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(NB! Bruk rødt skjema ved konfidensiell oppgave)

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ENGELSK TITTEL:

**Digitalisering of the paper money.**

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## **FOREWORD**

This paper is written as a final part of a three-year bachelor's degree in economics and administration at the Business School at the University of Stavanger. The work amounts to 20 point in the last spring semester and it is within the main theme of macroeconomics. The choice fell on macroeconomics because we are in a time that we witness a great financial crisis and to solve this financial problem we must use a new and better tool than we do today.

The purpose of this paper is to investigate how the newly digital money innovation like CBDC or BTC will improve our current economy and whether the new central digital money will have better impact on Monetary policy than fiat money.

When choosing a problem for the thesis, I emphasized finding the relevant topic I wanted to learn more about. Immersing myself in this issue has been instructive and challenging.

I thank my supervisor, Christian Jensen for the good advice and guidance during the process. In addition, I would like to thank all those who contributed to the challenging semester. Based on this, I am very pleased to be able to present my final bachelor theses.

### **Abstract.**

There have been a never end discussing about the possibility of a cashless society, a concept that arose the global popularization of digital financial services and the development of the technologies with the potential for an application in the financial markets. The Central bank- backed digital currencies, such as the potential digital Euro and digital Yuan, may become a reality in the coming years. Unlike cryptocurrencies such as Bitcoin and Ethereum, these currencies promise less volatility and greater security. In addition, they will have the support of their respective monetary institutions, responsible for ensuring financial stability.

Through a systematic literature review, this thesis attempts to synthesize the information obtained into an overview of the current state of CBDC research. Therefore, an optimal strategy proved to be a comprehensive literature search to increase the likelihood that all relevant resources were considered. The selection of sources also went through a systematic process to ensure the validity and reliability of the selected literature.

The literature highlights the overall impact CBDC and cryptocurrencies has to our current economic system. My research on monetary policy suggest a CBDC would be useful at mitigating the Zero-lower bound (ZLB), but the actual effect of moving ZLB is unclear. Through a CBDC, an alternative to quantitative easing (QE) is possible, called helicopter money. Although a CBDC increase the eases of transferring funds into a risk-free asset, the finding does not indicate a risk of banks runs, if necessary, measures are in place. Finally, the payment system can benefit from a CBDC, especially one based on blockchain technology, from lower settlement times and cost, with the added benefits of the security it offers. Meanwhile, the possibility of BTC to become global currency will remained out of reach because of its supply limit and because of its not recognized yet from the global governments.

### **Introduction**

In this paper I will address the digitalization of paper money and I will investigate if it's the time to develop the current system of paper money into digital cashless system. Digital money itself is not new. Commercial bank money has been digital for decades, and we already use digital means of payment daily. Central banks already provide wholesale digital money to banks. In 2020, we have witnessed a rise of digital payment over the cash payment because of the Covid-19 pandemic.

In this theme, I would like to mention some of the digital currencies including bitcoin and central bank digital or CBDCs that have been in the news lately. If we need digital currencies of these new kinds,

who should issue them, and how should be designed? what are the implications of the digital currencies for the monetary system? These are weighty issues that much on the minds of central bankers, scholars, and the public.

### **Summary**

The purpose of this paper has been to investigate whether the creating of new digital currency like Central digital currency (CBDC) or crypto currency like Bitcoin (BTC) can be effective instrument in order to deal with the current economic crisis caused by the Coronavirus pandemic. To answer this problem, I will examine relevant literature, research, and statistics related to this topic.

In the theory chapter, I take key definitions and theoretical aspects that are important for presenting a result and conclusion. This involves theory directly related to the problem, as well as other theoretical areas as several aspects must be elucidated.

In this paper I have choice to use literature study as a method, where the information is taken from existing literature and research. The choice of method is justified based on the circumstance surrounding the paper, in strong connection with the problem statement. The finding in the paper are based on secondary date from Bank of International Settlement (BIS), articles from famous economic newspapers like Forbes, Bloomberg, Wall Street Journal and organization like IMF and many others.

In the last part of my paper I will Introduces the concept of CBDC and BTC, how it relates to money and its functions. It gives a presentation of different types of monies that exist within the economy and highlights three functions, as well as their possible implementation.

### **BACKGROUND AND MOTIVATION**

It is clear for the most of us that we are in the middle of a technological revolution. A combination of new digital technologies and greater online activity allows huge volumes of data to be collected, managed, and telecommunicated. This has dramatically lowered the cost of many task. It has resulted a growth of powerful, hyper-scalable applications that have disrupted entire industry-every ting form print media to financial sector. New players entered the digital economy to make it even faster and easy to use these services. Although, the transformation of such digital money technology and communication have been under way for many decades, the past decade has ushered in truly far-reaching changes. The Covid-19 pandemic may have further accelerated the pace of digital change.

The technological revolution has reached to the financial system- and even help the design of money itself. Just to name one example, on primary foreign exchange (forex) venues, market-makers can now access real-time price at five-millisecond time intervals. Project RIO, a new application for monitoring fast-paced markets developed at BIS innovation Hub, allows the entire market order book to be monitored every 100 millisecond, or 36,000 time every hour. Perhaps it so surprise that we have seen a burst of digital innovation in payment, including new digital payment offering by fintech startups, big techs and incumbents. (Wehrli, 2021). Many payment innovations build on improvement to underlying infrastructure that have been many years in the making. For instance, harnessing technological progress, central banks around the world have instituted real-time gross settlement called ( RTGS) systems over the past decades. For the moment, operating hours of these systems have continued to lengthen around the globe, and in several countries are already operating almost 24/7 (Wehrli, 2021).

In 2008, the Satoshi Nakamoto published a paper called “Bitcoin: A peer-to-peer Electronic Cash System. “As the financial crisis raging, the paper proposed a new decentralized system aiming at replacing at third parties involved in transaction. The lack of confidence in the current system motivated this response. Trusting in a completely decentralized and open peer-to-peer network might have time,

but as the public started to acknowledge the technology, popularity surged, and the Bitcoin price peaked at \$58 000 today, 3. May. 2021 (CoinDesk, 2021) Through the rise of Bitcoin, other developers have recognized the potential in this new technology and decided to launch their version of this new technology called blockchain.

The motivations behind a CBDC are not solely the new cryptocurrencies. But a long planning from the several Central banks including USA, CHINE AND EUROAN Central bank. Several advanced economies have experienced a decline in cash usage, and a CBDC might be an available alternative for keeping fiat currency relevant in cashless society. As several of these economies have experienced stagnation in growth, and central banks interest rate approach zero or even negative values, the effectiveness of policy interest rate is decreasing due to the Zero Lower Bound (ZLB). Quantitative Easing (QE) can stimulate the economy when the interest rate is at the ZLB, but there is skepticism surrounding this policy. A CBDC could also open the possibility of new monetary tools, which the current system does not support. Finally, I will try to find out how these innovations of digital currency will relate to our current economic system.

## OUTLINE

### Outline and Delimitation of the paper.

**Chapter 1** contains a presentation of the background, research question, and outline and delimitation of the thesis. **Chapter 2** includes the essential theory of money supply, blockchain technology, central banks and its functions and role, for our current economic system. To be able to examine the potential impacts of a CBDC and BTC, it is necessary to understand how blockchains differ from existing technology. On top of this, one must understand the tools at central banks disposal and how the policy interest rate affects commercial banks and the money supply within a country.

**Chapter 3** includes the presentation of some data I found in my thesis to answer my research question. **Chapter 4** includes the methodological approach used in this thesis, the reason a literature review fits the research question, and strengths and weaknesses of this method. This chapter also describes the search terms used to find relevant literature and evolution of the chosen resources. **Chapter 5** is the discussion of the concept CBDC AND BTC, and how it relates to money and its functions. It gives a presentation of different types of monies that exist within the economy and highlights its three functions.

There is limitation in this thesis, as we know the topic of cryptocurrency or digital money is complex and there is a lot of uncertainty surrounding the research question let alone the amount of cryptocurrency that have been created lately and the uncertainty future surrounded to this new digital currencies. I decided to focus the little time I have, to compare the central digital currency CBDC to Bitcoin BTC and how those two are related to money and its functions.

## Theory chapter

### Money supply.

Money can be described as a generally accepted medium of exchange for goods and services. Virtually anything can be considered money, as long as it performs the three major functions of money, namely as a medium of exchange, store of value and unit of account. In the developed world there are two traditional forms of money, fiat money and commercial bank money. Fiat money, in the form of notes and coins, gets its value because the government declares fiat money to be legal tender, which requires all people and firms within the country to accept it as a means of settling debt. By definition, fiat money has an intrinsic value, which is significantly lower than its face value. Its value is derived through supply and demand forces. This is the form of currency with which we are most

familiar. An additional form of money is commercial bank money which can be described as claims against financial institutions that can be used to purchase goods or services. It represents the portion of a currency that is made of debt generated by commercial banks. Commercial bank money is created through fractional reserve banking. Fractional reserve banking is a banking system in which banks only hold a fraction of the money their customers deposit as reserves. This allows them to use the rest of it to make loans and thereby essentially create new money. Commercial banks and other selected financial institutions hold these balances (electronic commercial bank deposits) at the central bank (CB) to facilitate electronic settlement in real Time Gross Settlement (RTGS) systems. This is a form of electronic CB money. (Rochemont, 2019)

### **Monetary policy**

Central banks affect economic growth by controlling the liquidity in the financial system. They have three monetary policy tools to achieve this goal.

First, they set a reserve requirement. It's the amount of cash that member banks must have on hand each night. The central bank uses it to control how much banks can lend.

Secondly, they use open market operations to buy and sell securities from member banks. It changes the amount of cash on hand without changing the reserve requirement. They had used this tool during the 2008 financial crisis like QE, lowering interest rate and increase money supply. Banks bought government bonds mortgage-backed securities to stabilize the banking system. The federal reserve added \$4 trillion to its balance sheet with quantitative easing. It began reducing this stockpile in October 2017.

Thirdly, they set targets on interest rates regular banks charge each other. That guides rates for loans, mortgages, and bonds. Rising interest rate slows growth, preventing inflation. That's known as contractionary monetary policy. Lowering rates stimulates growth, preventing or shortening a recession. That's called expansionary monetary policy. The European Central bank lowered rates so far till they become negative in order to encourage borrowing and the lender would actually pay the borrower. (Amadeo, 2020)

### **Financial services.**

Central banks serve as the bank for private banks and the nation's government. They process checks and lend money to their members. Central banks store currency in their foreign currency, usually the dollar or euro, to keep their own currency in alignment. Central banks also regulate exchange rates to control inflation. They buy and sell large quantities of foreign currency to affect supply and demand. (Amadeo, 2020)

### **Financial crisis**

The central bank also has a unique role in case of a financial crisis. Multiple tools can be useful in stopping a bank run and avoiding a financial crash. A bank run occurs when the liquidity of banks becomes constrained and the public attempts to withdraw their deposits, leading to solvency issues.

