important role in the economic development of a country. Firstly, the commercial banks mobilize saving for capital formation, which states that the banks channelize the savings into valuable investments, thus, producing capital for the country (Fereira et al., 2018). Furthermore, the banks help the country's economic development by providing short-term, medium-term and long-term loans to industries so that they may advance further by investing in their operations (Westerhuis, 2016). Moreover, the commercial banks are involved in financing trades, both external and internal. The commercial banks can provide foreign exchange facilities to exporters and importers of goods. While the banks also provide loans to wholesalers and retailers to stock goods, which they sell.

Additionally, the commercial banks help in financing agriculture; the banks can provide loans for multiple elements in agriculture, such as the purchase of machinery or developing irrigation facilities (Fereira et al., 2018). Providing funds for agriculture is an important aspect of commercial banks, especially for developing countries that rely on agriculture. Furthermore, regarding developing countries, the commercial banks provide loans for house products such as refrigerator or fans, this can help improve the living standard of the people (Yadav, 2016). While the banks also provide finance for employment generating activities such as providing loans for education. Lastly, the banks provide value to the economic development by following the monetary policies by the state bank; this helps in creating a stable financial situation for the country. At the same time, the providing of loans for agriculture and other industries under the monetary policies also helps in the capital generation for the country (Alam and Sattar, 2019).

2.4. Relationship between Digital Currency and Commercial Banking Performance

The financial independence and freedom that digital currencies bring are useful for individuals and businesses operating in regions where government bodies control financial institutions and banks (Narayanan et al. 2016). Considering the

relationship between digital currency and banks, Young (2018), highlights that digital currency such as Ethereum and Bitcoin have more advantages over banks in terms of efficient payment, clearance, borderless transaction settlement, lack, and reliance on centralized service providers and security. To elucidate further, Amstad et al. (2019), mentions that banks are significant players in monetary and financial transmission. The introduction of digital currencies may not be suitable before additional policies to aid capital needs and liquidity of commercial banks, as it may result in loss of profit base of commercial banks. It is important to ensure that adequate resolution mechanisms are in place to aid the alteration of the bank from account-based commissions into wealth management services.

HSBC is one of the largest banks and global financial institutions in the world. Being the biggest banking power in the world, HSBC has recently planned to use blockchain technology, knowing the advantages and potential it has. The plan of HSBC to adopt blockchain has confronted its rivals, creating what could be global shifts towards mainstream banks using the blockchain. Certainly, it is a positive move by a global financial institution to explore such technology that can contribute to more efficient and positive banking performance (Johnson, 2019). Likewise, Arnold (2017) highlighted that 6 of the world's biggest banks; Canadian Imperial Bank of Commerce, Credit Suisse, Barclays, State Street, MUFG and HSBC have teamed up to create new digital cash that they anticipate to introduce in the coming year for settling or clearing financial transaction over blockchain, the technology behind cryptocurrency. These banks have collaborated to work on 'utility settlement coin' something that Switzerland's UBS created to increase the efficiency of the financial markets. This initiative comes as a project shift into a different stage of development, in which its affiliates aim to enhance discussion with central banks to plan to strengthen up its cybersecurity protections and data privacy. Therefore, it shows that banks are planning to introduce and implement the digital form of currency in a way that it helps in their financial transactions and provide data and cybersecurity.

According to Amstad et al. (2019), the size of the market capitalization of digital coins reached around \$113 billion, of which bitcoin constitutes more than 50% of the entire value. Besides, money creation is not allowed by digital currency developers and exchanges (as banking license is required and so far, no financial authorities have issued any). Therefore, a little threat is generated by them to both commercial and central banks. Few commercial and central banks have shown uneasiness regarding the popularity and emergence of digital currency, largely due to their high volatility. Their fears show the possible loss of users from bank and cash deposits to the firms that develop digital currencies such as fintech. Nevertheless, the rise of private-sector money is still in its early phase, so it will take time for digital money to threaten central and commercial banks. It reflects the commercial banks are reluctant to adopt the use of digital currency, knowing it will possibly affect the traditional transaction process and negatively impact their performance in general.

Dannen (2017) mentioned that digital currencies are built on blockchains, and blockchains reduce the need for the third party to verify transactions and provide access to people for borderless, cheap, and fast payments. It, however, seems to go against the interest of commercial banks, and the adoption of digital currencies by a financial institution or at government level can significantly affect banking liquid reserves, as people will move towards a more easy and convenient way of transaction. Similarly, Mohamed and Ali (2018), discussed that blockchain offers a low-cost way of transferring money has high security, and reduce the need getting verification from third parties, beating processing times for commercial bank transfers. In addition, blockchain enables 'atomic transaction' or dealings that settle and clear when a payment is made. Hence, this goes against the commercial banking systems, which settle and clear payment after a few days. Further, Vassallo (2016) concluded that it is estimated by commercial banks that blockchain technology could reduce approximately \$20 billion worth of costs from the financial sector by allowing improved arrangements for settlements and clearance of payments. Still, the digital currency may not go well with the practices and function of commercial banks and might adversely impact their performance, including liquid reserves.

Jović (2016) highlights that although digital currencies are helpful in easy transactions, as compared to traditional banks, it poses challenges in the banking system. The security and database of an information system that supports digital currency is a significant challenge. Schich (2019) elucidate that digital currency contends with the commercial banks in relation to the transaction, and it allows peer-to-peer exchange without any third party that may adversely affect the currency transactional relationships. In many countries, digital currencies are not legalized so far; hence there is a possibility of a serious challenge to payment and banking systems once digital currency becomes accepted widely. It adds that almost all economic functions offered by physical, financial intermediaries can be effectively replaced with advanced digital interfaces, one that offers significantly lower fees. With the exception of digital currencies not being able to regulate control via monetary policy measures, banks still largely dominate the monopolistic money structure safeguarding their privileged role in society. It considers that the financial crises fueled by conventional banking system may drag the entire economy into crises occasionally. Yet, its obvious benefits of regulating sufficient liquidity coupled with acting as an effective monetary policy transmission channel outstrip the associated costs. Godart-Van der Kroon and Vonlanthen (2018) discussed that it is obvious that banks are worried about the possible impact of digital currencies on the banking sector on their profitability and liquidity. However, if digital currency is legalized and becomes widespread, then there is a strong possibility of commercial banks becoming obsolete. As per financial experts, commercial banks are vulnerable by substitute means of finance given by digital currencies. There is a probability of commercial banks becoming outdated and redundant if they do not consider digital currencies.

