MACRO RISK AND BITCOIN

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Abstract

One of the topics that has been in the news for the last two years and has gained a permanent column in the headlines of news agencies and the media is the issue of cryptocurrencies due to the rapid rise in the price of Bitcoin which is the core of all cryptocurrencies, as all the other cryptocurrencies were based on it, some with exactly the same code and others with minimal variations. In mid-2017, the price of Bitcoin showed a rapid rise which lasted until the end of 2017 when its price reached a peak of $ 17,900 each (Kelly, 2017).

This event managed to catch the public eye and make Bitcoin and the new crypto currency innovation known to the general public. Nevertheless, most people do not know anything about cryptocurrencies other than the rapid rise in the price of Bitcoin, what exactly they are, how they came about and what their creators originally sought.

Bitcoin and other cryptocurrencies are a hotbed of controversy among crypto currency advocates and skeptics alike. An the one hand, the proponents of cryptocurrencies, which came mainly from the IT and start-ups, argue that crypto currencies are the natural evolution of money and at the same time a revolution that will offer cheaper and faster transactions.

While the most ardent proponents of crypto currencies argue that cryptocurrencies could free the planet from the wrong economic policies that create financial crises, as crypto currencies due to their decentralized nature are not controlled by any central authority except by the code which determines the provision of "money" and controls transactions and which is not subject to any intervention as is the case with traditional monetary policy.

On the other hand, there are the views of popular investors, analysts and institutions of the global financial system who claim that cryptocurrencies are a bubble that is very similar to the tulip frenzy that occurred in the 17th century in the Netherlands (Caneva, 2017) while others argue that crypto currencies and their aggregate demand can be translated as the overall need for tax evasion and money laundering (Zillman, 2018).

The purpose of this paper is to study the relatively new phenomenon of cryptocurrencies and their role in the global economy. This will be done through the study of the case of Bitcoin as it is the first crypto currency on which the rest were based while it is also the cryptocurrency with the largest share in the crypto currency market. Thus, the success or failure of Bitcoin will have a direct impact on the future of crypto currencies but also on the role they claim to play in the global economy.

The structure of the work will be as follows: First in the first chapter we will study the phenomenon of cryptocurrency development, in the second and third chapter we will study how it works as well as the strengths and weaknesses of Bitcoin. In the next chapter we will analyze the reactions of national and international regulators to the

development of cryptocurrencies. Finally, in the fifth chapter we will study the role of cryptocurrencies in the global economy.

The methodology followed for the elaboration of the diploma thesis is the international macroeconomics and the descriptive statistics while at the same time bibliographic and internet references were used for its elaboration.

Finally, the intended contribution of the dissertation is the enrichment of the literature regarding the role of cryptocurrencies in the global economy, and how Bitcoin is used on increased cases of Money Laundering processes.

Contents

1. The rise of cryptocurrencies

1.1 Introduction

Before we start the main analysis on how Bitcoin works as well as in the search for the role of cryptocurrencies in the global economy, it would be appropriate to first refer to the phenomenon of cryptocurrency development. In this chapter we will proceed to the historical analysis of the phenomenon of the development of cryptocurrencies.

For decades, the sole right to issue banknotes and coins was reserved for states and government organisations. Only they were able to successfully prosecute forgery. Simultaneously, the monopoly on money creation was a statement of authority. As a result, it's unsurprising that the rise of Bitcoin (Nakamoto, 2008) is likewise considered as a "democratic financial disruption." The public discussion of Bitcoin contains both positive and bad features. Some see it as a way to spur financial sector innovation or even as a weapon to undermine the United States' financial industry supremacy.

Although initial concepts are being developed to de-anonymize bitcoin users, anonymity is a core feature of bitcoin. Nonetheless, research is being conducted to ascertain the most significant bitcoin user groups. According to this study, the typical bitcoin user is 33 years old. The majority of bitcoin users reside in the United States and have chosen libertarianism as their preferred political stance. As a result, the lack of government regulation is a significant reason to utilise bitcoins.

In recent years, interest in Bitcoin has grown, and an increasing number of businesses have begun to accept it as a digital currency. Due to payment service providers, businesses may easily integrate Bitcoin into their web pages. They give Bitcoin to thousands of businesses as a payment information system. For example, the largest payment systems are 'Bitpay' with over 50.000 businesses and organisations and 'Coinbase' with over 39.000 enterprises and organisations. Among them are well-known brands such as Dell, Microsoft, Expedia, Overstock.com, and WordPress. Bitcoin is very relevant for information systems research because to its broad practical application and effect on information systems.

1.2: The chronicle of the development of cryptocurrencies

The idea of crypto currency, ie the currency whose creation and transaction is regulated through cryptography instead of a central authority, has its roots in a Microsoft developer Wei Dai and in his work on b -money a decentralized digital

cryptocurrency (Dai, 1998). But b-money did not thrive due to various malfunctions. But the idea was the driving force behind the creation of Bitcoin's first cryptocurrency.

On October 31, 2008, the paper "Bitcoin: A peer-to-peer electronic cash system" was published. by a developer or programming team under the pseudonym Satoshi Nakamoto. The purpose of Nakamoto as evident in his work is to create a decentralized trading system, which would bypass the central authority that oversees the transactions that in the traditional system this role is played by banks or e-commerce services, such as Visa thus offering fast and cheap transactions as the validity of transactions would be monitored by the nodes of the Bitcoin network and not by a central authority which for this role would receive a commission on transactions thus raising the cost of transactions (Nakamoto, 2008).

The first issue of Bitcoin is issued in January 2009 and the first transaction takes place when Nakamoto sends 10 Bitcoin to a developer Hal Finney. During the same year, the exchange rate of Bitcoin against the US dollar was set at 1 $ = 1,309.03 BTC. This exchange rate was based on an equation that calculated the cost of electricity that a computer needed to mine a Bitcoin (Salazar, 2017).

In August 2010 there was a malfunction in the code that allowed an anonymous user to create a block containing 184 billion bitcoins an amount that is well above the maximum of 21 million bitcoins that are programmed by the system code to be produced (Bigmore, 2018). The problem was addressed but at the same time it became clear that Bitcoin was not as invulnerable as its creators initially claimed. All this time the price of Bitcoin continued to rise, but Bitcoin was not widely known except in the cycles of the field of information technology and cryptography (Wallace. 2018).

But two things made Bitcoin known to the general public, most notably in the US and Japan, one was when the FBI suspended the Silk Road black market, which operated in the dark network and acted as an intermediary against the supply in the market and the sale of drugs and other illegal products. Investigations revealed that Silk Road used Bitcoin as its primary currency for transactions (Randewich, 2013).

The second event that made Bitcoin known was the collapse of the largest Bitcoin exchange to date in the Mt Gox world, when they were stolen from the exchanges' databases at about 850,000 BTC which were exchanged within the exchange's customers (McMillan, 2018).

The total value of the stolen cryptocurrencies based on the current BTC exchange rate with the euro amounts to 4 billion euros. But not only did these events not discourage Bitcoin, but when decentralized nature became known it was considered by many to be a safe haven for savings in the event of the collapse of banking institutions or in cases of bail-in as in the case of Cyprus or the scenarios for Grexit and the collapse of the Eurozone. These events increased the global demand and consequently the price of the cryptocurrency.

The success of Bitcoin has given rise to the development of new competitors to Bitcoin cryptocurrencies called alternative coins, which others have exactly the same architecture as Bitcoin as Namecoin, Litecoin, Dogecoin while others have some improvements and variations such as Ethereum or Ripple which unlike other cryptocurrencies presents a new more efficient Blockchain architecture and promises fast and cheap transactions while aspiring to work with banking institutions as an alternative method of trading. In December 2017, the price of Bitcoin reached $ 17,900 each, dragging the other cryptocurrencies on an upward trajectory.

Within a few years and given the rise in the price of cryptocurrencies around the cryptocurrency market, a large number of cryptocurrency-related start-ups have grown, such as Coinbase and Bitstamp, which are the largest exchanges for buying and selling cryptocurrencies.

Many major trading platforms such as the Plus 500 and e-Toro have also included cryptocurrencies as trading products on their platforms, where one can trade live Bitcoin with other cryptocurrencies or currencies while the Chicago Mercantile Exchange trades Bitcoin futures contracts.

Figure 1 - total capitalization of the cryptocurrency market. Source: CoinMarketCap, 2019

Also a number of insurance companies such as Mitsui Sumitomo Insurance offer insurance coverage in cryptocurrency exchanges in case of theft by cyber attack. With the advent of cryptocurrencies, a new controversial way of raising finance has been used by many start-up companies, the ICO (Initial Coin Offering) practice, which, unlike the initial public offering, takes place outside the traditional financial system.

According to this method, a start-up company draws funding from investors and in return gives them tokens which will be translated into cryptocurrencies, when the

start up company achieves its business goal the motivation for the investor in this case is the expectation that the value of the future cryptocurrency will increase.

In 2018, the ICO practice was also used by countries such as Venezuela, which introduced the Petro cryptocurrency from which Venezuela raised $ 735 million (PetroCoin, 2018). The move was seen by all analysts as a way for the Venezuelan government to overcome sanctions imposed by the United States.

The phenomenon of cryptocurrencies is a controversial issue with its proponents arguing that it is the future of money and a revolution in the way of trading and financing, while on the other hand there is the view mainly from institutional economic operators, that the cryptocurrency market, although not large enough to become a systemic risk, should be taken seriously and efforts should be stepped up to create an international regulatory framework for it.

Figure 2 Percentage of Total Market Capitalization (Dominance)

Today the size of the cryptocurrency market is $ 270 billion as we can see in Chart 1.1 while of the 790 cryptocurrencies that make up the cryptocurrency market only 9 cryptocurrencies have the largest capitalization with Bitcoin occupying 42.50% of the cryptocurrency market, followed by Ethereum with 17.71%, Ripple with 7.04%, Bitcoin Cash with 4.95%, Litecoin with 1.78%, IOTA with 1.16%, Monero with 0.82%, Dash with 0.75% and NEM with 0.60% while all other cryptocurrencies occupy 21.91% of the market as we can observe in Figure 2.