### **Inflation**

Inflation is the decline of purchasing power of given currency over time. A quantitative estimate of the rate at which the decline in purchasing power occurs can be reflected in the increase of an average price level of a basket of selected goods and services in an economy over some period of time. The rise in general level of prices, often expressed as percentage, means that a unit of currency effectively buys less than it did in prior periods.

### **Deflation**

Deflation is general decline in prices for goods and services, typically associated with a contraction in the supply of money and credit in economy. during deflation, the purchasing power of currency rises over time.

### **Interest Rate**

The interest rate is the amount a lender charges for the use of assets as a percentage of the principal. The interest rate is typically noted on an annual basis known as the annual percentage rate (APR). The assets borrowed could include cash, consumer goods, or large assets such as a vehicle or building.

### **Blockchain technology**

Blockchain technology is most simply defined as decentralized, distributed ledger that records the provenance of digital asset. By the inherent design, the date on a blockchain is unable to be modified, which makes it a legitimate disruptor for industries like payments, cybersecurity and healthcare. The ledger in a blockchain network contains every transaction done since the inception of the blockchain. Using consensus protocol and robust cryptography, there is no need for a central authority, and every node in the network always has its copy of the updated ledger.

### **Decentralized network**

Blockchain operates on a decentralized network, that is acting on peer-to-peer basic. It handles all operations similar to bank, but without any central authority that monitors all data. So, it can potentially cut`s out the middleman, giving back the power to the owner of the assets (i.e. Data or tokens carrying some financial value). All information is stored across its network via block. These blocks, that are time-stamped and linked together with all past and current transaction, are permanently recorded and consistently reconciled an updated in a cryptographically secure way. By storing data across its network, blockchain eliminates the risks that come with data being held centrally.

### **Distributed ledger**

A second property of blockchain is the distributed ledger, that allows of a ledger of activity – such as arbitrary data or virtually anything of value between multiple parties. What makes blockchain so important is its ability to automate trust and transparency among all parties using it. Because the ledger is distributed among all transaction participants, it exists simultaneously in multiple places. Each of the computers in distributed network maintains a copy of the ledger to ensure transparency and to prevent a single point of failure and all copies are updated and validated simultaneously. This makes it extremely difficult to manipulate entries or tamper with the data without the other parties noticing.

### **Immutable records**

A third unique property is its immutability. By design, blockchains are inherently resistant to modification of data. All blockchain networks adhere to a certain protocol for validating new blocks. No changes can be made once the system is set with the initial standards. Once recorded, the data in the consensus of the network majority. (Meijer, 2019)

### **What drives the transition towards a Cashless society?**

There is a complex range of factors driving the transition to a cashless or “less cash” society in countries around the world. Regional analysis exposes key differences in the drivers for a cashless society. In western countries, convenience appears to be the main force driving a natural evolution towards cashless system, supported by lower transaction cost that make contactless payments more competitive than cash transactions. There seems to be general political interest in removing cash altogether denomination notes in the fight against money laundering, terrorism, tax evasion and



corruption. The transition also appears to be happening by stealth, without active government intervention in satisfactory transition management.

Meanwhile, Africa has become a mobile payments innovation powerhouse, out of a necessity to equip the unbanked with access to a payment infrastructure. In Asia's, India's latest demonetization exercise was aimed at restructuring the economy for a sustainable future, seeking to reduce corruption and improve tax collection. In China and elsewhere in Asia, the digital economy and associated investments in infrastructure and payment systems, designed with financial inclusion in mind, drive cashless transactions. Innovations in Africa Asia are now being exported to the world. mobile payment has been quickly evolving, with more recognizable brands stepping into the industry to advance technology and offer what consumers and businesses wants in terms of apps and services that allow to with their phones. If Africa has become a mobile payments innovation powerhouse, out of a necessity many developed countries like Norway choose this payment system to reduce the cash usage among its citizens to become a cashless society. (Rochemont, 2019)

### **The rise of digital financial services.**

It is understandable for most of us, that money as quantifiable value that can stores and the one expects to be traded for and another asset in short or long run. In our minds, money usually takes the form of sovereign currencies, which are associated with physical money, that be a banknotes and cash. Moreover, digital financial services have brought financial services bank branches to our homes and pockets. Tanks to the information and communications technology called (ICT) that have revolutionized money and make it conveniently be transferred from a bank account to individual from a mobile device. Money transfers even cross-border, bill payments and loan request have all become easily available through technology, bolstering the nation that money will soon go digital and paper money will become defunct. In addition, the concept of digital money currently presented as disruptive is neither new nor recent. Digital innovation in financial services have been discussed for at least the two last decades. In the late 1990, it was already suggested that electronic cash cards eventually displace cash (J, 1998). by the that time, both consumers and the industry were enthusiastic about the potential adoption of payment cards, but the economic rationale for the adoption of e-money remained unclear (Santomero, 1996). Despite their substantial potential benefits, new technologies in the payment markets have typically only been adopted after considerable delay (Berger, 1996).

### **Central bank functions and role for our current economic system.**

A central bank is an independent national authority that conduct monetary policy, regulates banks, and provides financial services including economic research. Its goals are to stabilize the nation's currency, keep unemployment low, and prevent inflation. (Amadeo, 2020)

### **What is central bank digital currencies?**

CBDS is central bank-issued digital money denominated in the national unit of account, and it represent a liability of the central bank. If the CBDC is intended to be digital equivalent of cash for use by end users (households and businesses), it is referred as to as a "general purpose" or "retail" CBDC. As such, it offers a new option to the public for holding money. CBCD is also different from existing forms of cashless payment instruments for consumers such as credit transfers, direct debits, card payment and e-money, as it represents as direct claim on a central bank, rather than a liability of a private financial institution. This type of riskless claim also makes CBDC different from cryptocurrencies (such as Bitcoin). In contrast to retail CBDC "wholesale" CBDC targets a different group of eligible users. It is designed for restricted access by financial institutions and is similar to today's central bank reserve and settlement account. Accordingly, it is intended for the settlement of large interbank payments or to provide central bank money to settle transactions of digital tokenized financial assets in new infrastructures (Wehrli, 2021)

### How central digital currencies (CBDC) works.

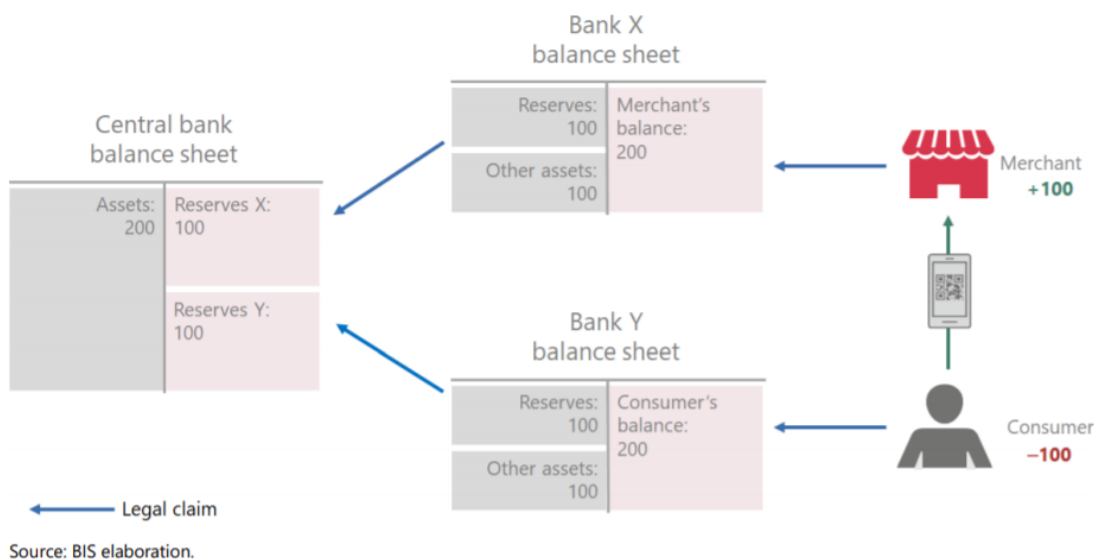
As we know today, central banks issue two types of money and provide to support a third. Physical cash and electronic central bank deposits, also known as reserves or settlement balances, are issued. Physical cash is widely accessible and peer-to-peer. In contrast, central bank reserves are electronic and typically only accessible to qualifying financial institutions. The third type of money is private money, principally available through widely accessible and electronic commercial bank deposits. Central banks support commercial bank money in various ways, by:

- I. Allowing commercial banks to settle interbank payments using central bank money.
- II. Enabling convertibility between commercial and central bank money through banknote provision,
- III. By offering contingent liquidity through the lender of last resort function. Importantly, while cash and reserves are a liability of the central bank, commercial bank deposits are not. So, CBDC would be a new type of central bank money.

A general purpose of CBDC would require an underlying system to provide and distribute it conveniently to public. This system would comprise the central bank, operator's, participating payment service providers and banks. A wider ecosystem supporting the system could then include date service providers, companies providing and maintaining applications and providers of point of sale devices to initiate and accept payments.

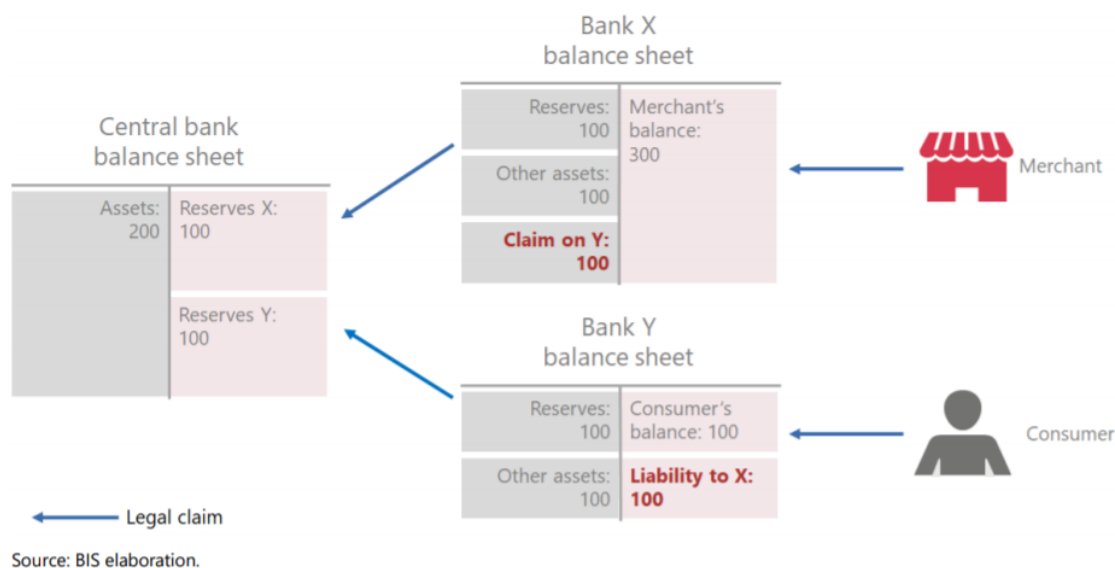
To see what it would mean for consumers and merchants, take the example of a shopper buying \$100 worth of groceries. Compare a retail CBDC payment with a typical transaction today, execute through a fast-payment system (FPS) with net settlement in the central bank's balance sheet. The customer's payment provides final funds to the merchant immediately and any time. Our consumer pays \$100 and it arrives in real time in the shop's account.