As electronic and digital currency payment systems becoming increasingly significant factors of the monetary system for several years, they have not been able to considerably change so far that architecture of the convention two-tiered monetary system centered on the central bank deposits and money in commercial banks. Private money is the new developments in the form of digital currencies, and

the prospect of digital currencies issued by private entities or government have the probability of changing the way how monetary system operates dramatically. The central bank that issues a digital currency can be challenging for the fractional reserve system, as money users may not have the option to hold a claim against the state bank. However, commercial banks would need to replace payments with more trustworthy sources of funding (Houben and Snyers, 2018).

Fatoki and Wanjagi (2019), in their research, examined the future of banks in Kenya using blockchain technology and digital currency to reduce financial risk. The research highlighted that digital currency performs the key role of money, as in intermediate of exchange. The financial system in Kenya may take benefit of the smart contracts to solve the countless risks owing to the economic activities of public and private parties. Commercial banks utilize digital currency to reduce intermediaries that usually limits the capacity of traders that enter into agreements. The digital currencies work on a user-user basis to increase control and flexibility by the traders. The technological advancement can help the countries to mitigate the risk of loss due to incorrect valuation and authentication of assets. Wright and De Fillippi (2015) discussed the digital currencies could help the capacity of commercial banks to involve the private sectors as intermediaries. Any risk pertaining to the disparity of the market can be resolved using digital currencies. Nevertheless, with digital money, it is comfortable to match the prospect of the parties to an agreement. The transactions with digital currencies are usually quick and demonstrate the interest of different participants.

As per the report of CIO Applications (2019), other than the rising rates of digital payments, commercial banks are encountering issues related to security. The use of cash is declining, whereas customers are moving towards safer alternatives, i.e. cryptocurrency. The cryptocurrencies as compared to cash perform much better on various factors. If commercial banks start issuing their own digital currencies, then they can support more effective and faster transactions. The working and operations on the blockchain allow significant cost savings too. Hence, commercial banks with digital currencies can enhance services while reducing operating costs. Overlooking

or forbidding the rise of digital currencies does not impact the leading banks, the financial sector needs to emphasize on developing its regulations and digital currencies. In these ways, commercial banks can remain competitive and relevant while dramatically changing standardized digital currencies.

Gulled and Hossain (2018) mention that the pseudonymity strategy surrounding the virtual currency mechanism holds the potential to vanquish conventional transaction infrastructure, facilitating users to eliminate dependency over the third party when undertaking monetary transactions. For the conventional banking system to fight back or at least operate side by side, it is necessary to implement technologies that run parallel to accommodate electronic transaction systems, like the one established by cryptocurrencies. However, Raskin and Yermack (2018) argue that this may require alternative technologies to be built and adopted by the existing infrastructure, which can be both expensive and timely to execute practically.

In a similar theme, Ng and Griffin (2018) argue that while commercial banks may benefit in terms of advanced and efficient payment mechanisms to undertake inter-bank transactions hence improving performance, it may even cannibalize the entire banking system by establishing its own Real Time Gross Settlement (RTGS) system thus reducing not only the profitability but also market share as domestic citizens too might shift for virtual currency transaction methods. The findings of Othman et al. (2019) also proved that nations that have adopted cryptocurrencies as an alternative means of conducting financial transactions had exhibited a severe negative influence on commercial banks deposit variability. In attempts to minimize being completely replaced by the launch of virtual currencies, banks may strive to employ virtual currencies as an alternative investment opportunity to diversify their investment portfolio, especially when the market conditions portray a bullish behavior. If not, financial intermediaries should be open to directly invest in cryptocurrencies in attempts to profit from price volatility.

According to Polyviou, Velanas, and Soldatos (2019), digital currencies have the potential to revolutionize the banking sector by changing the way in which various services are performed in that industry. The supporters of digital currency consider that its use will likely to become widespread in the financial sector in the coming years. Besides, the use of digital money may be beneficial in the areas of securities and investment banking. Nevertheless, for future banks have to adapt to new changes that are arriving in the financial sector; also, digital currencies have to adopt different regulations and rules to fit into the financial industry. Commercial banks need to implement fluid role, and their conventional operational methods need to be abandoned. Considering the on-going trend, the digital currency would aid commercial banks to modernize and retain their operational models. Having said that, the relationship between digital currency and commercial banking performance is not clearly defined, as there is a lack of literature to support or discuss any such relationship. However, what is known so far is that digital currency poses an immense threat to the conventional practices of commercial banks, as it is expected that digital currency providing fast, easy and timely payments may significantly impact the profit and performance of commercial banks. In order to address the identified gap in this review, the present research holds significance in discussing the relationship between digital currencies and banking performance. It will elucidate the benefits and threats that digital currencies carry in relation to the financial and banking sector.

2.5. Digital Currency and the Economy

The blockchain network of cryptocurrencies is identified as a powerful technological establishment that possesses enough potential to influence increased efficiency and transparency in several government and private organizations. Jonáš and Stancel (2015) claim that the dynamics of trust and ownership as the world knows today could be changed significantly as the technology highly impacts how the economy and government systems operate.

In terms of cost, Perkins (2020) highlights that cryptocurrency proponents prefer the new mechanism against conventional payment networks due to substantial cost

advantages. It explains that internal money transfers involve complex services provided by additional intermediaries than domestic transfers, usually including transfers between money transmitters and banks in various nations and perhaps changes in national currencies as well. This exhausting process, along with the increased cost is likely to be minimized using the cryptocurrencies network as monetary transactions occur over the internet, which is already globally available. Even though studies fail to quantify exactly how much reduction in costs is expected, it is worth mentioning that the fall in costs will obviously benefit consumers largely (Hayashi and Keeton, 2012). The literature presented by Ng and Griffin (2018) identifies that for consumers undertaking payment transactions domestically, however, may only perceive the introduction of cryptocurrencies as merely an additional electronic payment method unlikely to add any significant benefit to their current modes of payments. Although for international customers, since the current modes remain costly and time-consuming, employing cryptocurrencies is likely to minimize the exchange rate risks such as those associated with global money transfer operators (MTO) like PayPal and Western Union. Despite its benefits, in theory, households in an economy actually switching towards the new and still largely unknown mechanisms of the digital currency network still has a long way to go. In this context, the empirical study of Alaeddin and Altounjy (2018) recognizes that the intention to practically use cryptocurrencies in routine transactions depends upon the degree of trust and awareness along with the level of satisfaction derived by it.