From the above data it is clear that Bitcoin is the reference currency in the world of cryptocurrencies, something similar to the role of the dollar in the global economy. So in this paper to look at the role of cryptocurrencies in the global economy, we will look at the case of Bitcoin as it is the cryptocurrency with the largest market share, but also the model on which cryptocurrency technology is generally based, so the success or

failure of Bitcoin will largely determine the role that cryptocurrencies will play in the global economy.

1.3 General Round Up

A decade ago, Bitcoin introduced a new trading method that paved the way for the emergence of a new branch of this cryptocurrency. The decentralized nature of Bitcoin as well as the positive features such as the speed of transactions and the increased levels of privacy it offers, made it very popular with the general public very soon.

The success of Bitcoin as well as its open source led in a short time to the development of the cryptocurrency industry with the development of new cryptocurrencies which have at their core the structure of Bitcoin. Today there are about 800 cryptocurrencies and the total size of the cryptocurrency market is $ 270 billion.

This rapid increase in cryptocurrencies is now a field of intense controversy among proponents of cryptocurrencies coming from the field of information technology, as well as skeptics about the increase in the phenomenon, which come mainly from the national regulatory authorities, as well as from the international financial institutions, which emphasize the risks and consequences that can arise from the non-regulation of the   phenomenon.

2. Bitcoin

The purpose of this paper is not to delve into the technical side of the Bitcoin cryptocurrency, but to look at the role of cryptocurrencies in the global economy. Nevertheless, it is useful to refer to some key elements of its structure and how it works, in order to determine the pros and cons of Bitcoin. But first we need to define what Bitcoin is and therefore all cryptocurrencies.

Bitcoin is a digital currency, which uses encryption techniques to regulate the creation of new currencies and to confirm the transfer of funds, without at the same time being controlled by a regulatory authority, which in the traditional system has the role of the central bank.

When we talk about "encryption techniques", we mean the way we make information inaccessible to third parties, unless they have the appropriate "key" to gain access to it. Bitcoin is a decentralized peer-to-peer network. The peer-to-peer network is defined as a computer network in which all the computers (peers) that participate in it are considered equal. This means that there is no central administrator or central control point (Antonopoulos, 2017, p.1) as we can see in Figure 3.
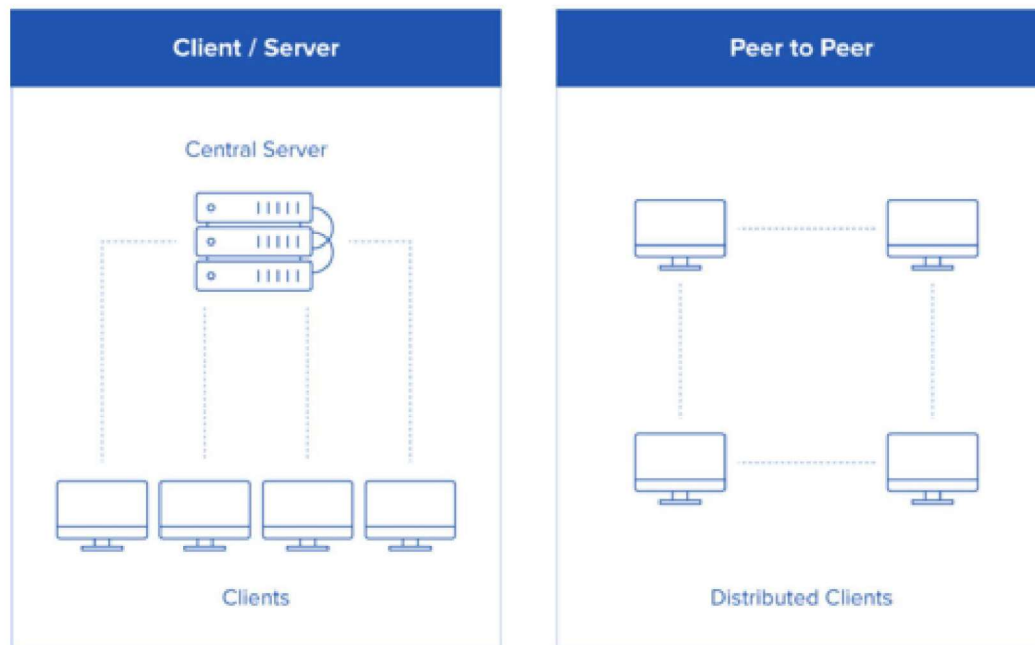
Figure 3 : The difference between a centralized and a peer-to-peer network. Source: Mazer, 2017

All Bitcoin in the world is owned by network users in their personal digital wallets. These wallets or clients are divided into three main categories: Full Node, Lightweight client and Web client (Antonopoulos, 2017).

Each of these forms offers different levels of   control   and   anonymity. Lightweight and web clients are served by third-party administrators, and being a

complete node allows them to trade directly and with what degree of anonymity. Regardless of the mechanism, these customer categories allow the user to access their wallet and send and receive bitcoin.

Each wallet is associated with one or more Bitcoin addresses, these are roughly similar to email addresses and allow anyone to send money to any account anywhere in the world at any time.

In addition, each wallet is accompanied by a private key which allows its holder to access the wallet and the bitcoin it has (Antonopoulos, 2017, p.1).

2.1 Confirmation of the transaction.

Initially one of the most complex elements of the peer-to-peer system since it has no central control is how transactions are identified and confirmed. This is where Bitcoin innovation comes into play. Instead of relying on an accredited principle for clearing online transactions as is the case with credit cards, Bitcoin on the other hand relies on a decentralized consent system.

Every user with full node status participates in the decentralized confirmation system. When a user transfer Bitcoin from his wallet to another wallet within the network, then the transaction is immediately logged by some nodes of the system (operating in the world).

Each node in turn sends the transaction to all the other nodes to which they are connected and so the transaction spreads rapidly throughout the network ecosystem. Each transaction contains proof of ownership and can only be unlocked and spent from the final recipient's wallet.

For this reason it plays absolutely no role that the other nodes see the transaction as they can not access the content of the transaction (Antonopoulos, 2017, p.24). The wallet that receives the transaction will record the transaction in a few seconds and the wallet holder will know that it is an incoming payment and thus will be able to access the transaction with his wallet key.

As Bitcoin moves from wallet to wallet it creates a chain of transactions, with each of the new transactions referring to the previous ones as a source for Bitcoin (Antonopoulos, 2017, p.18). All this information is tied to blocks which are confirmed through thorough computational processes performed by all nodes that are active in the system.

So anyone with full node status on the network uses part of their computer's processing power to confirm transactions on the Bitcoin network. Computers from all

over the world compete to confirm these blocks and a computer succeeds every 10 minutes at which point computers start a new block (Antonopoulos, 2017, p.28).
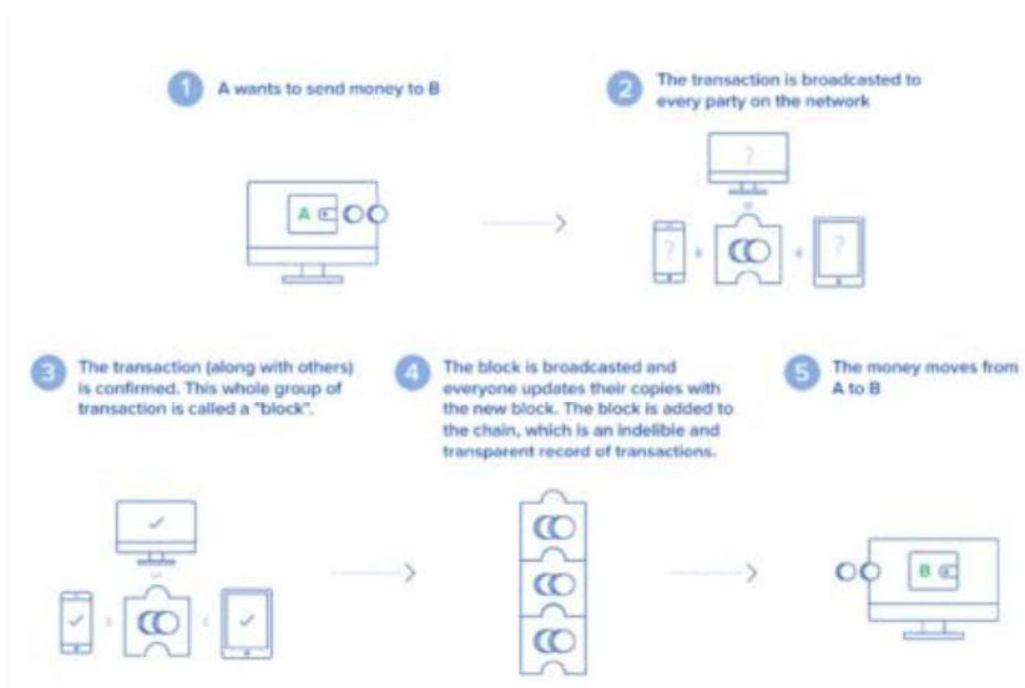

Figure 4 How Bitcoin Works. Source: Mazer, 2017

The computer that confirms each block adds it to a public blockchain called blockchain, which is essentially a decentralized public store that records all the transactions that have taken place. The complexity of the calculations required to confirm a block is enormous and it takes 10 minutes to form regardless of the processing power used or the number of transactions that took place to form the block (Antonopoulos, 2017, p.37).