**Figure1; Retail payment is executed in real time**



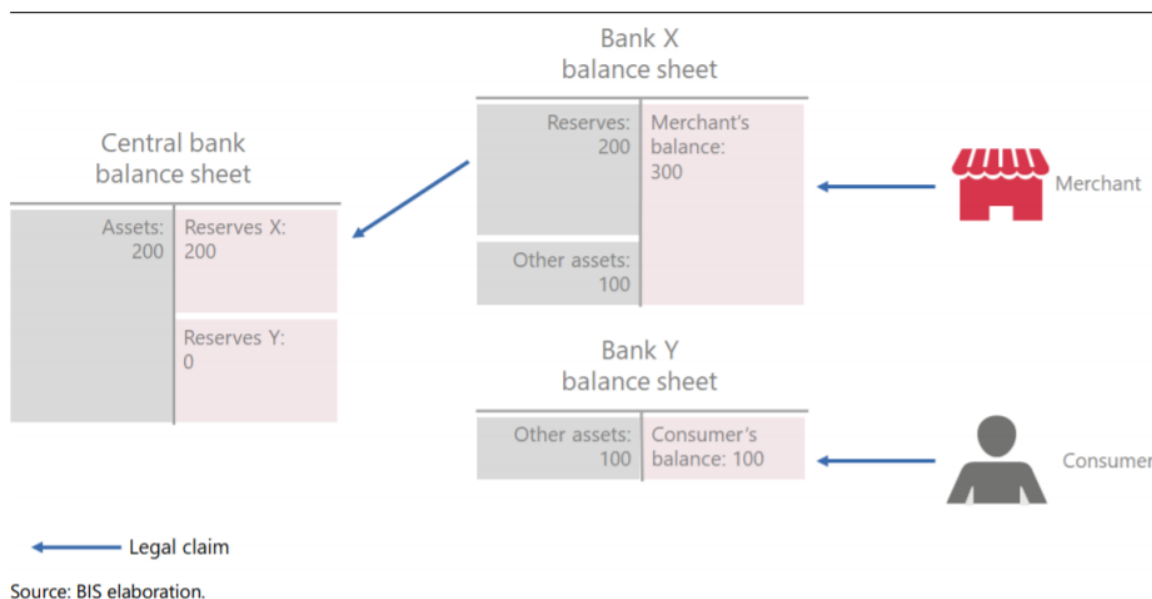
However, settlement between banks on the central bank balance sheet is typically not instantaneous for technological and operational reasons, even though the transaction between merchant and consumer is cleared instantly. This implies a loan: the merchant's bank credits its account in real time, while the merchant's bank has an account payable vis-à-vis the consumer's bank.

**Figure 2; Credit risk for payee's PSP result.**



In an FPS with deferred settlement, credit exposures between banks accumulate during the delay, but exposures are fully collateralized—and institutional safeguard designed or required by the central bank.

Figure 3; Until central bank accounts are settled



Only once the net of all retail fund transfers is settled on the central bank books are claims extinguished. There is no further credit or liquidity risk. (Carstens, 2021)

**Benefits and impacts of central digital currencies (CBDC).**

Digital fiat currency is currently being studied and tested by government and central banks in order to realize the many positive implications it contributes to financial inclusion, economic growth, technology innovation and increased transaction.

- **Technological efficiency:** instead of relying on intermediaries such as banks and clearing house, money transfers and payments could be made in real time, directly from the payer to the payee.
- **Financial inclusion:** safe money accounts at the central banks could constitute a strong instrument of financial inclusion, allowing any legal resident or citizen to be provided with a free or low-cost basic bank account.
- **Preventing illicit activity:** ACBDC makes it feasible for a central bank to keep track of the exact location of every unit of the currency (assuming the more probable centralized, database form), tracking can be extended to cash by requiring that banknote serial numbers used in each transaction be reported to the central bank. This tracking has a couple of major advantage.
  - **Tax collection:** it makes tax avoidance and tax evasion much more difficult, since it would become impossible to use methods such as offshore banking and unreported employment to hide financial activity from the central bank or government.
  - **Combating crime:** it makes it much easier to spot criminal activity (by observing financial activity), and thus put an end to it. Furthermore, in cases where criminal activity has already occurred, tracking makes it much harder to successfully launder money, and It would often be straightforward to instantly reverse a transaction and return money to the victim of the crime.
- **Protection of money as a public utility:** digital currencies issued by central banks would provide a modern alternative to physical cash— whose abolition is currently being envisaged.
- **Safety of payments systems:** A secure and standard interoperable digital payment instrument issued and governed by a central bank and used the national digital payment instrument boost confidence in privately controlled money systems and increases trust in the entire national payment system, while also boosting competition in payment systems.
- **Banking competition:** the provision of free bank account at the central bank offering complete safety of money deposits could strengthen competition between banks to attract bank deposits, for example by offering once again remunerated sight deposits.
- **Monetary policy transmission:** the issuance of bank base money through transfers to the public could constitute a new channel for monetary policy transmission (helicopter money), which would allow more direct control of the money supply than indirect tools such as quantitative easing and interest rate, and possibly lead the way toward a full reserve banking system.
- **Financial safety:** CBDC would limit the practice of fractional reserve banking and potentially render deposit guarantee schemes less needed.

### **Risks of the (CBDC).**

There is a general concern that CBDC will affect and be the cause of precipitate potential bank runs if the central bank itself take the banks role and thus make bank`s funding position weaker. However, the bank of England has claimed that if the introduction of CBDC follows a set of core principles the risk of a system-wide run from bank deposits to CBDC is addressed.

Since most CBCDs are centralized, rather than decentralized like most cryptocurrencies, the controllers of the issuance of Central bank Digital Currency can add or remove money anyone`s

account with a flip of a switch. In contrast, cryptocurrencies such as Bitcoins prevent this unless a group of users controlling more than 50% of mining power is in agreement. (Wikipedia)

### **Cryptocurrency.**

Cryptocurrency is digital money. That means there is no physical or bill, it's all online. You can transfer cryptocurrency to someone online without a go-between, like a bank. Bitcoin and Ether are well-known cryptocurrencies, but new cryptocurrencies continue to be created.

People might use cryptocurrencies for quick payment and avoid transaction fees. Some might get cryptocurrencies as an investment, hoping the value goes. You can buy cryptocurrency with a credit card or, in some cases, get it through a process called "mining". Cryptocurrency is stored in a digital wallet, either online, on your computer, or on other hardware. (Consumer Information, 2018)

### **How bitcoin works.**

Bitcoin is a digital currency that is created and held electronically. These bitcoins are sent and received using a mobile app, computer software, or service provider that provides a bitcoin wallet. The wallet generates an address, akin to bank account number, except that a Bitcoin address is unique alphanumeric sequence of characters where the user can start to receive payments. Usually, bitcoins may be obtained by buying them at a bitcoin exchange or vending machine or as payment for goods and services. However, Bitcoin is revolutionary because the double-spending problem can be solved without needing a third party. In computer science, the double-spending problem refers to the problem that digital money could be easily spent more than once. Consider the situation where digital money is merely a computer file, just like a digital document.

Alice could send \$10 to Bob by sending a money file to him and can easily do so by e-mail. However, remember that sending a file means, it sends a copy of the file and does not delete the original file from the computer. When Alice attaches a money file in an e-mail to Bob, she still retains a copy of the money file even after she has sent and therefore spent it. Without a trusted third-party intermediary to ensure otherwise, Alice could easily send the same \$10 to another person, Charlie. Bitcoin solves the double-spending problem by maintaining a ledger of balances, but instead of relying on a single trusted third party to manage this ledger, Bitcoin introduced this responsibility to the entire network. Behind the scenes, the Bitcoin network constantly keeps track of bitcoin balances in a public ledger called the blockchain. The blockchain is a publicly accessible authoritative record of all transactions ever processed, allowing anyone to use Bitcoin software to verify the validity of a transaction. Transfers of bitcoins, or transactions, are broadcast to the entire network and are included onto the blockchain upon successful verification, so that spent bitcoins cannot be sent again. New transactions are checked against the blockchain to make sure that the bitcoins have not been already spent, thus solving the double-spending problem. (Chuen, 2015)

```

{
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0c1d",
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        },
        "scriptSig": "3046022100bb1ad26df930a51cce110cf44f7a48c3c561fd977500b
1ae5d6b6fd13d0b3f4a022100c5b42951acedff14abba2736fd574bdb465f3e6f8da
12e2c5303954aca7f78f301
04a7135bfe824c97ecc01ec7d7e336185c81e2aa2c41ab175407c09484ce9694b449
53fcb751206564a9c24dd094d42fdbfdd5aad3e063ce6af4cfaaea4ea14fbb"
      },
      "out": [
        {
          "value": "0.01000000",
          "scriptPubKey": "OP_DUP                                OP_HASH160
39aa3d569e06a1d7926dc4be1193c99bf2eb9ee0 OP_EQUALVERIFY OP_CHECKSIG"
        }
      ]
    }
  ]
}

```

Figure 4; Example of a raw transaction data. (Chuen, 2015)

<b>General information about this transaction</b>		
Hash	e9a66845e05d5abc0ad04ec80f774a7e585c6e8db975962d069a522137b80c1d	The hash for this transaction
Block	100000 (2010-12-29 11:57:43)	Obtained from examining the block on the blockchain where this transaction was found
Version	1	Bitcoin software version
Size	225	The filesize in bytes of the transaction is recorded in the transaction data itself
<b>Input from</b>		
Previous output	f4515fed3dc4a19b90a317b9840c243bac26114cf637522373a7d486b372600b	The truncated hash of the previous transaction which provides the bitcoins to be sent for this transaction
Previous amount	0.01	The amount in the previous transaction which provides the bitcoins to be sent for this transaction
Public address	1JxDJCyWNakZ5kECKdCU9Zka6mh34mZ7B2	The public address of the sender, obtained from examining the blockchain
Signature	3046022100bb1ad26df930a51cce110cf44f7a48c3c561fd977500b1ae5d6b6fd13d0b3f4a022100c5b42951acedff14abba2736fd574bdb465f3e6f8da12e2c5303954aca7f78f30104a7135bfe824c97ecc01ec7d7e336185c81e2aa2c41ab175407c09484ce9694b44953fcb751206564a9c24dd094d42fdbfdd5aad3e063ce6af4cfaaea4ea14fbb	The digital signature of the transaction, signed by the sender
<b>Output to</b>		
Index	0	"0" indicates the first recipient in the transaction; here this transaction only has one recipient
Amount	0.01	Amount sent to this user in this transaction
Public address	16FuTPaeRSPVxxCnwQmdyx2PQWxX6HWzhQ	The public address of the recipient, obtained from the scriptPubKey
Bitcoin address (scriptPubKey)	39aa3d569e06a1d7926dc4be1193c99bf2eb9ee0	A hash160 of the public address
Conditions	OP_DUP OP_HASH160 OP_EQUALVERIFY OP_CHECKSIG	Conditions to be met together with the scriptPubKey for the output bitcoins to be redeemed by the recipient

Figure5: Explanation for the transaction. (Chuen, 2015)

## THE RESEARCH QUESTIONS

Based on this strain time we are now both for people and for the economy, I will try to find out the future of money and whether the coronavirus pandemic that hit the world in 2019 and the social distances that were followed, speeded up the digitalization process of paper money.