For the digital currency mechanisms to be employed within an economy, it is first necessary to evaluate whether the technology is able to replicate if not replace, the functions long performed by fiat currency. In this regard, Ammous (2018) evaluates five distinct digital currencies namely Bitcoin, Ether, Ripple, Litecoin, and Steem to examine whether these efficiently perform the basic functions of money that is, store of value, a unit of account and as a generally accepted medium of exchange. It concludes that while all of these proved to serve as a medium of exchange owing to the worldwide availability of internet access, none of them can be used as a unit account due to inflexible supply and fluctuating demand equilibriums. With regards

to the store of value, only Bitcoin proved to be acceptable due to its strict regulation oversupply growth and high credibility provided by the network protocol itself. Although, Kubát (2015) produces contradicting findings as it suggests that Bitcoin, like all other digital currencies, does not satisfy the store of value function of money due to high volatility and risk. These conflicting findings can perhaps be the result of differences in an economic structure comprising each nation.

Consequently, literature put forward by Kang and Lee (2019) assesses whether Bitcoin or any other virtual currency can compete against fiat currencies and what affect is likely to be imposed over conventional economic activities and overall welfare. The findings conclude that cryptocurrencies like Bitcoin can replace money when the inflationary pressures are relatively high and rising as currency fails to act as a store of value. Its further dictates that in an economy where both a digital currency and fiat currencies operate side by side, economic welfare is likely to be lower owing to inefficient mining process coupled with delayed settlements. Hence, a money-only economy would be preferred. With rising inflation, the welfare gap between money-only economy and co-existing economy too expands. It is because as the general price level rises rapidly, people prefer digital currencies, e.g. Bitcoin over money, increasing its transactions. Sudden rise in Bitcoin transactions increases validation and recording time due to the existence of constraint upon the number of transactions that each block can undergo. This accelerates delivery lags when Bitcoin is used as a medium of exchange to purchase goods and services. Therefore, timely consumption and welfare are minimized in a co-existence economy.

It is believed that within developing economies, where the current financial infrastructure is weak or less trustworthy, substituting digital currencies in place of money could show promising prospects. Concerning policy mechanisms such as those implemented to control inflation, unemployment and growth, the substitution from fiat currencies to virtual ones can result in the central bank losing its control over the economy and money supply (Dabrowski and Janikowski, 2018). In regions where the substitution is already apparent, for instance, people engaging in

euroization or dollarization, due to distrust in economic agents, cryptocurrencies to gain higher market capitalization seems predictable.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Research Philosophy

Research philosophy is the principle of how the data would be used, gathered or analysed. According to Crossan (2003), three main types of research philosophies exist, i.e. Positivism, Interpretivism, and Realism. The present study uses positivism; it is a term that is used to define the approach that is focused on the study of the population through scientific evidence, for example, statistics or experiments, this can help the researcher to reveal the true nature of how the population operates. Positivism is used in the present study to construct conclusive evidence for the arguments using a statistical analysis of data. Realism is not applied in the present study because it relies on the idea of reality's independence from the mind of humans (Crossan, 2003). Furthermore, Interpretivism is not used as it integrates human interest in a study (Crossan, 2003). Therefore, positivism is the most ideal for philosophy for the present study as it helps in achieving the research objectives.

3.2. Research Approach

The research approach is the methodology the researcher applies to conduct the study, such as analysis of numerical or other forms of data. According to Amaratunga et al. (2002), common forms of research approach techniques applied are qualitative and quantitative. The present study, however, applies quantitative methodology as the intention of the study is to analyze numerical data. In quantitative studies, mathematical, computational or statistical approaches are taken to analyze the numerical data (Amaratunga et al., 2002). While Qualitative study uses factors such as identifying themes based on in-depth analysis. The present study does not use the Qualitative approach because it does not require in-depth information; rather, the usage of data to analyze statistically (Zimmerman et

al., 2010). Furthermore, the study aims to analyze the data regarding the cryptocurrency (Bitcoin) volume and commercial banks liquidity. Thus, the quantitative method is more applicable. Nonetheless, through this method, in-depth knowledge would not be gained that can be a possible concern for added knowledge about the topic.

3.3. Research Design

Research design is defined as the framework which contains the methods and techniques which are chosen to combine multiple aspects of the research in a manner that is logical, to handle the problems of the research in an effective manner (Zimmerman et al., 2010). The design provides insights into how research should be conducted via a certain methodology (Zimmerman et al., 2010). Research design can help in the assessment of the research questions. Some common research design methods include correlational, semi-experimental, descriptive, experimental, and review (Myers et al., 2010). The present study has a correlational research design as it analyses the relationship between the variables. Correlational studies can establish links between variables through statistical data. Relationship between cryptocurrency and commercial banks liquidity performance is assessed through the correlational design.

3.4. Sample Size and Sampling Technique

The sample size is the representation of the target population. According to Uprichard (2013), the sample size is reached through sampling; there two types of sampling probability sampling and non-probability sampling. Probability sampling is the procedure where the chances of getting selected is equal. However, the present study uses non-probability sampling, which is the non-random method of collecting data. This form is adopted because it is convenient for the researcher. Nonetheless, the method contains the risk of lacking generalizability in the study (Wolf, 2016). However, non-probability sampling is more convenient, time-saving and cost-effective for the collection of required data (Jha, 2014). Therefore, the data to be collected regarding cryptocurrencies and commercial banking trends is selected through non-probability sampling technique. The sample size of the current

study is equal to 36 countries x 5 years of data, i.e. equal to 180 observations per variable. Further details are provided in the variable description. The sample period is 2013-2017. Due to unavailability of complete dataset, the sample span does not include years 2018 and 2019.

3.5. Data Collection

Data collection is the process of obtaining information from the sources that are relevant to develop an understanding regarding the research objectives. There are two types of data collection primary source and secondary source. The definition of the methods and comparison is conducted below.