Each block is based on the previous blocks and is the verification for the previous ones, for this reason each new block strengthens the validity of the previous transactions. In case someone wants to cancel a transaction fraudulently, that is, to spend the same money twice he must have a node, which will be able to change and confirm the blocks faster than the other nodes of the system.

But once a transaction is at a depth of a few blocks in the chain this node will have to reaffirm the original block and all the following in the same amount of time it takes just one node to confirm a new block (Antonopoulos, 2017, p.28) . This makes trading quite fast and secure.

In Figure 4 we can briefly observe how Bitcoin works. Much of the processing power of computers is currently used to extract blocks, and there are companies that devote all their resources to mining. You may be wondering why some people sacrifice the processing power of their computers to confirm other people's Bitcoin transactions.

Each block that is created offers 25 new Bitcoin which based on the current exchange rate of Bitcoin with the euro are worth many thousands of euros (Antonopoulos, 2017, p.27). Mining is therefore a mechanism that, in addition to ensuring that more and more computers enter the network helping to maintain system reliability, It is also a mechanism that provides new Bitcoin to the system, something similar to the issuance of new money by the central bank of a country that is part of the traditional monetary system.

This controlled and continuous increase in Bitcoin supply makes it invulnerable to high inflation. Brtcom is essentially a deflationary currency as the final amount of bitcoin that can be produced is 21 million bitcoins. The system is expected to reach its peak in 2140 and at this point the incentive to make one's computer as a hub in the Bitcoin system will not be the provision of new bitcoins, but rewarding the owner of the node with a percentage of the revenue from the commission on the transactions (Reiff, 2018).

2.2 How does one get bitcoin?

A person who wants to use bitcoin for transactions has four alternative ways to obtain them other than mining, where each of them has its pros and cons. The first way to get bitcoin or other cryptocurrencies is to open an account at one of the many cryptocurrency exchanges where you can buy bitcoin in any currency you want. Of course, in order to be able to buy bitcoin from the exchanges, one has to pay several certificates that will certify his tax status but also his identity, which makes the exchanges less attractive for those who would like to purchase Bitcoin anonymously and without much formality.

Other alternative ways to buy Bitcoin are through special ΛTMs where one can sell and buy Bitcoin anonymously simply by paying an additional commission on the purchase or sale to the ATM provider. But this solution is also subject to limitations as the global Bitcoin ATM network is very small.

An additional way to get bitcoin is to buy it directly from a miner for money or by selling products and services for a fee in Bitcoin. Today there are several start-ups but also IT workers who accept payments in Bitcoin. Nevertheless, as it is obvious, the ways of supplying Bitcoin are quite limited in relation to the ways of supplying the forced circulation money, greatly restricting someone who would like to make transactions in Bitcoin.

2.3 Blockchain

Once the transaction is done then it is published all over the Bitcoin network and can be seen by anyone in the world who has access to the network. Most people tend to associate Bitcoin with words such as confidentiality and anonymity, but when the public nature of blockchain technology behind Bitcoin cryptocurrency and its network is explained to many, many are hesitant.

In essence, however, the transactions take place under a pseudonym. Every transaction that takes place within the Bitcoin network together with the amount of the transaction and the address of the sender and recipient wallet are published on the blockchain page (www.Blockchain.info) (Swan, 2018, p.2). Blockchain, however, does not publish information such as who owns the wallet or on which server the wallets are stored.

Another feature of blockchain is that any transaction is irreversible. The publication, the irreversibility of the transactions but also the pseudonym of the user was included by the creator of Bitcoin for reasons of transparency, for the protection of users from fraud (Nakamoto, 2008, p.1) but also for security reasons respectively, despite these three elements are the most wonderful and at the same time the most controversial elements of Bitcoin.

Bitcoin is a peer-to-peer decentralized electronic trading system based on the principles of cryptography to secure the network, provide money and verify transactions. This enables network users to confirm their transactions on their own, without the need for any kind of central authority or which would act as an intermediary to verify and clear the transactions.

3. The pros and cons of Bitcoin

Having analyzed what Bitcoin is and how it works, it is the right time to talk about its strengths and weaknesses, before proceeding to the study of the role of cryptocurrencies in the global economy. In this chapter we will look at the main strengths / weaknesses of Bitcoin.

3.1 The advantages of Bitcoin.

In this section we will look in detail at the three main advantages of Bitcoin: transaction speed and cost, privacy and accessibility. Transaction speed and cost. We have the main advantages and disadvantages of Bitcoin.

When Bitcoin (BTC to USD) was established, its inventor, Satoshi Nakamoto, envisioned it as a medium of daily transactions. The goal of a decentralised cryptocurrency was to abolish government entities' centralised control of money and to ensure rapid transaction processing

Observers are now asking if the cryptocurrency has failed to live up to that promise more than a decade later. Bitcoin is used as a medium of exchange in a very small number of everyday transactions.

However, the concept of an alternate currency that is independent of governments and federal agencies is compelling. Recent Bitcoin technological advancements, like as the Lightning Network, have the ability to restore Bitcoin to its original promise. The number of locations accepting Bitcoin has risen in tandem with the evolution of the cryptocurrency's technology and brand awareness. You can use Bitcoin to purchase a surprising number of items.

Bitcoin was created to provide consumers with a unique set of benefits not available through conventional payment systems. These things will be examined in further detail below, but first, it's essential to understand what Bitcoin, the cryptocurrency, is. By comprehending the design concepts underlying Bitcoin, it will be simpler to appreciate the benefits of utilising Bitcoin for payments.

One of the positives of Bitcoin is that it is a fast and cheap way of trading. Cryptocurrencies can cross national borders, making the free movement of capital easier. A financial transaction using Bitcoin is faster and cheaper than any other traditional way of trading available today.

Sending a bank transfer to some part of the world using traditional currencies takes a few days due to the settlement of the transaction, until the recipient receives his

payment while the sender of the transfer will end up paying a commission rate on the transaction. But using bitcoin one can send any amount in fractions of a second free of charge. For the first time in history, technology makes it possible to transfer property rights quickly, transparently and safely.

Another positive aspect of using Bitcoin is that one can use it in several countries without having to change money in the local currency and at no extra charge. Cryptocurrencies can avoid such costs because they are designed for transnational use via the internet.

Bitcoin provides users with autonomy, whereas conventional fiat currencies are subject to numerous limitations and hazards. Banks, for instance, are susceptible to the economy's boom-bust cycles. Occasionally, as has occurred several times before, these conditions might result in bank runs and crashes. This implies that users lack true control over their money. At the very least, bitcoin theoretically provides users with autonomy, given its value is unrelated to specific government actions. This implies that bitcoin users and owners retain control over their funds.

Bitcoin transactions are pseudonymous. The majority of online transactions need a slew of information to authenticate the party initiating the transaction. For instance, money transfers between individuals are permitted only when the participants' identification information is confirmed on both ends. Similarly, to make an online transaction, you must submit your identifying information. While the verification procedure may help prevent criminality, it also firmly positions the intermediary in control of the transaction, allowing them to regulate the distribution of services to select parties.

Bitcoin transactions are encrypted with a hash of the recipient's public key. While this does not make the transactions totally anonymous, they may be traced back to a blockchain address. Individuals may own numerous addresses, just as they may possess many usernames and passwords for a single account. The transaction does not involve the exchange of Internet Protocol (IP) addresses or other identifying information.

Bitcoin transactions are peer-to-peer: The Bitcoin payment system is entirely peer-to-peer, which means that users may send and receive payments to or from anybody else on the network. Unless the parties to a transaction are sending or receiving bitcoin through a regulated exchange or institution, the parties to a transaction are not required to get approval from an external source or authority.

While it is customary for fiat currency exchanges to impose so-called "maker" and "taker" fees, as well as occasional deposit and withdrawal costs, Bitcoin users are exempt from the litany of typical banking expenses connected with fiat currencies. This implies that there are no account maintenance or minimum balance fees, no overdraft costs, and no penalties for returned deposits, to name a few.

Bitcoin payments feature minimal transaction fees for international transactions. Typically, wire transfers and overseas purchases incur fees and currency rates. Due to the absence of intermediate organisations or government intervention in Bitcoin transactions, transaction costs are often lower than those associated with bank transfers. For tourists, this may be a significant benefit. Additionally, bitcoin transfers are quick, avoiding the inconvenient wait times associated with traditional authorization processes.

As is the case with many other online payment systems, Bitcoin users may pay for their coins from any location with Internet connection. This eliminates the need for consumers to visit a bank or a business in order to make a transaction. Unlike online payments made using US bank accounts or credit cards, however, no personal information is required to complete any purchase.

Bitcoin transactions are irreversible. The immutability of the Bitcoin blockchain is one of its features. As a result, blockchain transactions are irreversible and cannot be altered by a third party, such as a government organization or financial services agency. Additionally, chargebacks for bitcoin delivered to another party are not permitted. In a sense, the only method to reverse Bitcoin transactions is for the recipient to return the original bitcoin back to you.

Bitcoin transactions are safe and secure. Bitcoin is not a tangible medium of exchange. As a result, criminals will be unable to steal it from its owner. If hackers get the wallet's private keys, they can take the owner's bitcoin. However, it is theoretically impossible to steal bitcoin if adequate security measures are taken. While there have been allegations of hacking at cryptocurrency exchanges, Bitcoin's exchange has remained unaffected. As a result, transactions between two (or more) addresses are completely safe.

Due to the fact that users may send and receive bitcoins using just a smartphone or computer, Bitcoin is potentially accessible to masses of people who do not have access to traditional banking systems, credit cards, or other forms of payment.

3.2 The disadvantages of Bitcoin

After reviewing the fundamental advantages, we may discuss the negatives. Three major disadvantages must be highlighted in order to give you a sense of what to expect from Bitcoin.