My research question`s

if the world would use digital currencies, which one is more suited to our current economic system, and how the invention of digital currencies like central digital currency CBDC OR Bitcoin will improve our current economy to growth.

## DATA COLLECTION

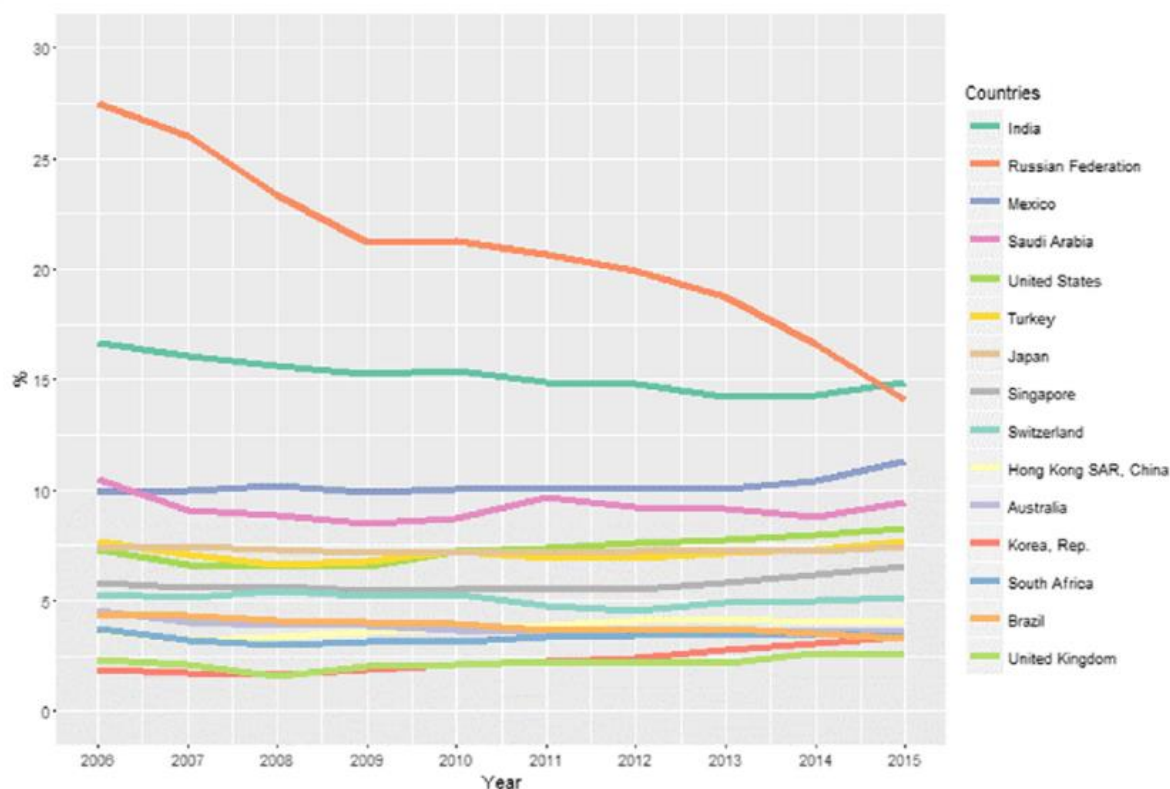
I have collected my data trough from different sources such as well-knowing economic newspapers such as Forbes, Wall Street Journal, and different organizations such as the International Monetary Fund (IMF) or the Bank for International Settlement (BIS). Based on this, I had gathered information I think was relevant to thesis. Firstly, I will present my finding and later I will discuss some of them to draw full picture of it.

### **Is money going digital? An alternative perspective on the current hype.**

In this article “Is money going digital. An alternative perspective on the current hype” writing by “Daniel Gersten Reiss” describe how the form of many was changing over the time. Even though cash is high-turnover commodity commonly used by people for retail payments, most money is stored in digital form. Figure 6 display the series ratio of cash in circulation outside banks to broad money for selected countries from 2006 to 2015. cash in circulation can defined as the money in people’s hand that is used for trade or saving. When individuals stored their cash in banks, it transformed, on their view, into a digital form.

### **Figure 6: Ratio of cash in circulation outside banks to broad money**





[Ratio of cash in circulation outside banks to broad money \(M4\), 2006–15%, BIS Red Book countries with available data. CPMI \(2016\), CPSS \(2012\), IMF \(2015\). Annual data refers to the position on the year's last business day](#)

This 2015 Figures show that India and Russia were the countries with the largest ratio of cash in circulation outside banks to broad money, at 15%. Russia demonstrated a sharp reduction in its ratio, of almost 30% in 2006, whereas India showed a slightly downward trend. All other countries fell below the 10% ration, with ratio below 5% in the United Kingdom, Brazil, South Africa, and Korea.

In other word, roughly just 10 of the global money supplies is still not digital. Some reasons people continue to hold cash are its potential use as a medium of exchange when no other electronic payment methods are accepted by the counterpart agent. (Reiss, 2018)

### **The government and financial institution want a regulated central digital currency.**

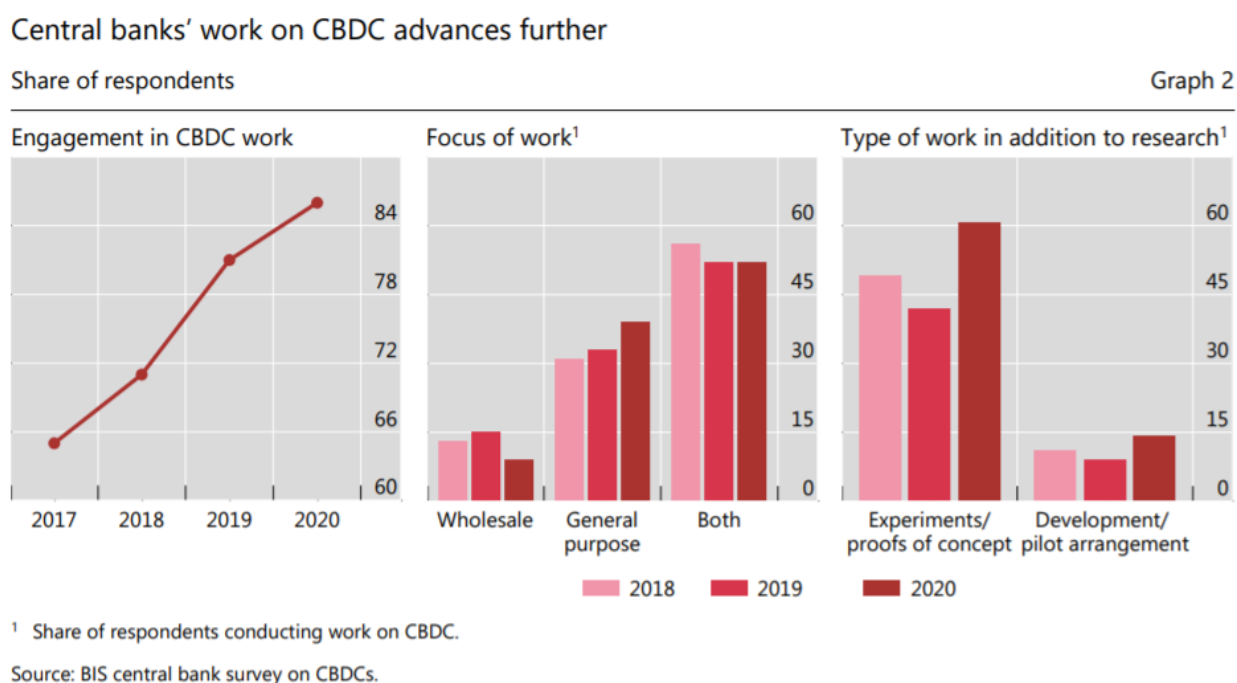
According to survey done by the Bank for International Settlements 2021, they were an increase grew over last four years about share of central banks actively engaging in some form of the CBDC work. The survey shows grew by about one third and now stands at 86% (Graph 7, left- hand panel.).

In addition, the survey data shows that work related to retail CBDCs is gaining in relative popularity, with more central banks either looking at both wholesale retail and narrowing their scope of work down to retail only (central panel).

The survey has also found out that, the central banks are not currently involved in any CBDC are primarily in smaller jurisdictions. This finding is consistent with the results of the previous two survey. It continues that the research also suggest that CBDCs are more likely to be under research and development in jurisdiction with high mobile phone use, innovation capacity 11 and internet search interest for CBDCs, albeit with some differences across retail and wholesale CBDCs (Auer et al (2020d).

The research of the survey has also shown that more central banks are moving into more advanced stages of CBDC engagement, progressing from conceptual research to experimentation. About 60% of the central banks (up from 42% in 2019) are conducting experiment or proofs-of-concept, while 14% are moving forward to development and pilot arrangement (Graph 8, righthand panel). (Wehrli, 2021)

FIGURE 7: central bank`s work on CBDC advances further



(Wehrli, 2021)

### The coming currency war: digital money controlled by the central governments or decentralized cryptocurrencies

This article, from Wall Street Journal mention how Central banks are getting closer to issuing their own digital currency. The article also raises the possibility of the dollar might finally face real competition as the world's dominant currency. Central banks such as the Federal Reserve in essence already issue digital money, via the commercially to households that have accounts with them. Commercial banks then send money electronically to households and businesses and enable customers to make and receive payments digitally without exchanging cash. But a central-bank digital currency would be leap beyond that. Instead of working only trough commercial banks, central banks might issue digital currency directly to the public that could be used as legal tender in the same way cash is today.