Primary Data	Secondary Data
<ul style="list-style-type: none"> • The researcher collects data through methods such as surveys, interviews or observations. 	<ul style="list-style-type: none"> • This method provides information on whether the existing data on the topic applies to the research questions or not.
<ul style="list-style-type: none"> • More targeted data collection, however, can be more time-consuming and expensive. 	<ul style="list-style-type: none"> • The data collected is the information which has been collected, processed and reported by someone else.
<ul style="list-style-type: none"> • An opportunity is created to review the secondary data before the collection of primary data. 	<ul style="list-style-type: none"> • This method answers what questions have already be addressed, while what kind of information is still missing.

Source: Hox and Boeije (2005)

The present study uses secondary data to satisfy the objectives. Essential information can be gained through secondary data to increase the knowledge and answer the research questions. Additionally, the reliability and credibility of the study can increase by the usage of already assessed data which is fairly recent. The primary data collection method could be useful as it can be used to compare the information; however, secondary sources being used approve sufficient to develop

the answers for research questions. The World Bank database and the Coin Dance website is used to gather the necessary data.

3.6. Description of variables

The variables are defined under independent and dependent categories.

3.6.1. Independent Variables

Nature of Variable	Independent
Measurement	Average Bitcoin volume in USD
Unit	Yearly
Period	From years 2013-2017
Countries	36
Source	Coin Dance Website

3.6.2. Dependent Variables

Nature of Variable	Dependent
Measurement	Bank liquid reserves to assets ratio of commercial banks shall be applied
Unit	Yearly %
Period	2013-2017
Countries	36
Source	World Bank Database

The above description shows that liquidity performance of the banks in this study is measured by commercial banks' liquid reserves to assets Commercial banks' liquidity reserves ratio, which reflects domestic currency deposits and holdings. Commercial banks' liquidity reserves are recognized as performance indicators

(Barth et al., 2012; Vodova, 2012). Profitability measures such as ROE are more widely used performance constructs. However, due to unavailability of the annual data of commercial banks' profitability for the 36 countries, the study considered liquidity performance as the proxy of commercial banks' performance.

3.6.3. Control Variables

The control variables for the present study are inflation, GDP per Capita and development status (dummy). This data shall also be acquired from the World Bank database.

3.7. Hypothesis

The hypothesis for the present study is conducted in a way to satisfy the research question.

Ho: There is no significant relationship between the Bitcoin volume and Commercial Banks liquidity performance.

H1: There is a significant relationship between Bitcoin volume and Commercial Banks liquidity performance.

3.8. Data Analysis

According to Walliman (2017), the last step considered for the research-based study is Data analysis because this step involves the evaluation and interpretation of the data using the statistical tools. While many different techniques can be used for data analysis, it is essential that the best method is chosen to complement the nature of the data collected. Additionally, there are many differences in the data analysis part of Qualitative and Quantitative methods. In contrast, the qualitative study aims to define the behaviors and characteristics of the population; the quantitative study analyses the data based on numerical data (Brannen, 2017). Thus, appropriate data analysis techniques must be adopted to get relevant answers to the research question.

The present study has applied regression and correlation analysis techniques. The OLS Regression analysis technique is applied as it provides the researcher with a

predictive modelling technique for the evaluation of the relationship between the dependent and the independent variables (Miller, 2014). The technique estimates time series modelling while searching for a causal effect relationship among the variables. Furthermore, the correlation technique is used as a help in establishing a probable link between the variables. At the same time, it also helps in statistically analyzing the strength of the relationship between the variables (Pecht, 2009).

3.9. Statistical Model

To test the hypothesis, OLS regression is used. The model is written as such:

$$BR = \alpha + \beta_1BTCV + e \text{ ----- (1)}$$

BTCV is the Bitcoin Value, while BR is the Bank Liquid Reserves.

Control variables are also taken into account to test the relationship between BTCV and BR. Thus, the regression model is developed as such:

$$BR = \alpha + \beta_1BTCV + \beta_2GDP + \beta_3INR + e \text{ ----- (2)}$$

GDP represents GDP Per Capita, while INR is the Inflation rate.

A third regression model is also tested, which also includes development status as dummy variable. Following is the regression equation:

$$BR = \alpha + \beta_1BTCV + \beta_2GDP + \beta_3INR + \beta_4DS + e \text{ ----- (3)}$$

Where DS = development status of the countries included in the study.

3.10. Summary of Research Methodology

The present study adopts the quantitative research approach, which states that the analyzation would be based on statistical data. Furthermore, the research design chosen is correlational as it helps the researcher in understanding the relationship between the variables. The sampling technique applied is non-probability, as it is more time-saving and convenient. Additionally, the data collection method used in secondary data which states that the data would collect form already available sources. The data would be analyzed through regression and correlation analysis. Whereas, the research philosophy adopted is Positivism, as the present study aims

to use statistical data to form conclusive evidence. The variables determined are Cryptocurrency and Commercial banking liquid reserves, while the control variables are Inflation rate and GDP per capita. Given the above information, the following model is created: $BR = \alpha + \beta_1BTCV + \beta_2GDP + \beta_3INR + \beta_4DS + e$. The hypothesis to be tested is whether the Cryptocurrency and Commercial banking liquidity performance are correlated.

CHAPTER 4

FINDINGS AND ANALYSIS

The current section of the research study is aligned with the research objectives to examine the relationship between the use of Digital Currency and Commercial Banking Liquidity Performance. Subsequently, the current section includes the descriptive tests of data gathered, concerning country-wise average and year wise average of volume traded in bitcoin transactions (BTC), bank's liquid reserves, GDP per Capita, GDP per Capita growth, and Inflation rate. Further, the chapter also interprets and analyses the correlation and regression tests performed through SPSS software, keeping the bank's liquid reserve percentage of assets as the dependent variable, while the BTC Volume as the independent variable. Also, during the tests, all the other variable of GDP per Capita, GDP Growth and Inflation have been used as a controlled variable to examine whether they moderate the relationship of dependent and independent variables. Finally, the results of the tests and their interpretation are discussed with the support of a critical literature review conducted in previous chapters.