Thus, among Bitcoin's downsides are a lack of notification and comprehension. Many people are still unaware of the existence of digital currencies such as Bitcoin. Individuals must be educated about Bitcoin in order to apply it to their lives. Networking is the most effective method of promoting Bitcoin. Businesses accept

bitcoins for a variety of reasons, although the list is quite brief in comparison to real money.

TigerDirect, Dell, NewEgg, Tesla, and Overstock all accept Bitcoin as payment, which is fantastic. Employees should be educated on Bitcoin in order to assist their customers. This will undoubtedly take some time and effort.

Risk and volatility are two significant disadvantages of Bitcoin. This is highly volatile, especially given the limited supply of coins and the increasing demand for them with each passing day. Bitcoin's Value Fluctuates significantly. Bitcoin's value fluctuates regularly in response to demand. As of June 2nd, 2011, a single Bitcoin was worth $9.9 on a prominent bitcoin exchange website. Only six months ago, it was valued at less than $1. Due to this continuous fluctuation, Bitcoin-accepting websites' pricing will fluctuate constantly. Additionally, it will create considerable uncertainty if a refund is issued for a goods. For instance, if a t-shirt was purchased for 1.5 BTC and returned a week later, should 1.5 BTC be refunded despite the fact that the value has increased, or should the new amount (calculated using the current value) be sent? These are still significant issues on which the Bitcoin community is divided.

Volatility, on the other hand, is projected to diminish over time. Given the widespread use of Bitcoin by businesses, media outlets, and shopping malls, its price will eventually stabilize.

At the moment, the Bitcoin price fluctuates daily, owing largely to the happenings surrounding digital currencies. Bitcoin is still in its infancy, with limited but developing capabilities. To increase the security and accessibility of digital currency, new features, tools, and services are continually being developed. In the following paragraphs the disadvantages will be further examined.

A severe drawback is that Bitcoins are not widely accepted. Bitcoins are now only accepted by a tiny number of internet retailers. This makes it impractical to rely only on Bitcoins as a medium of exchange. Additionally, governments may compel merchants to avoid using Bitcoins in order to facilitate the tracking of consumers' transactions.

Wallets storing Bitcoins can become damaged. If a hard drive fails or a virus corrupts data, and the wallet file becomes corrupted, Bitcoins are effectively "lost." There is no way to retrieve it. These coins will remain orphaned in the system in perpetuity. This may render a wealthy Bitcoin investor bankrupt in a matter of seconds, with no possibility of recovery. Additionally, the investor's coins will be permanently orphaned.

There is no Buyer Protection around Bitcoins. When things are purchased using Bitcoins and the vendor fails to deliver the goods, the transaction cannot be reversed. This issue may be resolved by utilising a third-party escrow service such as ClearCoin, however escrow services would then take on the function of banks, causing Bitcoins to resemble a more traditional currency.

There is a great possibility of Unknown Technical Vulnerabilities The Bitcoin system may include previously undiscovered flaws. Given the system's youth, if Bitcoins were extensively accepted and a weakness was discovered, it might result in enormous wealth for the exploiter at the price of destroying the Bitcoin economy.

Bitcoin's structure has Built-in Deflation. Due to the fact that the total quantity of bitcoins is limited to 21 million, deflation will occur. Each bitcoin will increase in value once the total number of Bitcoins reaches its maximum. This method was created to incentivize early adopters. Given that the value of each bitcoin will increase with each passing day, the decision of when to spend becomes critical. This might result in spending spikes, causing the Bitcoin economy to swing dramatically and unpredictably.

There is no Physical Form of bitcoins. Because Bitcoins lack a physical form, they cannot be utilised in brick-and-mortar shops. It would have to be changed to other currencies at all times. Although cards with Bitcoin wallet information have been presented, there is no consensus on a particular solution. Due to the existence of several competing systems, businesses would be unable to support all Bitcoin cards, forcing consumers to convert Bitcoins regardless, until a universal system is developed and implemented.

There is no minimum valuation guarantee on Bitcoins. Because Bitcoins are not governed by a central body, no one can guarantee their minimum value. If a substantial number of merchants decide to "dump" Bitcoins and exit the system, the currency's value will plummet, wreaking havoc on users who have significant money invested in Bitcoins. Bitcoin's decentralized nature is both a curse and a benefit, as we'll see below.

Bitcoin still has a long way to go before reaching its full potential. This is because Bitcoin is still in its infancy and, like any other coin, must overcome initial difficulties. Bitcoin's design enables anonymous ownership and transfer. Bitchers can be held on a personal computer as a wallet file or with a third-party wallet service; in either case, bitchers can be delivered over the internet to anybody with a Bitcoin address. Due to the peer-to-peer nature of Bitcoin and the absence of a central administration, it is impossible for an authority, such as a government, to manipulate the value of Bitcoin or cause inflation by generating them.

4. Statistical Analysis Bitcoin / Gold in $

For the statistical analysis performed, prices were initially collected from the Internet per month for the last 10 years and are presented below:

Month	BTC Price $	Gold price $
July-10	0,09	1196
August-10	0,06	1213,464
September-10	0,06	1271,461
October-10	0,06	1343,19
November-10	0,2	1371,784
December-10	0,23	1393,512
January-11	0,3	1360,475
February-11	0,7	1371,313
March-11	0,92	1422,848
April-11	0,77	1474,431
May-11	3,03	1512,188
June-11	9,57	1528,38
July-11	15,4	1568,526
August-11	13,09	1759,5
September-11	8,21	1780,648
October-11	5,03	1667,893
November-11	3,15	1735,977
December-11	3,06	1652,725
January-12	5,27	1656,095
February-12	6,08	1743,095
March-12	4,92	1675,057
April-12	4,83	1648,539
May-12	5	1585,114
June-12	5,27	1595,632
July-12	6,63	1592,784
August-12	9,55	1625,682
September-12	9,97	1741,925
October-12	12,4	1746,348
November-12	10,57	1724,352
December-12	12,56	1687,342
January-13	13,3	1671,886
February-13	20,5	1630,68
March-13	34,5	1591,013
April-13	104	1485,905
May-13	116,38	1416,143
June-13	129,3	1342,7
July-13	84,61	1284,348

August-13	96,42	1345,048
September-13	128,26	1348,464
October-13	125,49	1314,402
November-13	198,51	1277,417
December-13	946,92	1221,588
January-14	770,44	1243,068
February-14	853,02	1298,713
March-14	563,74	1336,56
April-14	479,72	1299,175
May-14	456,27	1288,913
June-14	629,02	1277,857
July-14	635,59	1312,989
August-14	595,08	1297,005
September-14	474,13	1241,32
October-14	381,33	1223,565
November-14	325,39	1176,413
December-14	378,64	1200,44
January-15	313,92	1249,333
February-15	226,4	1231,1
March-15	258,74	1180,636
April-15	246,55	1198,253
May-15	212,12	1197,684
June-15	223,31	1182,248
July-15	257,66	1131,58
August-15	280,04	1117,525
September-15	227,35	1124,905
October-15	237,57	1157,123
November-15	325,08	1088,388
December-15	362,73	1068,317
January-16	434,46	1095,655
February-16	371,25	1194,893
March-16	433,64	1246,312
April-16	417,01	1241,452
May-16	453,04	1259,755
June-16	536,42	1273,58
July-16	676,52	1337,429
August-16	607,37	1340,861
September-16	571,69	1326,618
October-16	613,93	1268,929
November-16	729,27	1240,293
December-16	753,26	1152,165
January-17	997,69	1192,648
February-17	987,35	1233,39
March-17	1230,02	1231,063
April-17	1089,51	1267,15
May-17	1402,08	1245,25
June-17	2452,18	1261,277
July-17	2460,2	1235,1

August-17	2735,59	1281,72
September-17	4950,72	1317,045
October-17	4394,64	1280,677
November-17	6750,17	1283,189
December-17	10859,56	1265,674
January-18	13412,44	1332,809
February-18	9052,58	133,775
March-18	10907,59	1325,562
April-18	6816,74	1335,332
May-18	9067,72	1303,618
June-18	7518,25	1282,126
July-18	6347,86	1238,064
August-18	7603,75	1201,859
September-18	7192,3	1199,198
October-18	6578,79	1214,726
November-18	6358,4	1221,275
December-18	4165,61	1249,887
January-19	3869,47	1291,63
February-19	3468,25	1319,755
March-19	3850,07	1302,2286
April-19	4156,39	1287,65
May-19	5423,66	1282,46
June-19	8553,13	1358,488
July-19	10599,33	1414,611
August-19	10405,21	1497,102
September-19	9773,34	1510,336
October-19	8326,58	1494,765
November-19	9265,43	1471,921
December-19	7420,84	1480,025
January-20	7188,46	1560,668
February-20	7388,66	1598,818
March-20	8540,26	1593,764
April-20	6671,95	1680,03
May-20	8771,57	1715,697
June-20	9564,95	1734,032
July-20	9153,95	1840,807
August-20	11354,16	1968,63
September-20	11964,21	1921,92
October-20	10626,6	1900,27
November-20	13762,97	1866,3
December-20	18795,2	1858,42
January-21	29391,78	1866,98
February-21	33543,77	1808,17
March-21	49619,64	1718,23
April-21	58726,68	1760,04

Based on these values, we proceed to a statistical analysis with the presentation of time series charts, the creation of a linear regression and a correlation table, and finally the following model for predicting the prices of both bitcoin and gold.