#### Deutsche Bank: Central bank digital currency will replace cash in long term.

The Deutsche Bank Research has published in November 2020, a new report on economic estimations and proposals to assist global economies hit by the coronavirus pandemic. Titled "what we must do to Rebuild". They concluded that central bank digital currencies will replace cash in long term. This is what they have concluded in their report **"Worldwide lockdowns and social distancing measures have only increased the use of cards over cash. To respond, companies and policymakers must design alternative to credit cards and remove middleman fees. [...] For now, the priority must be on regional digital payment systems. In the long term, central bank digital currencies will replace cash."** (PARTZ, 2020) Deutsche Bank warned also in their report to the European policymakers about the risk of not developing their own digital currency project in response to China

and Sweden's active progress in the field. The Bank argue that lagging behind other jurisdictions might force the adaptation of policies by the first movers.

### **Chine officially backs A cryptocurrency and establishes it as their official Coin**

According to this article from Forbes, Chine has officially backed a cryptocurrency and establishes it as their official Coin. The article starts with "It's finally happened. A major worldwide government has just bestowed a huge vote of confidence and legitimacy onto the world of cryptocurrencies. China, in an unprecedented move, just announced that they are officially adopting a certain cryptocurrency as China's official coin"

The government of chine just informed that they have chosen a preferred firm for the purchase and marketing of their new coin-YuanPay Group. The sales of chine`s coin officially started April 8 of 2021 September 2 of 2020 and currently these coins can be bought only from YuanPay Group. (Haixiong, 2021)

### **Bitcoin as a possible solution**

Since arrival of bitcoin in 2009, cryptocurrencies have become increasingly popular, promising a fast, secure, low cost international payment solution. in addition, cryptocurrencies Is more focusing when dealing with businesses in developing countries, whose currencies may be unstable or otherwise difficult to work with. While the promise of improvement remains present, Bitcoin har not yet get the global recognition specially the government and its financial sector. This hindering the Bitcoin to become more widespread, businesses may need to start re-thinking the way the manage their cash flow to keep up with the ever-changing landscape.

### **The advantages of Bitcoin over existing currencies.**

According to Bitcoin supporters, Bitcoin has two advantages over existing currencies. The first one is that its supply limited, making it impossible for central authority to issue it in quantities that would devalue it. This means it is much less vulnerable to hyperinflation crises, such as those seen in Weimar Germany, Zimbabwe, or Venezuela. But a limited supply can also be a weakness, as it makes it impossible to control deflation—a circumstance that can also lead to very severe economic consequences (Filardo, 2005).

The second claimed advantage of bitcoin is that all transaction is permanent and immutable. When money is held in a bank account, that bank could theoretically expropriate the money from its user and claim that never existed. With Bitcoin, this is impossible, because the database on which transactions are recorded cannot be edited by any central authority, in other ward this could make it very difficult to manipulate it. Bitcoin is thus often described as "trustless" because it does not require its holder to trust a financial institution not to expropriate it. (Quinn, 2021)

### **The disadvantages of Bitcoin compared with existing currencies.**

In economic theory, money is said to have tree primary function: a medium of exchange, a store of value and a unit of account. So how does Bitcoin fulfill these roles.

Bitcoin is an excellent medium of exchange for transactions that require anonymity. But using it for other transaction is often prohibitively expensive. During 2020, the average cost of fee for transaction was about (28 cents on 2 January to \$13.41 on 31 October). (Ycharts, 2020)

Furthermore, transferring Bitcoin without going through a third party, such as a crypto exchange, can be logistically challenging for those without a background in computer science. most traders therefore use an exchange, or a virtual wallet handled by a third party. But this doesn't mean that currency is no longer truthless, and bitcoin holders have historically lost sums of money to careless or fraudulent

third parties. The most famous such episode was the theft of the \$460 million worth bitcoin held the “Mt.Gox exchange in 2013”. (McMillan, 2014).

The usefulness of Bitcoin as a store of value is limited its volatility. In the years 9 December 2020, the US dollar value of Bitcoin- and therefore the quantity of goods that can be bought with Bitcoin- changed by an average of “2.22% per day” according to (CoinDesk, 2020). Since the price of Bitcoin rise considerably many time and advocates often argue that the cryptocurrency Is good store of value because its price will continue to rise over time.

In the other hand, the future price is inherently unpredictable, but even if optimist are correct its price will rise, this is only an argument that Bitcoin is a good speculative investment –not that it’s a useful form of money (Dirk G. Baur, 2018). Counties typically aim to have a stable currency rather than an appreciating but highly volatile currency, because the former is much more conducive to health economy.

### **The role of telecommunications in financial inclusion initiatives.**

If we are going to speak about digital money or cryptocurrencies, we must mention how the development of the technology and telecommunication hade played a key role in the transformation and development of the financial markets. In development markets, next-generation cell phones and wide broadband access have enabled the rise of the powerful payment platforms that have allowed the digitalization of traditional services and the launch of innovative products. In these markets, the main concern has been the availability and credibility of innovative product. (Dahlberg, 2015)

Innovative platforms are booming with novel technologies in developed markets, but there is still limited access to novel technologies in emerging markets. Despite this, they were un increase of e-money in these markets with help of telecommunications infrastructure. In these markets, the financial inclusion argument is key driver. Instead of new technologies, new methods of providing financial services supported by e- money have been adopted. Since mobile services have gained more widespread adoption than financial services among poorer segment of the population, so financial inclusion initiatives are heavily dependent on the telecommunications network infrastructure (Albuquerque, 2014)

### **Why central banks are now taking digital currency seriously.**

According to the bring news article there is tree main reason why we may see a central digital currency in the near futures, the number one reason is the Bitcoin, the bitcoin has raised the question of whether countries should set up their own digital currencies. A digital currency would be issued by central banks, like banknotes, while cryptocurrencies rely on distributed ledgers like blockchain. The number two reason is Chine who has already begun piloting a digital Yuan currency in several major cities, and the Federal Reserve chairman has said that he will hold a public dialogue about the idea of creating a central bank digital currency. And third reason is the possibilities of using digital currency for welfare payment. (Focardi, 2021)

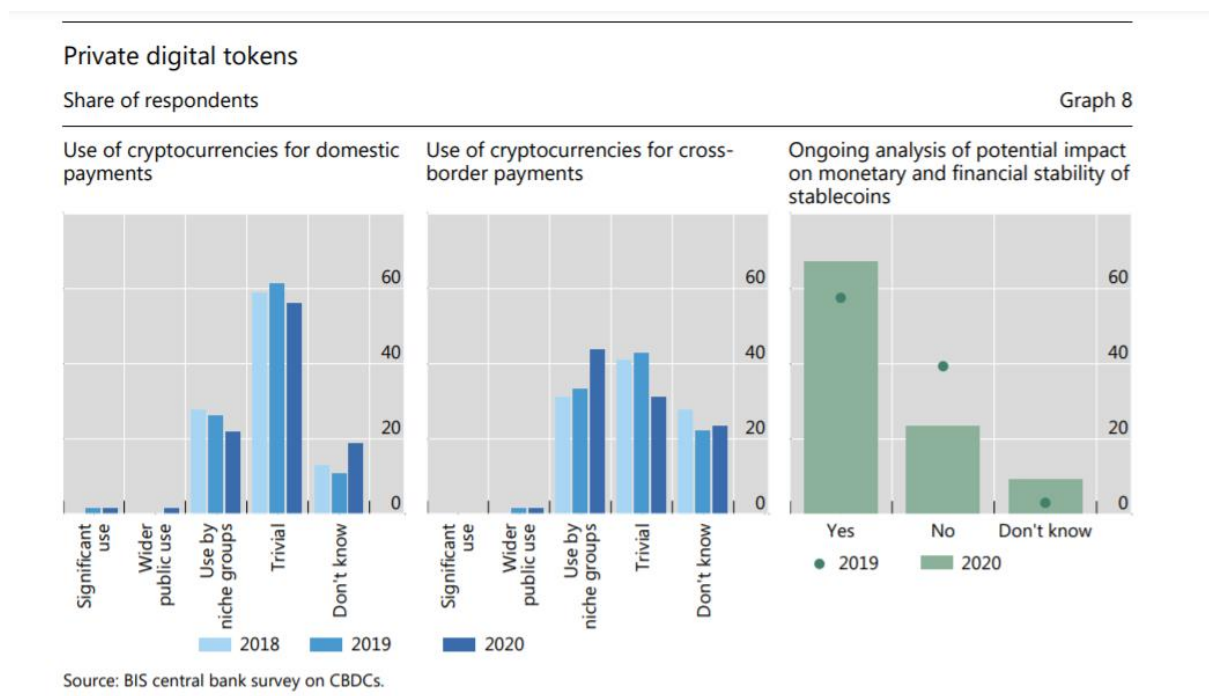
### **Central banks still see cryptocurrencies as niche product.**

The survey that BIS have done concluded the most central banks still see cryptocurrencies as niche products and stablecoin developments are being closely watched cryptocurrencies are privately issued digital assets with their own “currency” unit of account, such as Bitcoin and Ethereum. This doesn’t mean we will not see the use of digital currency soon.

In addition to that, they also believe that Many Cryptocurrencies experienced a surge in their values in 2020, true to their form as speculative assets. This increase was not matched by any change in perceived usage in payments. Indeed, most central banks continue to see cryptocurrencies as niche

products. Specifically, the survey asked central banks about current and anticipated use of the cryptocurrencies for domestic and cross-border payments. The majority responses indicated only trivial use or use by niche groups at both domestic and cross-border level, in line with previous years (Graph 8, left hand and center panel). There are a few exceptions: the paradigm of the cryptocurrencies which strive to maintain trust in the stability of their value through the use of technology (BIS (2018) ) was seen as holding promise in extraordinary situations where trust in public institutions is low, leading to a more widespread or significant use for domestic payments.

Figure8: Central banks still see cryptocurrencies as niche product.



### The general arguments for a successful distributed cryptocurrency are as follows:

- Open- source software: A core and trusted group of developers is essential to verify the code and possible changes for adoption by the network.
- Decentralized: even if it is not fully distributed, it is essential that it is not controlled by a single group of person or entity.
- Peer-to-peer: while the idea is not having intermediaries, there is a possibility of pools of subnetworks forming.
- Global: the currency is global, and this is a very positive point and workable for financial integration with or without smart contracts among the parties.
- Fast: the speed transaction can be faster and confirmation time can be shortened.
- Reliability: the advantage is that there is no settlement risk and it non repudiable.
- The savings in cost of a large settlement team for financial activities can be potentially huge.
- Secure: privacy architecture can be better designed incorporating proof of identity with encryption. If that is done, the issues surrounding know your customer/client (KYC) and anti-money laundering and terrorist financing (AML/TF) will be resolved.
- Sophisticated and flexible: the system will be able to cater to and support all types of assets, financial instrument, and markets.
- Automated: Algorithm execution for payments and contracts can be easily incorporated.
- Scalable: the system can be used by millions of users.