4.1. Descriptive Statistics

4.1.1. Country Table

The country table shows descriptive statistics of the average volume of BTC traded in the five years from 2013 to 2017. According to Table 4.1.1. 1, it can be observed that the highest average of BTC Volume traded stands out to be of the USA with \$4743.60 thousand on average and Russia with \$2750.99 thousand. It is consistent with the literature of the current study that highlights the USA to be the most

dominant country having the highest number of cryptocurrency users, Bitcoin ATMs and Bitcoin transaction volumes in the international market, perhaps supporting the report of Thomson Reuter (2017). On the other hand, the country table descriptive tests also exhibit that the lowest average of BTC volume traded stands out to be in countries like Japan, Indonesia, Hungary, etc. It is mostly the case because these countries have recently legalized the adoption and use of bitcoin and other types of cryptocurrencies, like Japan (Thomson Reuter, 2017). Furthermore, it can be seen that the highest average of bank liquid reserves % of bank assets, out of the 36 countries, stands out to be of Venezuela, with a BTC traded volume of 47.33%. Whereas, where the BTC traded volume is the highest, like the USA, the average bank liquid reserves % of bank assets stand at 14.26%, showing that the commercial banks' liquid reserves might be lower than that of banks of Venezuela. Moreover, the highest GDP Per Capita is observed to be of Norway, while Tanzania and Pakistan have the lowest GDP per Capita. In the case of GDP per Capita growth, Brazil and Venezuela have the highest negative growth recorded among the 36 economies while Romania records the highest GDP per Capita Growth. Finally, inflation according to consumer price index (CPI) is highest in Venezuela and Egypt, while the lowest average of inflation has been recorded by Croatia.

Table 4.1.1. 1 Variable description country-wise

	BTC Volume in thousand USD	Bank liquid reserves % of bank assets	GDP per capita (constant 2010 US\$)	GDP per capita growth (annual %)	Inflation, consumer prices (annual %)
	Mean	Mean	Mean	Mean	Mean
Australia	630.00	1.05	55226.11	0.93	1.93
Brazil	90.71	26.60	11465.73	-1.29	6.75
Chile	24.29	10.49	14652.93	1.00	3.37

Colombia	138.60	6.64	7486.17	1.92	4.35
Croatia	10.82	19.67	14294.17	2.36	0.31
Czech Republic	13.94	34.50	21234.11	2.70	1.05
Denmark	11.88	3.42	60471.14	1.29	0.64
Dominican Republic	7.96	35.86	6690.01	4.94	2.71
Egypt	2.48	36.92	2712.56	1.35	14.65
Hongkong	96.30	7.18	36350.21	2.17	3.13
Hungary	3.96	24.09	14602.33	3.53	0.84
Indonesia	2.86	21.01	3833.81	3.79	5.30
Japan	4.83	22.66	47143.78	1.36	0.85
Kazakhstan	6.44	18.66	10616.49	1.85	8.25
Kenya	60.59	8.99	1094.45	2.94	6.70
Malaysia	155.52	12.07	10887.66	3.77	2.66
Mexico	59.99	7.16	10014.89	1.22	3.88
Morocco	15.02	3.13	3190.42	1.98	1.25
New Zealand	149.52	2.59	36670.55	1.61	1.03
Nigeria	677.21	32.24	2494.52	0.28	11.55
Norway	119.48	1.24	89959.99	0.62	2.35
Pakistan	81.54	11.78	1089.17	2.84	5.05
Peru	24.72	36.68	6121.51	2.29	3.20
Philippines	34.16	33.77	2623.76	4.90	2.19
Poland	22.37	12.79	14660.40	3.33	0.32
Romania	51.69	22.17	9847.54	5.02	0.85
Russia	2750.99	7.30	11464.74	-0.07	8.17

South Korea	4.14	6.71	24903.16	2.49	1.24
Sweden	202.50	2.12	54924.82	1.49	0.50
Tanzania	3.59	21.82	875.44	3.52	6.02
Thailand	164.22	18.80	5786.00	2.43	0.81
Turkey	35.50	15.80	13781.29	4.33	8.59
UAE	64.86	15.41	39531.29	2.90	2.22
Ukraine	71.25	9.39	3003.41	-0.92	17.78
USA	4743.60	14.26	51833.22	1.47	1.32
Venezuela	9.52	47.33	14373.61	-2.41	119.87

4.1.2. Year Wise

Table 4.1.2. 1 Variable description year-wise

	BTC Volume in thousand USD	Bank liquid reserves % of bank assets	GDP per capita (constant 2010 US\$)	GDP per capita growth (annual %)	Inflation, consumer prices (annual %)
	Mean	Mean	Mean	Mean	Mean
2013	28.10	16.67	19220.87	2.34	4.49
2014	96.13	16.24	19533.77	2.01	5.43
2015	177.05	16.85	20080.78	1.98	7.81
2016	323.42	15.96	20361.19	1.85	10.84
2017	840.17	17.63	20737.14	2.47	4.57

Considering that the country-wise average means demonstrated which nation had the highest average volume traded and the highest percentage of liquid reserves, Table 4.1.2. 1 illustrates the average BTC volume traded in each year during the 5-year period (i.e., 2013-2017). Interpreting Table 2, it can be observed that the highest average of BTC traded volume is recorded in the year of 2017, at approximately USD 840.17 thousand for the overall 36 counties. It is also verified

through the literature, whereby the researcher has cited Hileman and Rauchs, (2017) showing that the total cryptocurrency market capitalization was increased by more than 3 times since early 2016, reaching nearly \$25 billion in 2017. Furthermore, the table also shows that the highest percentage of bank liquid reserves was in 2017. A similar trend is exhibited for the averages of GDP per capita, GDP per Capita Growth and Inflation rates.

4.1.3. Descriptive Tests

Table 4.1.3. 1 Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
BTC Volume in thousand USD	180	0.00	10340.96	292.9739	1227.36463
Bank liquid reserves % of bank assets	178	0.56	63.77	16.6676	12.47186
Inflation, consumer prices (annual %)	179	-1.54	254.95	6.6395	21.88714
GDP per capita (constant 2010 US\$)	177	817.12	91451.35	19979.8643	21287.47537
GDP per capita growth (annual %)	177	-9.44	7.62	2.1296	2.17506
Valid N (listwise)	177				

The descriptive statistics have been performed to gauge the mean, maximum and minimum range and standard deviation of the five variables regardless of the country and year they belong to. In this case, Table 4.1.3. 1 exhibits that the BTC has a highest traded volume of \$ 10340.96 thousand within the 5 years, with an average of \$ 292.9739 thousand and deviation of the average from \$ 1227.36 thousand. Further, the highest range for Bank liquid reserves as a percentage of banks' assets have been recorded as 63.77% whereas the lowest has been 0.56%.