The comparative chart shows the change in the price of gold and the change in the price of bitcoin per month over the last 10 years from historical data extracted from a bank of statistics. Specifically, from July 2010 until May 2021.
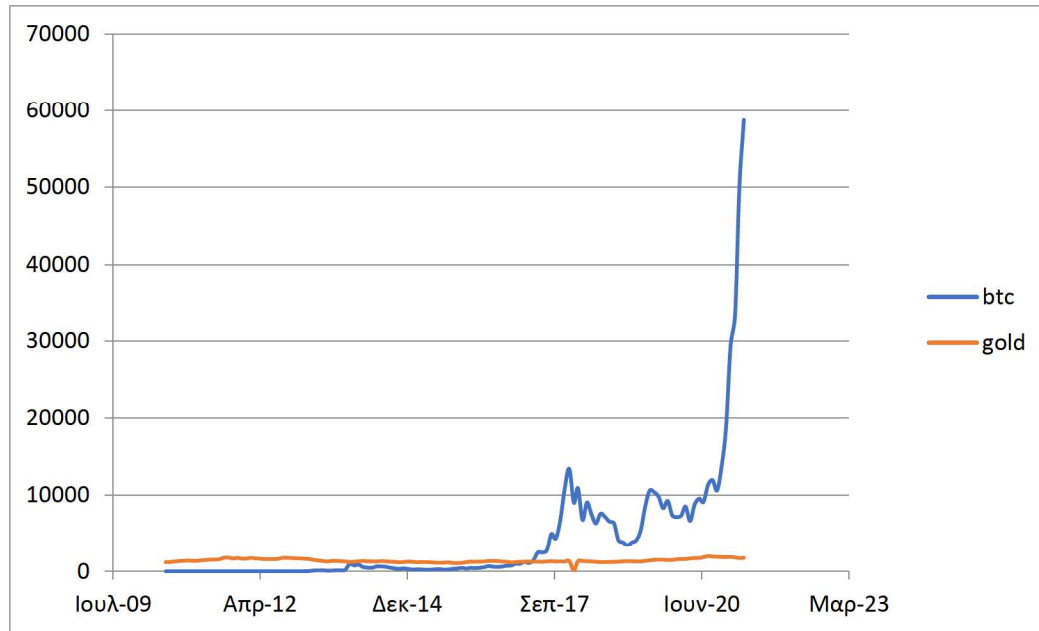

Figure 5 Change in the price of gold and bitcoin over the last 10 years

From what we see, the price of gold remains essentially unchanged, while on the contrary we observe a large change in the price of bitcoin with it launching in recent months.

Then we want to see the correlation of these 2 quantities based on the linear regression model that we will develop. By solving from excel taking as an independent variable the price of gold and as dependent that of bitcoin we have the following table.

The dependent variable is the price of bitcoin for the linear regression model that we will develop below since after a study it becomes clear that the price of gold remained essentially constant. So, the price that changes is that of bitcoin and will be the dependent variable Y of our model while the price of gold respectively will be the independent variable X.

Statistical Conclusion

Regression Statistics								
R	0,32482737							
R Square	0,105512821							
Adjusted R Square	0,09852464							
Standard Error	7867,889412							
Size of Sample	130							
Variance Analysis								
	Independence	*SS*	*MS*	*F*	*Σημαντικότητα F*			
Regression	1	934668435,4	934668435,4	15,09875306	0,000162851			
Residual	128	7923671527	61903683,8					
Total	129	8858339962						
	Value	*Standard Error*	*t*	*P-Value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Ψ Factor	-11208,79078	4001,643007	-2,801047159	0,005884742	-19126,72515	-3290,856408	-19126,72515	-3290,856408
X Factor	10,94543525	2,816842047	3,885711397	0,000162851	5,371832	16,5190385	5,371832	16,5190385

We observe that R^2 is very far from the ideal value of the unit which means that our variables are not related or interact very much. The latter can also be seen from the correlation table that also comes from evolution and is presented below.

	Column 1	Column 2
Column 1	1	
Column 2	0,324827	1

At the value of β the correlation table gives satisfactory results since β> 0.

It was also made with the help of the predictor in excel and a forecast for the prices of bitcoin and gold based on the historical data extracted and used for the previous analyzes. The results of the forecast are presented below:
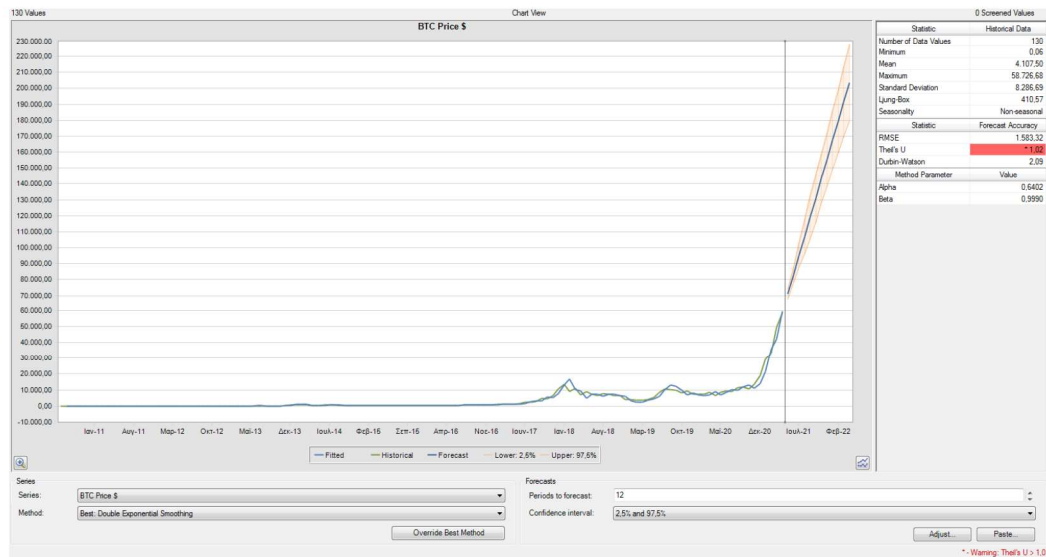

Figure 6 Forecast for the price of bitcoin based on historical data

The confidence interval used is 95% and from what appears in the forecast chart, a further increase in the price of bitcoin is expected in the coming months.

Figure 7 Forecast for the price of gold based on historical data

In the case of gold now we observe that the forecast gives a stable price for the coming months, which is expected based on the historical data we have from the time series.

Crystal Ball Report – Predictor (created 01/06/2021)

Data attributes	
Number of series	2
Data is in	months
Run preferences	
Periods to forecast	12
Fill-in missing values	On
Adjust outliers	Off
Methods used	Non-seasonal methods
	ARIMA methods
Forecasting technique	Standard forecasting
Error measure	RMSE

Predictor Series

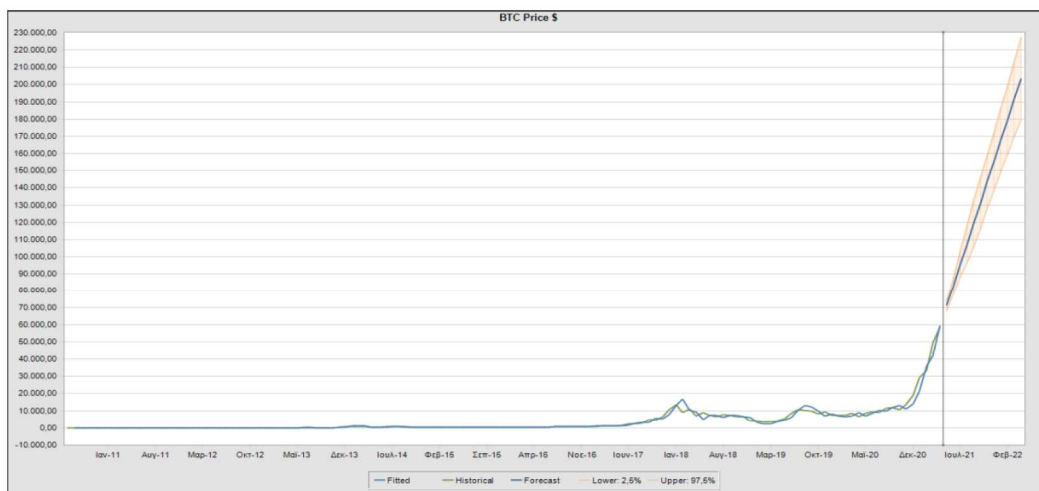| Summary:	
Best method	Damped Trend Non-Seasonal
Error measure (RMSE)	134,92

Figure 8 Forecast for the price of bitcoin based on historical data

Forecast Results:

Date	Lower: 2,5%	Forecast	Upper: 97,5%
May '21	67.968,65	71.071,90	74.175,15
June '21	78.169,85	83.116,31	88.062,76
July '21	87.536,78	95.160,72	102.784,66
August '21	96.333,55	107.205,13	118.076,71
September '21	105.614,60	119.249,54	132.884,48
October '21	116.166,52	131.293,95	146.421,38
November '21	127.856,57	143.338,36	158.820,15
December '21	138.416,19	155.382,77	172.349,35
January '22	148.744,69	167.427,18	186.109,68
February '22	159.720,95	179.471,59	199.222,23
March '22	169.465,63	191.516,00	213.566,38
April '22	179.616,20	203.560,41	227.504,62

Historic Data:

Statistic	Historical data	
Data Values	130	
Minimum	0,06	
Mean	4.107,50	
Maximum	58.726,68	
Standard Deviation	8.286,69	
Ljung-Box	248,67	(Detrended)
Seasonality	Non-seasonal	(AutoDetect)
Screened Values	0	

Forecast Accuracy:

Method	Rank	RMSE
Double Exponential Smoothing	**Best**	**1.583,32**
Damped Trend Non-Seasonal	2nd	1.583,43
ARIMA(1,2,0)	3rd	1.587,33

Method	Theil's U		Durbin-Watson
Double Exponential Smoothing	1,02	*	2,09
Damped Trend Non-Seasonal	1,02	*	2,09
ARIMA(1,2,0)	0,9943		2,08

Method Parameters:

Method	Parameter	Value
Double Exponential Smoothing	Alpha	0,6402
	Beta	0,9990
Damped Trend Non-Seasonal	Alpha	0,6404
	Beta	0,9990
	Phi	0,9990
ARIMA(1,2,0)	---	---