- Platform for integration: it can be designed to integrate digital finance and digital law.

## **THE ANALYZING CHAPTER**

In this part of the thesis I will start by addressing my paper question that was If the world would use digital currencies, which one is more suited to our current economic system and how the invention of digital currencies like central digital currency CBDC OR Bitcoin will improve our current economy in order to growth. To do this I will analyze and discuss different findings using the theories I have selected and date collection I have found to see the possibilities of which of those two alternative central digital currencies or Bitcoin are more suited to our current economic system.

### **Transition towards a Cashless society Could we be entering into a cashless society?**

As we know the process of transformation of cash money to digital hasn't start lately. In fact, the financial transformation was hand to hand with the transformation of the internet and telecommunication. According to (Rochemont, 2019) the main driving factors of the transition to a cashless or "less cash" society in countries around the world is convenience appears to be the main force driving a natural evolution towards cashless system, supported by lower transaction cost that make contactless payments more competitive than cash transactions. There is general political interest in removing cash altogether, to fight against money laundering, terrorism, tax evasion and corruption. Meanwhile, in Africa according to (Rochemont, 2019) the mobile payments innovation is out of a necessity to equip the unbanked with access to a payment infrastructure. In Asia's, India's latest demonetization exercise was aimed at restructuring the economy for a sustainable future, seeking to reduce corruption and improve tax collection. In China and elsewhere in Asia, the digital economy and associated investments in infrastructure and payment systems, designed with financial inclusion in mind, drive cashless transactions. Innovations in Africa Asia are now being exported to the world. (Rochemont, 2019). The development of digital money has been on the move and lately, it has begun to show up gradually on the stage to offer an alternative solution for developed countries and developing and poor countries as well.

### **The role of telecommunications in financial inclusion initiatives.**

we may ask ourselves why central digital money or cryptocurrencies now, why we haven't seen it for 10 years before or 20 years before. the answer to this question maybe is because of the lack of technological advance or political willingness. There is also a competition between countries and private companies about creating new ways and platforms to exchange money, this may result as we saw lately I 2009 the creation of Bitcoin. Either way can be the answer, but we must mention how the development of the technology and telecommunication hade played key role of the transformation and development of the financial markets. In development markets, next-generation cell phones and wide broadband access have enabled the rise of the powerful payment platforms that have allowed the digitalization of traditional services and the launch of innovative products. In these markets, the main concern has been the availability and credibility of innovative product. (Dahlberg, 2015).

as claimed by (Albuquerque, 2014) Innovative platforms are booming with novel technologies in developed markets, but there is still limited access to novel technologies in emerging markets. Despite this, they were un increase of e- money in these markets with help of telecommunications infrastructure. In these markets, the financial inclusion argument is key driver. Instead of new technologies, new methods of providing financial services supported by e- money have been adopted. Since mobile services have gained more widespread adoption than financial services among poorer segment of the population, so financial inclusion initiatives are heavily dependent on the telecommunications network infrastructure (Albuquerque, 2014).

So, The role of telecommunications in financial inclusion initiatives is important for the transformation of the financial sector without the development of technology and telecommunication

like cellphones and powerful computers, and blockchain systems it may become difficult to see the progress that has been made today.

### **The coming currency war: digital money controlled by the central governments or decentralized cryptocurrencies.**

An article, from Wall Street Journal mention how Central banks are getting closer by issuing their own digital currency. The article also raises the possibility of the dollar might finally face real competition as the world's dominant currency. The article also mention the Federal Reserve has already issue digital money, via the commercially to households that have accounts with them. Commercial banks then send money electronically to households and businesses and enable customers to make and receive payments digitally without exchanging cash. But a central-bank digital currency would be leap beyond that. Instead of working only trough commercial banks, central banks might issue digital currency directly to the public that could be used as legal tender in the same way cash is today.

Deutsche Bank has also spoken about this topic in Research they have published in November 2020, a new report on economic estimations and proposals to assist global economies hit by the coronavirus pandemic. Titled "what we must do to Rebuild" and their conclusion was the need to promote and prioritize regional digital payment systems. This could be understanding or interpret that the European Union also looking to join the rivalry of creating new digital currencies controlled by the central banks. In addition to that Deutsche Bank warned also in their report to the European policymakers about the risk of not developing their own digital currency project in response to Chine and Sweden's active progress in the field. The Bank argue that lagging behand other jurisdictions might force the adaptation of policies by the first movers. (PARTZ, 2020)

### **Chine officially backs A cryptocurrency and establishes it as their official Coin**

According to this article from Forbes, Chine has officially backed a cryptocurrency and establishes it as their official Coin. The article starts with "It's finally happened. A major worldwide government has just bestowed a huge vote of confidence and legitimacy onto the world of cryptocurrencies. China, in an unprecedented move, just announced that they are officially adopting a certain cryptocurrency as China's official coin". although Chine is arguably leading the world in developing a national digital currency, a project it has been working on since 2014.

But the government of chine have just informed that they have chosen a preferred firm for the purchase and marketing of their new coin-YuanPay Group. The sales of chine`s coin officially started April 8 of 2021 September 2 of 2020 and currently these coins can be bought only from YuanPay Group. (Haixiong, 2021)

The Chine move could be seen as the first step toward the ending of USA dollar domination as the world Reserve currency. While United Stated of America are still hesitating to take the lead of creating new currency system, Chine officially backs A cryptocurrency and establishes it as their official Coin recently could intensify the competition of the digitalization of the paper money among other countries.

### **Central banks' interest in CBDC rises further**

A survey done by the Bank of International Settlements 2021, shows some slow progress toward fully digitalizing work of paper money. They didn't mention the reason behind this slow progress, but it could be a political issue or a jurisdiction issue. In addition, the survey data shows that work-related to retail CBDCs is gaining in relative popularity, with more central banks either looking at both wholesale retail and narrowing their scope of work down to retail only. The survey has also found out that, the central banks not currently involved in any CBDC are primarily in smaller jurisdictions. This finding is consistent with the results of the previous two surveys. It continues that the research also suggests that CBDCs are more like to be under research and development in a jurisdiction with high

mobile phone use, innovation capacity, and internet search interest for CBDCs, albeit with some differences across retail and wholesale CBDCs (Auer et al (2020d). The research of the survey also shows that more central banks are moving into more advanced stages of CBDC engagement, progressing from conceptual research to experimentation. About 60% of the central banks ( up from 42% in 2019 ) are conducting experiment or proofs-of-concept, while 14% are moving forward to development and pilot arrangement.

In addition, the survey shows Central banks still see cryptocurrencies as a niche product and Stablecoin developments are being closely watched. This point of the survey could be explained that the creation and implementation of new currency is often seen as a political issue and when the politicians decide its time then we could see this implementation by the central banks.

Moreover, many central banks believe that Many Cryptocurrencies like Bitcoin and Ethereum experienced a surge in their values in 2020, true to their form as speculative assets. This increase was not matched by any change in perceived usage in payments. Indeed, most central banks continue to see cryptocurrencies as niche products. Specifically, the survey asked central banks about current and anticipated use of the cryptocurrencies for domestic and cross-border payments. The majority responses indicated only trivial use or use by niche groups at both domestic and cross-border level, in line with previous years. There are a few exceptions: the paradigm of the cryptocurrencies which strive to maintain trust in the stability of their value through the use of technology (BIS (2018) ) was seen as holding promise in extraordinary situations where trust in public institutions is low, leading to a more widespread or significant use for domestic payments.

#### **Why central banks are now taking digital currency seriously.**

in the opinion of bring news article there is tree main reason why we may see a central digital currency in the near futures, the number one reason is the Bitcoin, the bitcoin has raised the question of whether countries should set up their own digital currencies. A digital currency would be issued by central banks, like banknotes, while cryptocurrencies rely on distributed ledgers like blockchain. The number two reason is China who has already begun piloting a digital Yuan currency in several major cities, and the Federal Reserve chairman has said that he will hold a public dialogue about the idea of creating a central bank digital currency. As we know China is the main rival of the United States when it comes to an economic and military power in the world. And third reason is the possibilities of using digital currency for welfare payment. This means central digital currency could play a secure and standard interoperable digital payment instrument issued and governed by a central bank and used the national digital payment instrument boost confidence in privately controlled money systems and increases trust in the entire national payment system. (Focardi, 2021)

Other argument could be Tax collection, it makes tax avoidance and tax evasion much more difficult since it would become impossible to use methods such as offshore banking and unreported employment to hide financial activity from the central bank or government. An additional reason is Combating crime, it makes it much easier to spot criminal activity (by observing financial activity), and thus put an end to it. Furthermore, in cases where criminal activity has already occurred, tracking makes it much harder to successfully launder money, and It would often be straightforward to instantly reverse a transaction and return money to the victim of the crime. One last important factor is as we know the Covid-19 pandemic has caused a severe damage to world economy and it will be difficult to deal this huge economic problem with the current payment tools. If the government want to use monetary policy, central banks can affect economic growth by controlling the liquidity in the financial system like Rising interest rate slows growth, preventing inflation or Lowering rates stimulates growth, preventing or shortening a recession, then ,they may need a new payment system like Central digital money. This is could be the hidden reason behind this upcoming central digital money called CBDC that United States of America are preparing for as I example. The other superpowers like European union and China are papering their own. The question is which one of those digital



currencies will dominate the world together with other cryptocurrencies like Bitcoins. And this is where the competition is heading to.

### **The idea behind Bitcoin.**

The idea behind Bitcoin was to have digital currency that is Decentralized, this means there is not a single group of person or entity who controlled it. Bitcoin is opposite of central digital currencies that is controlled by the government and its banks. This is one of the advantages of Bitcoin According to Bitcoin supporters. The other important advantage is its supply limited, making it impossible for central authority to issue it in quantities that would devalue it. This means it is much less vulnerable to hyperinflation crises, such as those seen in Weimar Germany, Zimbabwe or Venezuela. But a limited supply can also be a weakness, as it makes it impossible to control deflation— a circumstance that can also lead to very severe economic consequences. (Filardo, 2005)

The other claimed advantage of bitcoin is that all transaction is permanent and immutable. When money is held in a bank account, that bank could theoretically expropriate the money from its user and claim that never existed. With Bitcoin, this is impossible, because the database on which transactions are recorded cannot be edited by any central authority, in other words this could make it very difficult to manipulate it. Bitcoin is thus often described as “trustless” because it does not require its holder to trust a financial institution not to expropriate it. (Quinn, 2021)

In addition, cryptocurrencies are more focusing when dealing with businesses in developing countries, whose currencies may be unstable or otherwise difficult to work with. While the promise of improvement remains present, Bitcoin has not yet got the global recognition especially the government and its financial sector. This is hindering the Bitcoin to become more widespread, businesses may need to start re-thinking the way they manage their cash flow to keep up with the ever-changing landscape. We could say all those advantages I mention and others I didn't as the main reason behind the outbreak of Bitcoin.