The average of this ratio is 16.67% from the 178 observations. Moreover, inflation has ranging average from -1.54 to 254.95, showing that inflation had peaked when it reached 254.95 among the 36 countries in the 5 years.

4.2. Correlation Statistics

Table 4.2. 1 Pearson Correlation

		Correlations				
		BTC Volume in thousand USD	Bank liquid reserves % of bank assets	GDP per capita (constant 2010 US\$)	GDP per capita growth (annual %)	Inflation, consume r prices (annual %)
BTC Volume in thousand USD	Pearson Correla tion	1	-0.079	.162*	-0.102	-0.033
	Sig. (2- tailed)		0.297	0.031	0.175	0.659
	N	180	178	177	177	179
Bank liquid reserves % of bank assets	Pearson Correla tion	-0.079	1	-.430**	0.141	.335**
	Sig. (2- tailed)	0.297		0.000	0.061	0.000
	N	178	178	177	177	178
GDP per capita (constant 2010 US\$)	Pearson Correla tion	.162*	-.430**	1	-.184*	-.252**
	Sig. (2- tailed)	0.031	0.000		0.014	0.001
	N	177	177	177	177	177
GDP per capita growth (annual %)	Pearson Correla tion	-0.102	0.141	-.184*	1	-.474**

	Sig. (2-tailed)	0.175	0.061	0.014		0.000
	N	177	177	177	177	177
Inflation, consumer prices (annual %)	Pearson Correlation	-0.033	.335**	-.252**	-.474**	1
	Sig. (2-tailed)	0.659	0.000	0.001	0.000	
	N	179	178	177	177	179
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

For assessing relationships between the variables of the current study, Pearson correlation analysis has been performed (see table 4.2. 1). In order to check the correlation between the dependent, independent and controlled variables, the table shows a correlation matrix, which exhibits the significant relationship at 0.01 and 0.05 levels. Besides, multi-collinearity can also be denoted from this matrix. For example, BTC's traded volume is seen to have an insignificant relationship with the percentage of the bank's liquid reserve as a proportion of bank assets at 0.05 level. The liquid reserve percentage of bank's asset is a measure of bank's cash holding; thus, the table shows that the use of digital currency does not have a significant impact on commercial bank's liquidity performance in 6 economies.

Although the relationship is insignificant, the use of digital currency does have a negative impact on commercial banks' liquidity performance at -0.079. Coherent with the literature the insignificant relationship is there due to the fact that the cryptocurrencies have a relatively low rate of acceptance around the world and usage along with the on-going challenges they encounter (such as problems associated with tax evasion, terror financing and money laundering) may impact their growth in future (Houben and Syners, 2018). Hence, their present influence on the economy and financial institutions like the commercial bank is considered insignificant (Manta and Pop, 2017). It forms the basis to predict that digital

currencies will continue to be a product with restricted applicability to the boundary of traditional financial services. Further, the results have shown an insignificant relationship underlying the technological innovations of commercial banks in the face of digital currencies. For instance, the HSBC, known as the largest bank has introduced the blockchain technology to counter-effect the advantages of Bitcoin and offer bank's customers and account holders with efficient banking services (Johnson, 2019). In a similar context, the six largest banks in the world, according to Arnold (2017) are uniting to develop new technology as digital cash which will use the same technology system used behind cryptocurrency. These banks have collaborated to work on 'utility settlement coin' something that Switzerland's UBS created to increase the efficiency of the financial markets. This initiative comes as a project shift into a different stage of development, in which it can be affirmed that the impact of using digital currency can be further reduced if the banks keep up with the technological innovations. However, the volume of banks formulating plans and partnering with blockchain systems is still very low as compared to the number of existing banks around the world. It explains why the volume of bitcoin has an insignificant yet negative relationship with the liquid reserves of commercial banks.

Also, the negative impact of the use of digital currency on commercial bank's liquidity performance is rationalized through the theoretical framework of SET, introduced by Cook and Whitmeyer (1992). Correspondingly this framework justifies the negative impact due to the re-engagement behavior of individuals in the trade of digital currency because of the rewards, value and success they receive. These rewards and value include the reduction of transaction costs, earning quick profits and elimination of intermediary influence offered to those lack bank accounts and want quick transaction methods instead of dealing with banks' delayed customer services Hayashi and Keeton, (2012); Ng and Griffin (2018); Villarreal (2016); Popper, (2015). The results also validate the findings of Othman et al., (2019), Ng and Griffing (2018) and Polyviou et al. (2019) who explain that while commercial banks may have found advanced ways of becoming efficient due to the

introduction of cryptocurrency, the point that cryptocurrencies are used as an alternative means of conducting financial transactions have negatively influenced the banks' deposit variability. Consequently, the advantages of using cryptocurrency over fiat currency provide reasons as to why the use of digital currency might have a negative impact on the bank's liquidity performance.

The correlation matrix also exhibits that the BTC's traded volume and GDP per Capita has a positive rather insignificant relationship. In contrast, BTC's traded volume has an insignificant negative relationship with GDP per Capita growth and inflation. The literature of the study depicts a similar picture, discussing that the use of Bitcoin, instead of money can rather reduce inflationary pressures; however, its use stays insignificant because it fails to act as a store of value with high volatility and risk associated to it (Kang and Lee, 2019; Kubait, 2015; Ammous, 2018).

4.3. Regression Analysis

While correlation only helps to assess the relationship between the variables of the study, the regression analysis has been performed to examine the impact of the use of digital currency on the liquidity of the commercial bank.

Table 4.3. 1 exhibits the two regression models considered in the study. The first regression model of the study evaluates the impact of BTC Volume on BLR. According to the F statistic and the associated p-value, the overall results are statistically insignificant. Moreover, the beta coefficient, which is also insignificant, is negative suggesting that an increase in bitcoin volume in a country in a year, may reduce the banks' liquidity reserve percentage. Moreover, the r-squared value is very low, showing that only 0.6% variance in the dependent variable is explained by the model.