Summary:	
Best method	Damped Trend Non-Seasonal
Error measure (RMSE)	134,92

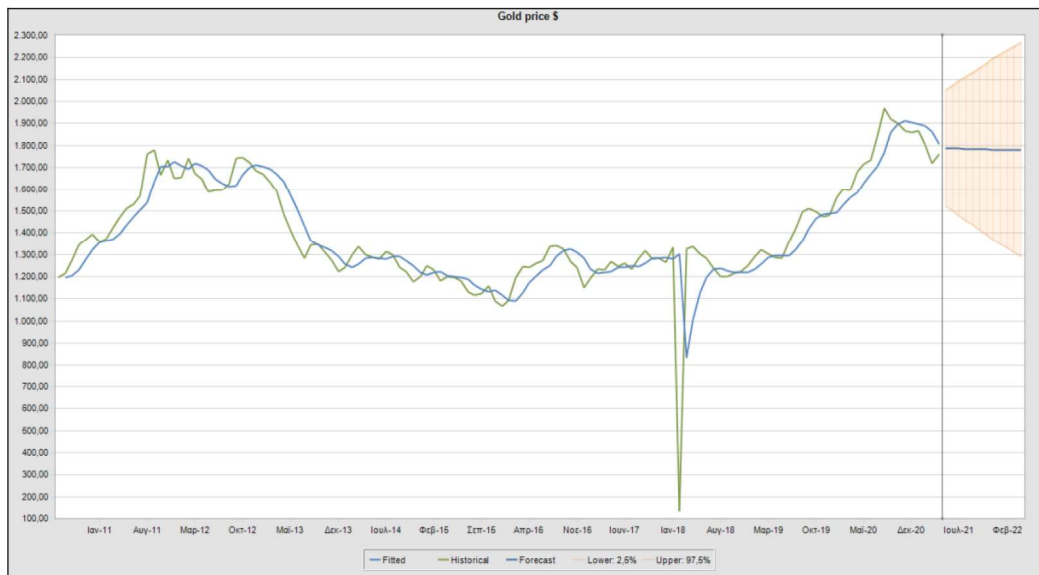*Figure 9 Forecast for the price of gold based on historical data*

Forecast Results:

Date	Lower: 2,5%	Forecast	Upper: 97,5%
May '21	1.524,26	1.788,70	2.053,14
June '21	1.500,57	1.787,30	2.074,02
July '21	1.476,73	1.786,07	2.095,41
August '21	1.454,97	1.784,99	2.115,02
September '21	1.434,10	1.784,05	2.134,01
October '21	1.413,90	1.783,23	2.152,56
November '21	1.391,02	1.782,51	2.174,00
December '21	1.367,39	1.781,88	2.196,37
January '22	1.347,84	1.781,33	2.214,82
February '22	1.327,53	1.780,85	2.234,17
March '22	1.309,04	1.780,43	2.251,81
April '22	1.289,22	1.780,06	2.270,89

Historic Data:

Statistic	Historical data	
Data Values	130	
Minimum	133,78	
Mean	1.399,33	
Maximum	1.968,63	
Standard Deviation	245,92	
Ljung-Box	1.017,01	(Detrended)
Seasonality	Non-seasonal	(AutoDetect)
Screened Values	0	

Forecast Accuracy:

Method	Rank	RMSE
Damped Trend Non-Seasonal	**Best**	**134,92**
ARIMA(0,1,1)	2nd	135,26
Single Exponential Smoothing	3rd	135,40

Method	Theil's	Durbin-

	U	**Watson**
Damped Trend Non-Seasonal	0,4263	1,98
ARIMA(0,1,1)	0,4582	2,04
Single Exponential Smoothing	0,4618	2,04

Method Parameters:

Method	**Parameter**	**Value**
Damped Trend Non-Seasonal	Alpha	0,3767
	Beta	0,0751
	Phi	0,8750
ARIMA(0,1,1)	---	---
Single Exponential Smoothing	Alpha	0,4374

5. Policy Concerns

Six major concerns should be addressed in the public policy debate over how to regulate crypto assets.

To begin, to what extent does new technology enable novel sources of financing that reduce financing costs? At the moment, crypto assets such as initial coin offerings (ICOs) play a minor role in financing the European economy. However, permissioned blockchain solutions may eventually reduce financial intermediation's transaction costs by increasing access to finance for smaller businesses and projects. It is too early to determine the magnitude of the benefits, as the technology and governance are still in their infancy. A compelling argument is undoubtedly that government should not stifle further innovation in this space.

Second, cryptocurrencies have been and continue to be used in criminal activity.[1] Because cryptocurrency transactions can be conducted anonymously, they can be abused. The strong market reaction to bitcoin's value following the closure of Silk Road, a major digital market for illicit drugs, indicates that illegal activity is indeed a significant feature of cryptocurrencies. As with cash, which has numerous safeguards in place to prevent abuse, prudent policy action is required to limit and prevent illegal

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[1] G20 Communiqué 19-20 March 2018. See: https://g20.org/sites/default/files/media/communique_-_fmcbg_march_2018.pdf.

activity in cryptocurrencies. The anti-money laundering directive of the European Union has been amended to address this. [2]
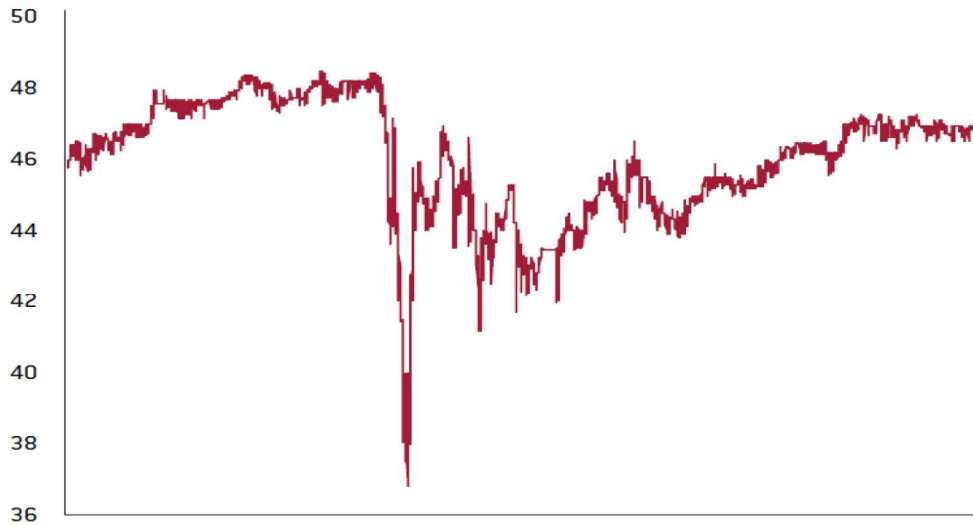

Figure 10 Variance of bitcoin price between 11 and 13 of March in - Source: Bruegel based on coindesk.com. Note: Intraday data.

Thirdly, consumer and investor protection concerns must be addressed thoroughly. Due to the digital nature of crypto assets, they are immediately accessible to the entire population, as long as they are technologically aware. While widespread access is ideal, it also puts disadvantaged populations at risk. For instance, the March 2018 US Student Loan Report23 cites the findings of a poll in which about a fifth of all participating students admitted to investing financial aid funds in cryptocurrencies such as bitcoin. The three ESAs have published cautionary statements regarding the risks associated with crypto assets.

By definition, many ICOs are investments in hazardous start-ups — something that would generally be done in the conventional financial system by venture capitalists who understand and appropriately price the risks.

Apart from the usual risk of default and loss associated with investing in initial coin offerings and cryptocurrencies, there have been instances of fraud. These incidences ranged from the discovery of coding flaws to actual cases of the system being hacked. Notably, a group of hackers dubbed the '51 Crew' gained control of over 51% of the computer network of two blockchain clones, Shift and Krypton. The organisation successfully took over the verification process, enabling the theft of $65

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[2] In February 2018, Europol, the European Union Agency for Law Enforcement Cooperation, estimated that about 3-4 percent of illicit proceeds in Europe are laundered through cryptocurrencies. See: https://www.bbc.co.uk/ news/technology-43025787.

million in bitcoin online24. Additionally, hackers and fraudsters have targeted service providers such as wallets that store cryptographic keys on behalf of customers and investors. According to the MIT Technology Review,25 the Wall Street Journal studied 1,450 initial coin offerings (ICOs) and discovered that 271 raised major suspicions about their validity. Investor protection becomes more more critical as they gain prominence.

Fourthly, financial stability is a concern. The market's high level of volatility could jeopardise financial stability. This is not a significant concern at the present, given the market is still very tiny and mainly unconnected to the traditional financial system. As a result, the FSB concluded that crypto assets do not constitute a major risk to global financial stability at the moment, but emphasised the importance of continuous monitoring given the rapid pace of development and data shortages.

Fifth, there are critical issues regarding the taxation of crypto assets. One point of contention is the taxation of gains made from cryptocurrency speculating. A sensible course of action would be to tax those profits similarly to other profits derived from speculation in, say, stocks. A second point to consider is how companies should be treated with the revenues of their initial coin offerings. Companies that issue security tokens may be taxed in the same way as other businesses. More complicated is the taxation of utility tokens, which are exchanged for cash at the moment of issuance and need the corporation to spend resources in order to supply the services. This necessitates some explanation regarding the required fiscal accountability. For the purchaser of the utility token, there is also the issue of whether and how the valuation gain should be taxed (if you pay €100 for a token in the anticipation of receiving access to a computer game worth €200 in two years, should the €100 gain be taxed? What if the token's value grows to €250 at that point?).