## **DISCUSSION**

### **Bitcoin as a private money**

“The German ministry of finance does not classify bitcoins as e-money or as a functional currency, they cannot be regarded as a foreign currency. Nevertheless, they have to be subsumed under the German term of ‘Rechnungseinheit’ as a financial instrument”. The article continues with by mentioning some of the members of the German parliament who call this move as good news, the federal government is recognizing bitcoins as private money. This indicates that still, some influential countries such as Germany, USA see cryptocurrencies as private currencies, something that means again that they will not allow this currency to work under their own system. This could be a signal sent to global politicians and central banks that we must make our own digital currency, not to compete with Bitcoin but to improve our current cash currency with new central digital currency. (Spaven, 2013)

### **How Central digital currency CBDC and Bitcoin BTC related to money supply and its functions.**

#### **Does Bitcoin fulfill the money supply criteria?**

For Bitcoin, money supply is straightforward. It's the total amount of a currency that exists at a given time. At this point, there is 16.9 million BTC have already been mined, and more BTC will continue to be produced at a predictable rate until we reach 21 million. This is called Fixed money supply, because there are predictable rules and a hard cap on production of new currency. On the other hand, fiat currency, like euros and dollars, money supply is more difficult to understand. It refers to a set of policies set by the central bank that determines how much new money to print. Central banks also take currency out of the circulation (when it gets old or defaced), so they can increase or even decrease the total supply of currency as needed. This gives the central bank the power to issue currency in the face

of financial crisis, meaning currency is more easily available and allowing the bank to control lending interest rate. Issuing more currency lowers interest rates and encourages business and individuals to take out low-interest loans. The result is more spending and economic stimulation. However, it also means that central banks are incredibly powerful and often serve corporate interest ahead of the common man. (Olav, 2019)

### **Deflation vs. inflation**

Since a central bank can issue new money at any time and there's no limit on how much money they can create, the value of the dollar or euro decreases over time. For instance, in the United States, a loaf of bread cost \$0.09 in 1939, \$0.30 in 1970, and 1.98 in 2013. It hasn't gotten more expensive to bake bread. It just that the dollar is less valuable now that it was decades ago. The value of fiat currency decrease because it becomes less rate over time, as central banks print more money. This growth of the money supply (and decrease in the buying power of the currency) is called inflation. All major fiat currencies today are inflationary, and all the assumptions we make in economic are on inflationary model.

In the case of Bitcoin, there's no central bank constantly issuing money and controlling monetary policy. Instead there is an algorithm that runs out once its hits 21 million coins. (CoinDesk, 2021) After that, any BTC that gets lost are permanently removed from the money supply, meaning the total supply will decrease, or deflate over time. As a result, BTC will become increasingly rare and increasingly valuable.

### **Saving vs. spending**

Fiat currencies are typically inflationary, meaning their buying power decrease over time. Of you put €100 under your mattress for 20 years, it will not buy you as much then as it will today. as a result, your incentive is to spend or invest the €100 today, since it will only decrease in value.

On the other hand, Bitcoin is deflationary, meaning buying power increase over time. For instance, if you put your private key under your mattress for 20 years (assuming Bitcoin is still around in 20 years), it will buy you more then it will today. This means your incentive is to save the Bitcoin and not spent it, since it will likely be worth more in the future. (Skalex, u.d.)

### **Debt/ Credit vs. Commodity.**

Another distinction to make between Bitcoin and fiat is debt versus commodity basis. Bitcoin is more like gold that it is like dollars or euros. Its code makes it a rare commodity and store of value that can be traded and divided. However, it can't be two places at once.

Fiat currencies have no fundamental rarity to them, and they are not commodities but essentially sign of debt. When someone pays you in fiat, they are not transferring something of inherent value. Instead, they are saying "I owe you." On large scale, banks accept deposits and then lend against those deposits with the total money supply growing because the bank has the currency listed in two places, once as a depository account and again as lie of credit one at any given time. (Skalex, u.d.)

### **EFFECTS CBDC ON MONETARY POLICY**

The primary tool for any central bank to maintain stability in the financial system is monetary policy. Raising or lowering the interest rates changes the money supply and in turn, the inflation and growth in the economy. Most central banks have a mandate to keep inflation at a predetermined level. If the current inflation is higher than this level, the central bank will raise the interest rate to slow down growth and in turn, inflation. In the opposite scenario, where the central bank sees the need for higher growth, interest rates will be lowered to stimulate the economy. In the last decade, Japan and multiple western European countries have experienced periods of low growth, even with historically low-

interest rates. Why is it not working? The reason might be because of limitations to the current system due to the Zero lower bound.

### **Zero LOWER BOUND**

The ZLB is a problem that occurs when the short-term nominal interest rate is close to zero, and due to the nature of fiat-money, it limits the central bank's ability to stimulate the economy. For that reason, central banks must explore other options. The Federal Reserve has used to do a large-scale asset purchases and forward guidance in the United States as an alternative in such a situation. Wu and Xia (2014) have measured the macroeconomic impact of monetary policy at the Zero lower bound. (Wu, 2014). They found that the effective federal base rate does not carry much information at the ZLB, while forward guidance, on the other hand, seems to have a small effect, though not statically significant at the 10 percent level. The researchers devised a shadow rate that could be substituted for the base rate to measure the effect of monetary policy when this rate drops below the ZLB. The finding illustrated that when the shadow rate dropped below zero percent, it stimulated the economy, which supports the argument that a negative interest rate could be beneficial in such circumstances. For instance, the pandemic of 2020 has led several countries including Norway and United States of America to lower their interest rate to Zero and some even suggest going below Zero to stimulate the economy if necessary. The negative interest rate could alleviate some of the problems central banks face today. Given that central banks have traditionally used interest rate to stimulate the economy, it is arguably better to use this method instead of QE.

Jobst and Lin (2016) show the positive effect of the negative interest rates on the economy by lowering the funding costs of banks and boosting asset prices. But there is a common concern when lowering the base is the financial health of the banking sector. (Jobst, 2016)

### **The effect of a CBDC on the ZLB**

There are comprehensible limits to current monetary policy to the nature of cash, which in turn has prompted central banks to use unconventional strategies such as QE. While traditional fiat currency is constrained to this ZLB due to its physical form, a CBDC that is entirely digital could, in theory, introduce more flexibility for the central bank's monetary policy, effectively bypassing the current ZLB. However, they argue that circumventing the ZLB is not the most persuasive argument for the a CBDC. Bordo and Levin (2017) studied the impact of the a CBDC on central bank's monetary policy. By designing the currency as interest-bearing, the interest rate would no longer be constrained by the ZLB in the event of the adverse shock. This claim is supported by Dyson and Hodgson (2016), who also point to the fact that physical cash would need to be removed from the economy for this to be effective.

### **HELICOPTER MONEY**

Many question marks surround the measures many countries are taking to contain the spread of coronavirus, while necessary, are bound to have a direct impact on the economy. This column argues that rather than raising taxes or lowering ZLB and increasing government debt to finance the necessary fiscal programmes, the time has come for "helicopter money"—direct, unrepayable funding by central bank. QE has proven to be an effective alternative, but there are side effects associated with this method. It lowers the yield on bonds, pushing this yield even further down and this could prove to have a limited effect. The loudest critics of this monetary policy believe QE is fueling a bubble in the stock and bond markets. Dyson and Hodgson (2016) point out that QE benefits those who hold stocks and bonds, which is often a small fraction of the public. Therefore, using QE might not be as effective at stimulating the entire economy.

### **helicopter money.**

In “the optimum quantity of money” from 1969, Friedman envision a bird flying over community, dropping money to the people. This though experiment explored the results of “one-off” increase in the money supply.

The term was once again introduced by Ben Bernanke in 2002 and is now known as helicopter money. Instead of changing the balance sheet of the central bank, it would be one-time distribution to citizens. Traditionally, the proposal to do this has been through crediting people’s bank balances or as tax rebate (Gilbert, 2019, August 30). A CBDC based on a blockchain could introduce another mechanism for distributing the helicopter money. A CBDC could serve as an efficient tool for distributing such cash. It would be an effective distributing mechanism, and as Dyson and Hodgson in (2016) highlight, it benefits every member of society.

Another benefit is the directness of helicopter money. While QE increase the prices of stocks and bonds like we saw in 2020, when the Fed expanded its repo operations on March 12, 2020, by \$1,5 trillion, then adding another \$500 billion on March 16 to ensure there was enough liquidity in the money market. The helicopter money increases the cash available for everyone to use, which directly affects spending. The advocate for the use of a CBDC as the current system is not constructed for task. If the central bank were to issue helicopter money through banks, it would increase their reserves, earning interest and increase the deposits which are close to interest-free, effectively giving the banks’s risk free money. Since the central bank would have to pay interest on reserve deposits, it would be no different from QE. Engert and Fung (2017) believes this can be done electronically in most modern countries. However, they have not addressed the concerns of the impact it would have on the current system, as Dyson and Hodgson (2016) did (Dyson, 2014).

Helicopter money might seem like an extreme and unconventional policy, but it could be precisely what central banks need, special now that the coronavirus pandemic hit hard on global economy. Instead of trying to stimulate the economy by increasing loan activity, they can directly stimulate the spending of consumers. Although some might hold onto the newly distributed money, it would most likely effectively stimulate the real economy. It seems unlikely that traditional system could handle such a policy efficiently. A CBDC implementation through an account- or register-based solution could provide a useful distribution mechanism.