Although the insignificant but negative impact of the two variables is supported by the findings of Mensah (2018); (Lagarde, 2018); Kaya (2018) who exhibit that individuals often prefer transactions in cryptocurrencies as it is cost-effective, efficient, and broadly helps consumers to access financial system when compared

to banking systems through fiat currency. Furthermore, as discussed by Ammous (2018) that, bitcoin and other digital currencies are considered as a store of value, unit of account and as a generally accepted medium of exchange. Also, bitcoin is largely referred to as digital gold over the period of years. The advantages bitcoins offer over fiat currencies make banks incompetent, hence explaining the negative impact. However, since many countries are still reluctant to legalize bitcoin or other digital currencies, the impact of transactions in bitcoin has an insignificant impact on commercial banking liquidity performance. Also, since the introduction of bitcoins and the increasing trend of its usage have induced within the economy, many countries have shut down a number of banks' branches due to less number of people visiting the branches, further reducing the presence of ATMs as people who belong to rural areas, can finally participate in the financial systems of the economy (Nabilou and Prüm, 2019).

The second regression test performed includes the control variables; inflation (consumer prices) and GDP per Capita. For the second regression model, BTC volume has been used as an independent variable, whereas, liquid bank reserves have been entered as an independent variable. In contrast, economic activity and inflation have been used as controlled variables, see table 4.3. 1.

Table 4.3. 1 Regression Analysis

Variables	Model 1				Model 2			
	B	Std. Error	t	p-value	B	Std. Error	t	p-value
(Constant)	16.903	0.961	17.585	0.000	8.339	1.597	5.223	0.000
BTC Volume in thousand USD	-0.001	0.001	-1.046	0.297	0.000	0.001	-0.337	0.737
GDP per capita growth (annual %)					2.104	0.439	4.799	0.000
Inflation, consumer prices (annual %)					0.817	0.128	6.366	0.000
F Statistics	1.0948				15.2513			
P-value	0.297				0.000			
R	0.079				0.457			
R Square	0.0062				0.2091			
Adjusted R Square	0.0005				0.1954			
Dependent Variable: Bank liquid reserves % of bank assets								

The findings extracted from table 4.3. 1 reveal that the overall regression model, that include both BTC volume and control variables, is statistically significant. Also, the F-test value, which explains the combined impact of independent and control variables on the dependent variable, is significant at 0.01 levels. Moreover, there is a positive impact of economic activity over the liquidity of a commercial bank. Thus, it can be concluded that an increase in inflation will increase the banks' liquid reserves. Finally, the R-Square value denotes that there is a 20% variation in the liquidity of commercial banks, justified by the variations in economic activity, BTC volume traded and inflation rate.

Table 4.3. 2 Regression Model 3 (including dummy variable)

Variables	Model 3			
	B	Std. Error	t	p-value
(Constant)	6.470	1.685	3.840	0.000
BTC Volume in thousand USD	0.000	0.001	-0.208	0.836
GDP per capita growth (annual %)	1.862	0.437	4.263	0.000
Inflation, consumer prices (annual %)	0.677	0.134	5.046	0.000
Development Status (Dummy Variable)	5.206	1.761	2.955	0.004
F Statistics	14.133			
P-value	0.000			
R	0.497			
R Square	0.2474			
Adjusted R Square	0.2299			
Dependent Variable: Bank liquid reserves % of bank assets				

The study further includes a dummy variable representing countries' economic development status to strengthen the model and evaluate the impact of the BTC volume. For this purpose, the countries are either classified as developing (1) or

developed (0). All emerging countries are considered as developing in this case. The performance of model 3 has improved, as suggested by the F statistic and R-square values. The model is now able to explain around 25% of the variance in the dependent variable. However, the impact of BTC volume on bank liquid reserves is still statistically insignificant. The development status variable, itself, is significant at 0.01 level and the coefficient is positive. It suggests that a developing country has a better bank liquid reserves % than a developed country, which is 5.2% higher, keeping BTC volume, GDP per Capita, and Inflation constant. Overall, the regression model has improved by the inclusion of the dummy variable.

The significant impact contradicts the study of Kang and Lee (2019) who concludes that in an economy where both, digital and fiat currency operates simultaneously, the economic welfare is likely to be lower due to delayed settlements and inefficient mining process. Despite this, the impact of BTC volume on banking liquidity performance is insignificant.

CONCLUSION

5.1. Summary of the Study

With digitalization and technological innovation taking over every aspect of human life, ranging from online marketing to online shopping, it has now paved a way into the monetary and financial systems of the economy through introducing virtual money and crypto-currency. Reinforcing the findings of the current study, the most commonly used ones include 'Bitcoin', 'Ether', 'Ripple', 'Litecoin' and 'Steem' (Mensah, 2018). The preface of Bitcoin and other different cryptocurrencies has not only increased the speed of domestic and cross-border transactions but largely reduced transaction costs for individuals and broadened the accessibility towards the financial system by rural households (Dabrowski and Janikowski, 2018). The benefits of using bitcoins, therefore, have relatively reduced the importance of banks. This is because the transactions involved with bitcoins do not entail any intermediary (i.e., banks) that may potentially influence the transactional relationship through increasing cost. Accordingly, digital currencies are posing a number of challenges to the banking industry, by exposing their failure to adapt quickly to changes (Joseph and Mensah, 2018) and showing an alternative way to the society for managing financial issues (Partanen, 2018).

Consistent with the challenges modelled by the introduction of cryptocurrencies to the banks, the current study concludes that many countries have not legalized the transactions through these such as China (PBC, 2017). However, payment systems involving bitcoin has been widely accepted in financial systems involving Islamic Banking and Finance as compared to interest-based bank fiat currency (Evans, 2015). Other than that, countries like Switzerland have also welcomed the use of digital currency (Diemers, 2017). Regardless, where bitcoin has proved to be beneficial for many people, at the same time, the current study has identified that the presence of such digital currencies is a threat to authorities, and financial institutions (i.e., banks) alike due to their nature of anonymity (Hafner, 2020; Partanen, 2018). As banning the use of cryptocurrency is a way out, but it is only seen as a short-term solution for something which cannot be avoided in the future.

Since the domain for technological progress cannot be ruled out, the current study identifies that majority of the attention within the domain of digital currency is devoted to its legal and illegal usage. At the same time, little empirical evidence has been found out towards its impact on commercial banks' liquidity performance. Rendering to this research gap, the current study rationalized its research aim to determine the relationship between digital currency use and commercial banking liquidity performance.