Finally, blockchain technologies create significant legal issues in financial and non-financial applications. For instance, blockchain technology has the potential to significantly simplify the clearing and settlement processes. However, the participants in such a solution would require legal safeguards to ensure that any blockchain-based settlement has the same legal status as past settlements.

Similarly, trials with blockchain-based solutions in trade finance indicate that significant cost savings are achievable. Nonetheless, the majority of tests presently replicate the blockchain approach through traditional document exchanges. To be truly functional, the blockchain-based transfer of property, such as a container, would need to be legally recognised and binding. Otherwise, a state of extreme legal insecurity reigns.

6. Three elements that should guide the EU's crypto assets debate

There is widespread agreement among cryptocurrency specialists and policymakers (IMF, 2018; BIS, 2018) that the technology behind crypto assets is intriguing and promising. However, it is believed that the technology is still in its infancy and that when new applications develop, we are only beginning to comprehend how it might be used for other purposes. As we have demonstrated, the overall value of crypto assets is now insignificant, and hence does not constitute a noticeable risk to financial stability (IMF, 2018) or to other sectors. Regulation must be tailored to the technical character of crypto assets, particularly when they are built on completely decentralised networks. Numerous these crypto assets, such as bitcoin, are not issued by well-known businesses (legal entities or otherwise).

The issuer's identity is never divulged during this process. As bitcoin is merely a piece of software code that resides on the internet, it is consequently impossible to govern. Rather than that, one can regulate any companies that deal in cryptocurrencies: for example, as China has done, mining farms can be prohibited. Additionally, exchanges can be regulated. On exchanges functioning in Europe, buying and selling may be forbidden. As a result, the regulatory approach must be modified.

The European policy debate on crypto assets should centre on three critical issues:

To begin, should cryptocurrency assets be decentralised, regulated, or integrated? Mark Carney was the first to pose this question. It is claimed that broad regulation of crypto assets may be premature, as regulation may stifle or prevent innovation.

Regulators would be required to define and classify crypto assets.

As a result, innovation may be stifled or even channelled toward regulatory avoidance. Rather than that, Landau and Genais (2018) advocated those regulatory efforts be concentrated on the interface between crypto assets and the conventional financial system. Another significant argument against broad regulation is that it may prematurely legitimise the regulated institution. The fact that anything is regulated and supervised serves as a stamp of approval for retail and professional customers.

However, the plan to effectively isolate crypto assets by focusing regulation on the interface and limiting banks and funds' capacity to invest in crypto assets has substantial downsides. To begin, government involvement may serve to stifle the growth of crypto assets. Significantly more than direct asset regulation. Without access to investment and savings funds, for example, it may be impossible for the market to flourish. Then, innovation would be primarily focused on novel applications.

Protection concerns are already considerable, and given their rapid growth and profitability, crypto asset exchanges may already be held to high standards. Mark Carney agrees that crypto assets should be regulated immediately but not segregated

from the traditional banking system. Others, such as the US Securities and Exchange Commission, are currently debating whether to approve a bitcoin ETF, which would allow for a more complete integration of bitcoin into the financial system.

It is prudent for financial institutions to minimise their exposure to cryptocurrencies. Not only do cryptocurrencies add little societal benefit (at least in industrialised economies with well-functioning and accountable central banks), but they are also high-risk assets that can threaten financial stability as they rise. However, the question is whether this would not be best accomplished by treating and regulating them as highly specialised. If one recognises the necessity of regulation, the next question is how to regulate. Much, in our opinion, can be absorbed under existing regulation, subject to case-by-case examination by the appropriate supervisors. At its heart, most of the crypto asset universe is a case of 'old wine in new bottles'. In other words, technological aspects do not alter the essential essence of financial intermediation, which must be regulated. Allow for the unfettered development of new technology and for legislation to be technology neutral.

Second, a worldwide approach to crypto assets requires coordination on critical regulatory issues. To combat money laundering and terrorism financing, as well as to avoid tax evasion, international collaboration is necessary, even more so in the world of crypto assets. However, because access to crypto exchanges is largely limited to having access to the internet, a global approach would help consumer and investor protection for crypto exchanges as well. As a result, we believe that the FSB and the G20 are the optimal institutions to tackle these issues. Apart from money, we have emphasised the importance of international standards and their compatibility with other legal systems. A global standard for blockchain-based trade finance solutions, for example, would be extremely beneficial. Organizations that develop standards, such as the ISO, can contribute to this effort.

Thirdly, there is the issue of which supervisor/institution should be responsible for enforcing regulation. As previously recorded, a range of national and EU-level supervisors presently apply the existing regulatory framework in a variety of ways, sometimes inconsistently.

Given that consumers, investors, and businesses can conduct digital commerce from any EU country, it makes sense to empower a single regulator to eventually oversee the whole crypto asset market. This is the correct way for capital market unity in general (Sapir, Véron, and Wolff, 2018), and is even more so for digitally delivered crypto assets.

However, the precise point at which this should occur is still debatable. Currently, it may be beneficial to maintain disparate practises across EU member states for a period of time in order to experiment and learn about the most effective ways to this rapidly growing technology. However, it means that regulatory arbitrage within the EU must be accepted for a period of time. This may be tolerable for the time being given the market's tiny size, but it establishes facts on the ground and complicates ultimate transition to European Securities and Markets Authority regulation. Thus,

policymakers should discuss not whether, but when, the EU should adopt a unified supervisory strategy.

Finally, we'd like to emphasise the need of accountability. Crypto-asset systems should be impervious to human mistake, fraud, and malice. However, even the most resilient system can fail, which is why it should include built-in methods for resolving disagreement and disputes.

Peer review of software code is not always enough to ensure its resilience. Purely decentralised systems, such as bitcoin, lack the ability to hold an individual/institution accountable in the event of an error. This may eventually result in unstable systems.

As a result, technology as a stand-alone mechanism may be constrained. Rather than that, it is believed that if technology is combined with institutions that have a strong emphasis on ultimate accountability, it will deliver genuine benefits.

7. Bitcoin, Crypto coins and Money Laundering

7.1 Cryptocurrencies as a Target for Money Laundering

There are a number of reasons why cryptocurrencies are used to facilitate money laundering, but the most important is anonymity. Individuals and criminal groups can conceal their genuine identities by utilising various aliases and pseudonyms, effectively allowing for anonymous transactions. Additionally, cryptocurrency transactions do not require the use of a regulated bank or even a third party. Rather than that, money can be moved freely and independently without the transaction's purpose or legitimacy being confirmed.

While transactions may be recorded on a blockchain and the ledger is publicly accessible, law enforcement may have limited use for the information unless they know the genuine identity of the parties dealing. As a result, it's unsurprising that the FBI spends around 75% of its financial crime investigation man-hours on digital money.

Another reason cryptocurrencies are ripe for money laundering is that the industry is not uniformly regulated, resulting in an inaccurate level of suspicious activity reporting. After all, banks and money service firms ("MSBs") such as Western Union maintain sizable compliance departments tasked with the sole responsibility of tracking money as it moves through their enterprises. Sophisticated software programmes identify transactions that appear to be strange or irregular, and an anti-money laundering investigator is entrusted with examining the transactions to ascertain the activity's validity. Attempts are made during this procedure to identify the parties involved, the source of the funds, the goal of the activity, and if the transactions are reasonable or have a discernible purpose. The information is then submitted to the Financial Crimes Enforcement Network (FinCen) via a Suspicious Activity Report if the activity cannot be properly explained (SAR).

However, because cryptocurrencies are not issued by financial organisations, they are not regulated in the same way. Individuals can freely swap cryptocurrencies without the assistance of a financial intermediary, and cryptocurrency exchanges can also be used to aid money laundering. Exchanges are essentially trading platforms where cryptocurrencies can be officially purchased or sold, allowing for the conversion of traditional currencies to cryptocurrencies or vice versa, as well as the exchange of one cryptocurrency for another. While some exchanges have anti-money laundering processes in place, there are still vulnerabilities that can be exploited.

Even the largest and most strictly regulated financial institutions, after all, are susceptible to money laundering operations. Simply having compliance departments and anti-money laundering detectives does not ensure that money laundering activity has ceased.

Another reason cryptocurrencies are vulnerable to money laundering is because some coins, termed privacy coins, are deliberately designed to conceal a user's identity

and transaction details. According to a Nasdaq article, these cryptocurrencies remain public in the sense that they have public open ledgers, but transaction data is disguised to varied degrees to preserve end users' anonymity. As a result, privacy coins like as Monero and Zcash add another layer of secrecy to the equation, which benefits criminals while impeding law enforcement.

It is critical to remember that, while privacy coins may appear to be unreasonably beneficial to money launderers, they were not established with the goal of modernising an age-old crime by manipulating twenty-first century technology. Rather than that, privacy coins were created to provide individuals with an additional layer of privacy, security, and anonymity in the digital era. Unfortunately, as is the case with most technical advancements, while the inventors may have had the greatest of intentions, some individuals will always find a way to abuse the technology.

Which leads us to the second reason cryptocurrencies are becoming increasingly vulnerable to money laundering: inconsistency in global regulation. According to an article titled Cryptocurrencies and the Global Governance Challenge, "the anonymity and lack of regulation around cryptocurrencies have aroused considerable worries that they promote money laundering, tax evasion, drug trafficking, and other forms of criminal behaviour."

When bitcoin was first developed, the goal was not to create a new vehicle for money laundering, but to enable unrestricted trade. While cryptocurrencies remain a relatively new notion nearly a decade later, legislation regulating cryptocurrency activities have lagged behind. While there is widespread agreement on the increased risk of money laundering associated with cryptocurrency use, and some nations have enacted legislation to address the issue, there is currently no global standard in place.

For example, bitcoin is not regarded legal cash in the United States, and the legality of exchanges varies by jurisdiction. In Japan, cryptocurrencies are considered legal cash, and exchanges that are registered with the Japanese Financial Services Agency are permitted. Bitcoin trading is prohibited in China, while India is reportedly considering outlawing bitcoin entirely.