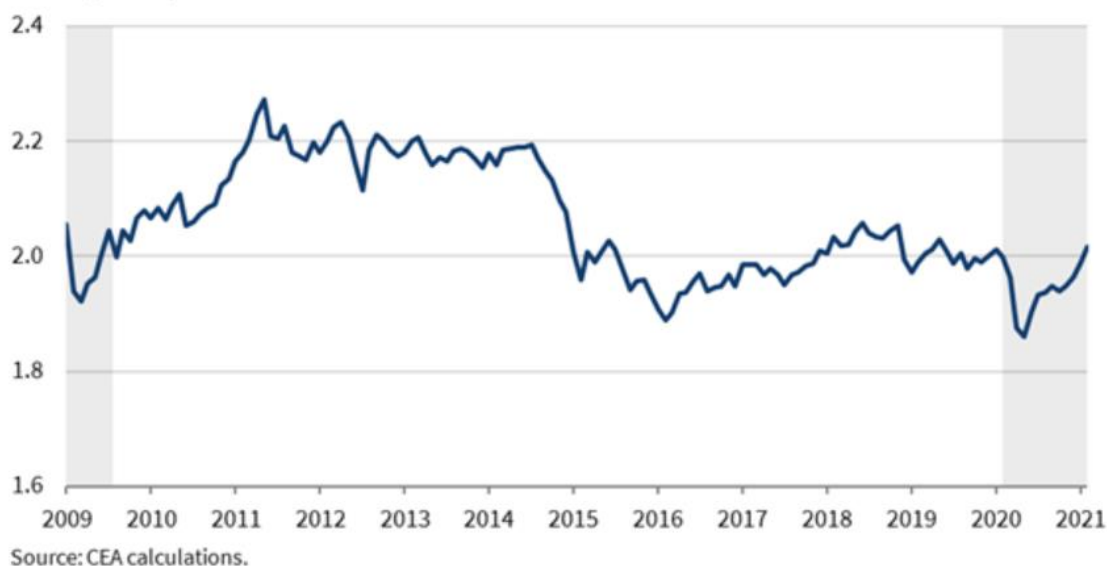
## **Inflation**

Central banks use inflation-targeting as a means to maintain price stability. This strategy has resulted in aggregate price level following a random walk with upward drift because most central banks aim at two percent inflation without placing any weight on previous deviations from this target. Recently, the COVID-19 pandemic can explain a large part of the recent inflation problems. That said, in the next several months we expect measured inflation to increase somewhat, primarily due to three different temporary factors: base effects, supply chain disruptions and pent-up demand, especially for services. Basically, the impact of the coronavirus on inflation is uncertain, as there are simultaneous supply demand movement that can tilt the balance toward more inflation, disinflation or even deflation.

Figure 9 shows the targeted and actual inflation in the US over the last two decades.

## Monthly Index of Longer-Run Inflation Expectations

Percent, PCE-equivalent



Through a CBDC, the central bank could use price-level targeting that can fluctuate in short term, while monetary policy can ensure that the price level returns to the target over time. This target would serve as a nominal anchor lowering the uncertainty associated with inflation targeting. These effects reduce the need to use unconventional measures like QE. Bordo and Levin (2017) highlight this benefit of CBDC and the positive effect this could have on lower-income households and small businesses because the new money that will be created will be reaching direct to the small business and households instead QE measure that help companies direct to save the economy. (Bordo, 2017,)

## METHODOLOGY

### RESEACH METHOD

I have chosen a qualitative approach to answer my research problem. Due do the complexity and lack of consensus on this topic, as well as the relative uncertainty surrounding the research question, a qualitative research method is natural fit.

Research methods are the strategies used in the collection of date or evidence for analysis to create a better understanding of topic (University of Newcastle, 2019). So far there are no central bank that have implemented fully-fledged the CBDC or other cryptocurrencies, most of the central banks still in research phase. Only a handful of central banks have started experimenting with digital currency as I mentioned in my previous capital. The consequence of this is the limited amount of numerical date available, which made it impossible to conduct a quantitative method (Saunders, 2019). Moreover, the use of qualitative research is due to the comparative absence of previous analysis, either quantitative or qualitative, on the actual effect that a CBDC could have. Because of futurist perspective associated with the topic, the qualitative methods tends to be more efficient at resolving. Therefore, it can adopt to the quality of the information gathered. Current CBDC investigations are being conducted by a multitude of different players, with different preconceptions and goals associated with their research. Because of this, the complexity linked with the collected date increases, as views on the topic can differ substantially. Therefore, having the ability to combine all this information and evaluate its validity and factuality through reviewing the literature, facilitates in producing stronger conclusions (Ridley, 2013)

## Evaluation of Sources

The data I found consist of a varied selection of financial articles, with different topics. Therefore, the credibility of the sources used in this literature review was essential. Moreover, the source I use in the analyses must fulfill specific criteria. Due to CBDC and Bitcoin being a relatively new topic and the full understanding of its implications and importance is unknown, it complicates the process. Despite this, I have examined the sources I have used carefully, about them are reliable and credible, as well as where the information comes from.

The first pertains to timeliness, signifying that a paper need to be recent enough in time to be relevant to the topic. However, exceptions in terms of obtaining a more comprehensive understanding underlying theoretical concept were made, such as the “zero lower bound”. The second criteria relates to whether the authors/publishers of the paper are an authority on the topic at hand (Cantrell, 2019). This measure is, to a certain extent, hard to establish, given how recent CBDC and cryptocurrencies like Bitcoin has emerged as viable option for central banks and other institutions. However, if the central banks or organizations such as the International Monetary Fund (IMF) or the Bank for International Settlement (BIS) commissioned the authors, authority is most likely established. The final criterion concerns the number of times others have cited a specific piece of literature. The total number of the references an article has in other research can provide an indicator of its trustworthiness, although it is not an absolute measure.

## CONCLUSION

The possible implementation of a CBDC is under consideration in many countries around the world. As cash use is diminishing and cryptocurrencies continue to increase in usage, there is a need for an alternative to fiat currency. Through a systematic literature review, this thesis has examined and synthesized the most central research on the subject. My research question is, if the world would use digital currencies, which one is more suited to our current economic system, and how the invention of digital currencies like central digital currency CBDC OR Bitcoin will improve our current economy to growth. And to answer this question, we must look a bit deeply on how central digital currency (CBDC) and Bitcoin BTC are related to money supply and its functions, in other word does BTC or CBDC digital currency fulfil the money supply criteria?.

The most likely scenario is that Bitcoin won't be the sole global currency in the new world order. Instead, other currencies will continue to exist, including inflationary fiat currencies that encourage consumers to spend and lenders to lend. Bitcoin has proven itself as an effective of value and could operate alongside markets like gold or as a go-between for global transactions or currency exchanges. The future of the Bitcoin economy is unclear at the moment, and everything is theoretical. However, it's probably best policy not to believe the extremists on either end spectrum. Bitcoin won't end a deflationary death spiral of its own creation. It also isn't a perfect replacement for fiat currencies in a utopian future and because it's a private currency and wasn't recognized yet by the central banks.

While the promise of improvement remains present, Bitcoin has not yet get the global recognition specially the government and its financial sector. This hindering the Bitcoin to become more widespread, businesses may need to start re-thinking the way they manage their cash flow to keep up with the ever-changing landscape. In the other hand, the future price is inherently unpredictable, but even if optimists are correct its price will rise, this is only an argument that Bitcoin is a good speculative investment –not that it's a useful form of money (Dirk G. Baur, 2018). Countries typically aim to have a stable currency rather than an appreciating but highly volatile currency, because the former is much more conducive to health economy.

While, Monetary policy transmission, the issuance of bank base money through transfers to the public could constitute a new channel for monetary policy transmission (helicopter money), which would allow more direct control of the money supply than indirect tools such as quantitative easing and interest rate, and possibly lead the way toward a full reserve banking system. The primary tool for any central bank to maintain stability in the financial system is monetary policy. Raising or lowering the interest rates changes the money supply and in turn, the inflation and growth in the economy.

Helicopter money might seem like an extreme and unconventional policy, but it could be precisely what central banks need, special now that the coronavirus pandemic hit hard on global economy. Instead of trying to stimulate the economy by increasing loan activity, they can directly stimulate the spending of consumers. However, if the CBDC were to replace physical cash, then the current ZLB could be moved further into negative territory, increasing the effectiveness of interest rate policy. The efficiency of the strategy is uncertain, as the reviewed papers disagree on the usefulness of lowering ZLB. Policies such as QE, could, to an extent be replaced by the concept of helicopter money, a “one-off” injection of cash directly to the public. A register based CBDC would offer an effective solution to the possible troubles associated with transferring the money to citizens.

Indeed, Digital banks runs are feared by the central banks, as the ease of moving funds away from commercial banks can result in liquidity issues in case of adverse shocks. However, the Bank of England states that if the introduction of CBDC follows a set of core principles the risk of a system-wide run from bank deposits to CBDC is addressed. Since most CBDCs are centralized, rather than decentralized like most cryptocurrencies, the controllers of the issuance of Central bank Digital Currency can add or remove money anyone's account with a flip of a switch. In contrast, cryptocurrencies such as Bitcoins prevent this unless a group of users controlling more than 50% of mining power is in agreement. A CBDC could increase the risk of this happening if there are no withdrawal limits in place.

A CBDC using blockchain could provide immediate settlement and provide more efficient peer-to-peer and cross-border payment than the current system. Through higher transaction speeds and fewer intermediaries, a CBDC could reduce cost. The combination of more efficient peer-to-peer and cross-border payments, along with lower cost, could improve the remittance process. As these transactions have high fees associated with them, a CBDC could change remittance transfers for better. In addition to that blockchain offers resilience of a decentralized distributed ledger. Centralized system has always been prone to attacks as there are often single points of failure. By distributing the nodes in the network, blockchains are tougher to bring down, as a coordinated attack on everyone at the same time is arduous. Altering the centralized systems is possible, while a blockchain offers a permanent record that cannot be changed. This immutability makes a distributed solution such as blockchain safer from fraud. A CBDC built with blockchain would most likely be safer than a system built on an existing centralized structure.

The research on CBDC is still mainly theoretical, attempting to analyze the consequences it could have on monetary policy, commercial banks, and payment systems. Through this thesis, the complexity of the subject has been apparent, and predicting future impacts of this new concept is extremely difficult. There are merits to implementing a CBDC, but not without potential concerns, especially for the banking sector. As economies are moving towards a cashless future, and with private cryptocurrencies at the brink of realization, the discussion on CBDC will be an essential part of central bank research in the years to come.

Based on the information I presented in my paper I think the CBDC is the most likely alternative digital currency to use to improve our current economy from the crisis than Bitcoin. The reason for that is that firstly, it has been created by the central banks themselves and most likely they are going to recognize it and make it legal to use, secondly, Central banks have the power to create new money and dictate what kind of money they will use to save the economy, unlike Bitcoin currency which is a

private currency and its unknowing yet who owns it.. So what happens next is that the central banks who have a huge responsibility to save the economy will use this new digital currency they have been created for the purpose of having more advanced payment tools in order to save the economy. while Bitcoin remained as it is today as an effective investment tool that could operate alongside markets like gold.

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### **Figurer guideline**

Figure1 Retail payment is executed in real time side 10

Figure 2 Credit risk for payee’s PSP result. Side 10

Figure 3 Until central bank accounts are settled side 11

Figure 4 Example of a raw transaction date. (Chuen, 2015) side 14

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