Based on the research question, the study conducted a critical literature review to explore the theoretical framework behind the adoption of digital currency and its influence on the financial system of the economy. One of the theories underpinning the adoption of Bitcoin was found to be the Homan's five Behavioral Propositions matured into the Social Exchange Theory (SET) (Cook and Whitmeyer, 1992). The theory provides the premise that if rewards of using cryptocurrency are high and beneficial to individuals, they may re-engage in using it. Further, the behavior of re-engaging in cryptocurrencies is stimulated by the existing environmental or situational conditions which act as a support. Another theory, K-percent Rule, in the similar realm, has been highlighted in the literature review. Under this framework, the digital currency has similar potential as fiat currencies to impact inflationary pressures and unemployment rates (Salter, 2014; Böhme et al., 2015).

Further, the literature review explores the current growing trend of cryptocurrency revealing that the US is the dominant country who has the highest number of cryptocurrency users, Bitcoin ATMs, and the highest transactional volume in the international market (Thomson Reuter, 2017). The trends also show that, gradually, economies are accepting the digital currency, such as; Japan; passed a law accepting Bitcoin as a lawful tender. In contrast, countries like Bangladesh passed a law prohibiting the use of cryptocurrency. Finally, the study examines existing literature concerning the relationship between digital currency and commercial banking liquidity performance. Summarizing the literature review, the current study also pointed out the although the digital currency has several advantages over banks, the common use of Bitcoin has motivated number of leading commercial banks to

adopt different technological advancements to stay competitive with the technology of cryptocurrency. For example, the growing trends of Bitcoin pressured HSBC to come up with its own blockchain technology that can contribute to more efficient and positive banking performance (Johnson, 2019). Also, the world's six largest banks have been seen to team up to establish their foothold in the financial system and embrace the challenges of digital currency; by introducing their digital cash (Arnold, 2017). Rendering to such technological innovations, it can be affirmed that where digital currency has exposed the vulnerabilities of the banking industry, at the same time, it has pushed banking industry to come up with new modern ways to stay competitive. The fact, however, remains, that digital currency, such as Bitcoin and Ripple is still used as a medium of exchange and might have been the reason behind the shutdown of more than 600 bank branches in the UK in 2016 (Wearn, 2016). Finally, the study also reviews existing literature which shows the link between adoption of digital currency and the economy.

To find out whether the digital currency has been significant enough to negatively or positively impact the commercial bank's liquidity performance, the study employs a quantitative methodological approach. Providing a recap of the methodology the study uses secondary data sources from the database of World Bank and Coin Dance to collect annual data of BTC Volume traded to measure the use of bitcoin (i.e., cryptocurrency), Banks' liquid reserve as a percentage of their total assets to measure commercial banking liquidity performance, GDP per Capita and GDP per Capita Growth to measure economic activity and consumer prices to measure inflation within the 36 economies who have legalized and accepted the transactions of digital currency. In total, the study analyzed 180 observations using regression, correlation and descriptive analysis through SPSS software.

5.2. Main Deductions

Drawing conclusions upon the findings extracted from descriptive statistics revealed that indeed the USA is the only dominant economy with the highest volume of bitcoin being traded, along with the highest number of consumers who deal in cryptocurrency and has the highest number of Bitcoin accounts (Thomson

Reuter, 2017). Although the data collected did not show countries like China, and Bangladesh as a part of economies which have legalized the transactions in cryptocurrency just yet. Furthermore, the results highlighted 2017 as a year where the BTC volume has skyrocketed all the preceding years determining a positive increasing trend of consumers using bitcoins and digital currency as an alternative for fiat currency by more and more people. Affirming from the findings of Hileman and Rauchs (2017), perhaps it is the case that the cryptocurrency market capitalization has increased thrice since 2016, reaching the point of \$25 billion by 2017. It shows that as time goes by the use of digital currency is becoming common and popular as people realize its cost-effectiveness, efficiency and the fact that it is subjected to less volatility as compared to the local currency,

Other than that, the correlation and regression tests found an insignificant yet negative relationship of BTC Volume on commercial banks' liquid reserve; thus, reject the alternate hypotheses formulated by the study (the null hypothesis retains). The negative impact shown in regression analysis is consistent with the existing theory and literature showing that the more people start trading in virtual currency, the less they will be willing to use banks for depository cash accounts; therefore, the performance in terms of liquidity of commercial banks is said to be negatively affected. However, the negative effect is considered to be insignificant since the volume of digital currency is not large enough to influence the banking industry yet. Many researchers think it will not sustain long. Further, only a few numbers of banks are finally introducing blockchain systems and digital cash by partnering with similar technology which is used for cryptocurrencies. It implies that the use of digital currency has not influenced the liquidity performance of the commercial banks around the world.

5.3. Limitations and Future Research

Although the results of the current study can be implied within the aggregate view of where the economy is headed towards, and whether the future of financial institutions (i.e., banks), with regards to the introduction of digital currency, is bright or not the results do not depict a complete picture of current years. Moreover,

the results of the research imply that commercial banks must not take digital currency as a threat to their financial or nonfinancial performance. Rather work on trying to partner with the latest technology used in the development of virtual currency to be more efficient. Thus, the results can further be used to lift bans and legalize the transactions involving digital currencies in a number of economies where people belonging to rural areas might find this technology cost-effective.

Since the publicly available data was limited after the year 2017, the study was unable to incorporate and discuss the current dynamics of the bitcoin volume, its usage and its direct or indirect impact on the economy and the commercial banking performance. It is referred to as one of the limitations of the current research. Besides the unavailability of current data, it is also important to note that the current research only took banks' liquid reserves as a percentage of its total assets as a proxy to measure commercial banking performance. It is not necessarily the case that the commercial banks' liquidity is always affected by BTC Volume, as discussed by Bhati, Zoysa and Jitaree (2019); there are several other factors which can potentially impact the liquid reserves of a bank. These factors include return on equity, equity over total assets (i.e., known as bank-specific variables); Lending rates of banks, consumer price index, Foreign exchange reserve (i.e., known as macroeconomic factors), and other regulatory factors which might be established by the government and restrict banks to increase their liquidity reserve. Subsequently, BTC Volume is not the only factor which can impact the liquidity of commercial performance, and therefore, the results of the regression model determined an insignificant impact.

Although using a quantitative methodology and the variables of economic activity, banking performance and Bitcoin traded volume, resulted in empirical evidence and findings which can be valuable to future practitioners, economists and regulatory authorities, however, the future studies in the similar domain can create more effective results by taking into account current data of the variables used. Further future researchers are recommended to consider different variables to determine the relationship between the use of digital currency and commercial banking performance.

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