7.2 Money Laundering Process with Bitcoin

Placement, layering, and integration are the three stages of traditional money laundering. Cash is routinely used to launder money at the placement step. The launderer is "particularly susceptible to being captured" at this stage, as depositing large sums of cash can raise suspicions (Money Laundering: A Three Stage Process, n.d.). During layering, money is moved across accounts, products, financial institutions, and even nations and currencies, making it impossible to track its origin. Finally, during the integration stage, the offender receives the cleansed, "laundered" money. The KYC Map map below depicts the multi-stage process:
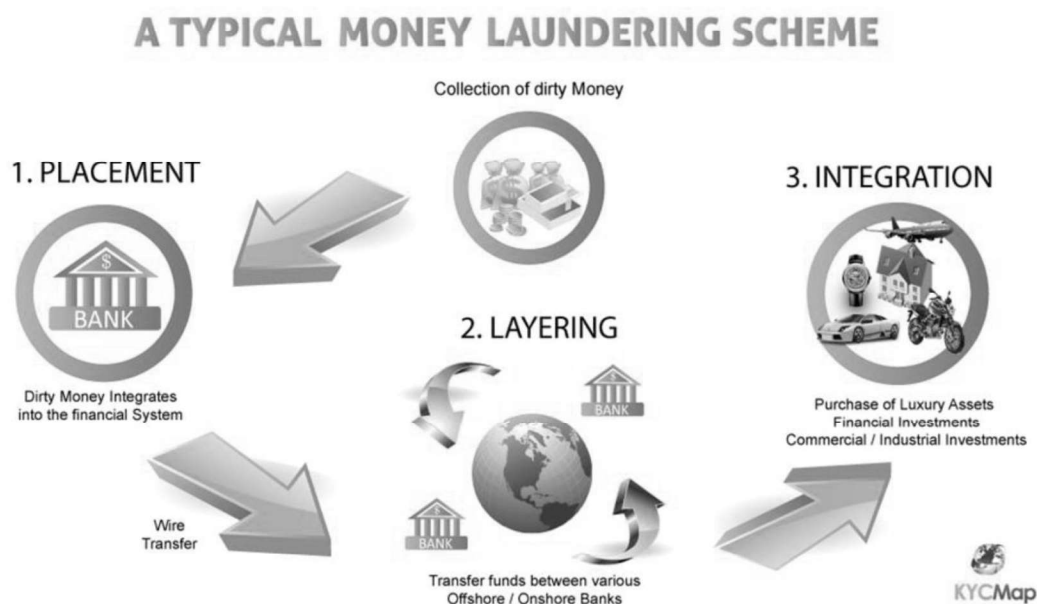

Figure 11 Money laundering scheme

Consider the following scenario: a cash-intensive business owner consistently deposits large sums of cash into Bank A. Moreover, the same person's drugs sales revenue is deposited into the same bank account. For example, if the business owner/drug dealer deposits the exact same amount of money every few days, the activity may appear normal to the bank and go undetected. Debit or credit card payments are not tracked by the bank, for example.

The owner of Bank A then transfers funds to Bank B, which is ultimately transferred to Bank C. The owner of Bank C then withdraws the monies. Bank C is unaware that the funds came from a cash deposit made of of legitimate business earnings and illegal drug sales. Bank C understands the cash were moved electronically from Bank B without doing any inquiry. As a result, if neither Bank A, B, or C suspects the behaviour, law enforcement is unlikely to be contacted.

Keep in mind that this is an oversimplified example that intentionally leaves out Banks A, B, and C. This scenario is meant to show how money laundering works and how difficult it might be to detect. The use of cryptocurrencies as a means of money transmission can make money laundering more difficult to detect.

Consider the same fictional business owner's cash-intensive operation. Like many money launderers, the business owner wishes to constantly change the method of laundering to avoid detection or unwanted attention. To purify dirty money, the business owner/criminal invests in cryptocurrencies.

The same three-step laundering technique applies to cryptocurrencies, but the challenges associated with each stage are essentially different, according to a Reuters storey. Placement involves moving funds from a regular bank to a cryptocurrency exchange account in order to buy major coins like bitcoin or Ethereum. It's then traded for altcoins during the layering step to muddy the electronic paper trail, making it harder for law enforcement to track the money path. This is known as chain hopping (Kelly, 2017). It can then swap altcoins for major coins, which can subsequently be converted for fiat currency at the integration process (Fruth, 2018).

A well-designed plan eliminates all the red flags that anti-money laundering investigators look for. It's not unexpected that more people are becoming interested in cryptocurrencies, which have long been viewed as an intriguing financial option. As a result, detecting suspicious activity on a bitcoin exchange may be difficult.

This is important if cryptocurrency exchanges don't properly vet new clients. Law enforcement will be unable to examine any suspicious actions if the exchange provider fails to keep proper records of its clients.

Regrettably, certain cryptocurrency exchanges have experienced this. Tech-savvy criminals are increasingly opening accounts with bogus names at offshore exchanges, according to a Wall Street Journal storey. "Even if investigators can follow currency using blockchain research, they may not be able to tie those funds to a real-world criminal," says a former US attorney. We have subpoenaed 'Mickey Mouse' of 123 Main Street (Ramey, 2018, par. 38).

7.3 Casinos Bitcoin and Money Laundering

Another prevalent method of money laundering is through the use of casino gaming sites. In principle, a criminal could use their stolen monies to purchase chips at a casino, use the chips to play a few rounds of a game such as blackjack or poker, and then cash out the chips for real money. It is common for individuals to incur losses throughout the course of their business, which is seen as a normal part of doing business. If the launderer wins, there is no doubt about it: the money is still cleaned, and the launderer makes an unexpected profit. While casinos have a number of safeguards in place to monitor and prevent this type of conduct, monitoring activities in an offshore, internet casino can be far more difficult due to the lack of physical presence.

The bitcoin security firm CipherTrace conducted an investigation in 2018 and discovered that between 100 and 200 gambling sites on the Internet accept cryptocurrency wagers. Cash can be transferred to an online casino for betting purposes, just as it can be transferred to a brick-and-mortar casino. However, cash can also be withdrawn from an online casino without requiring a certain number of bets or a particular amount of money spent. Because online casinos have little to no 'Know Your Customer' (KYC) regulation, law enforcement has a tough time gathering information on transfers into and out of these services, according to the findings of the research.

Simply searching for cryptocurrency gaming websites on the Internet gives hundreds of results, with one particular site, https://bitcoinplay.net, promoting a variety of gambling sites in the cryptocurrency space. Furthermore, the website places a strong emphasis on anonymity, which may make it possible for the websites to be utilised for money laundering reasons.

7.4 How Law Enforcement Is Combating Money Laundering Through Cryptocurrencies

Money laundering schemes are always evolving, and criminals are constantly changing their methods to avoid detection. Moreover, as certain schemes become increasingly complex, coordinated efforts by law enforcement are needed to effectively combat money laundering activity. In an effort to address the activity, earlier this year, over sixty financial investigators from the Interpol and Europol organizations of over 30 countries attended a cryptocurrency workshop to discuss measures that can be taken to combat the misuse of cryptocurrencies by criminals.

Separately, in the United States, the Financial Crimes Enforcement Network has declared that exchanges that do not have appropriate anti-money laundering safeguards will be held accountable for their actions. This also includes offshore exchanges which deal with U.S. customers (Cryptocurrency Anti-Money Laundering Report, 2018). Other agencies are also working to prevent money laundering through cryptocurrencies, but their tactics are more secretive. ICE, the Immigration and Customs Enforcement agency, has confirmed that it employs secret techniques to "infiltrate and exploit peer-to-peer cryptocurrency exchangers who typically launder proceeds by using mixers (Ozelli, 2018, par. 11).

Finally, the DEA is also using clandestine methods and shared that they have "ways of tracking currencies such as Monero and Zcash".

8. Conclusion

Cryptocurrencies are a relatively new innovation, but they have quickly transitioned from a niche market to global commodity. Consequently, cryptocurrencies have been abused in a number of illicit and illegal ways. From buying contraband on Silk Road to using privacy coins for nefarious purposes, criminals have exploited cryptocurrencies in order to launder millions of dollars through a variety of methods.

While the same three-stage laundering process applies, the anonymity and lack of standard global regulation surrounding cryptocurrencies has provided new opportunities for money laundering to occur. Moreover, ICO's and cryptocurrency exchanges can also be used to move money from one person to another or even from one currency to another. Fortunately, efforts are being made on several fronts to both address the problem and provide effective solutions. Exchanges are making greater efforts to identify their clients, while researchers are working to unmask transactions which were previously thought to be untraceable.

Bitcoin is a revolutionary financial technology for which many anti-money laundering and money transmitter legislation are unprepared. Virtual currencies in general have reversed the trend toward real, government-backed coin and paper currencies, and it is improbable that any new regulation would catch all iterations of developing technologies over an extended length of time. However, this does not mean that Bitcoin and similar virtual currencies should be declared illegal or heavily regulated to make up for the original lack of supervision. Allowing digital currencies, whether government-backed or not, makes perfect economic and societal sense in an increasingly digital society.

Regulation of such currencies should come at the point where law enforcement may most effectively prosecute civil and criminal breaches while incurring the fewest administrative costs. Because Bitcoin is a decentralised, peer-to-peer virtual money, regulating organisations other than Bitcoin currency exchanges makes little sense. Increased pressure on users will ultimately result in an increase in the cost of enforcement. Several Bitcoin currency exchangers have already demonstrated initiative by registering as Money Service Businesses under existing anti-money laundering regulations. Rather than expanding regulation and attempting to forecast the next generation of disruptive technologies, it would be preferable to understand the technology and regulate the points of public engagement using current legal frameworks.

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