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ADVANTAGES OF CRYPTOCURRENCIES OVER FIAT MONETARY SYSTEMS AND AN INVESTIGATION INTO THEIR POTENTIAL ADOPTION AS A WORLD CURRENCY

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Declaration

I declare that the Dissertation/Thesis entitled, “advantages of cryptocurrencies over fiat monetary systems and an investigation into their potential adoption as a world currency”, which I hereby submit for the degree, BScH at Rhodes University, is my own work. I also declare that this thesis/dissertation has not previously been submitted by me for a degree at this or any other tertiary institution and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Adrian Miles

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CHAPTER 1
Introduction and project overview

1.1 Introduction and background

Cryptocurrencies are a medium of exchange, originating from the first recorded cryptocurrency known as Bitcoin in 2008 (Nakamoto, 2008). Cryptocurrencies are in essence like any other currency, they have a value relative to other currencies and fluctuate in value and are medium of exchange (Hauschildt, 2012). Bitcoins and other cryptocurrencies are intended to provide anonymous, yet transparent online transactions (Nakamoto, 2008). Furthermore all major cryptocurrencies can be directly exchanged for any major world currencies and vice versa.

Bitcoins, like most cryptocurrencies, have no intrinsic value but instead earn their worth from their subjective value given by users and through a process called mining. Moreover, they are decentralised and are not regulated like existing fiat monetary systems (Dollars, 2014). Considering these components of Bitcoins, as well as the seemingly esoteric nature of cryptocurrencies, one wouldn't be unwise to expect little growth in their popularity and usage.

However, over the last 2 years, the original cryptocurrency, Bitcoin, grew in value by 10000% (Friedrich, 2014). Additionally, nearly 5 million dollars' worth of bitcoins are transferred everyday internationally (Barber et al., 2012). There is very clearly something causing this stratospheric growth. Part of this growth stems from desperation arising during the 2008 economic crisis in the USA, as people sought out alternatives to traditional banking systems (Jansen 2012). However, Bitcoin saw the most growth after the worst of the effects of the economic crisis had worn off, highlighting one key point: cryptocurrencies satisfy a gap in the monetary market currently not met by existing monetary systems (Ahama and Varghese, 2013).

Cryptocurrencies possess appealing characteristics currently not attributable to fiat monetary systems, confirmed by its rapid growth in recent years.

1.2 Problem statement and research questions

1.2.1 Problem statement

Considering the anonymity, decentralisation and lower transaction costs of Bitcoin and other similar cryptocurrencies, could cryptocurrencies replace existing fiat monetary systems or become a world currency, despite their volatility.

1.2.2 Main research question

What advantages do cryptocurrencies (with specific reference to Bitcoin) have over fiat monetary systems and is volatility the primary factor preventing its adoption as a world currency.

1.2.2.1 Sub-questions

1. What are cryptocurrencies and how do they obtain their value?
    a. The question serves to introduce cryptocurrencies as a concept and investigates their inner workings.
2. What practical advantages do cryptocurrencies offer over traditional monetary systems and services?
3. Is volatility the only characteristics of cryptocurrencies inhibiting their growth into a world currency?

1.3 Proposed methodological approach

The research will be approached from a critical positivist and interpretivist hybrid. The rational analytical skills required to contrast traditional banking services and systems with cryptocurrencies, justify the positivist alignment. However, only using positivism for contrasting fiat monetary systems and cryptocurrencies won't suffice as the human factor is critically important when answering the research questions stated.

To remedy this, all positivist-like analysis and research will undergo interpretivist-like scrutinising, namely qualitative analysis, to put it into context and to explain the human influence behind something. It is for this reason the paper will be marginally more aligned to the interpretivism paradigm.

Existing literature, relating to the topic of cryptocurrencies and traditional monetary systems, will be reviewed to answer the questions posed. The overarching research approach to be used within the research is content analysis, as it can be used for both qualitative and quantitative research (White and Marsh, 2006).

Qualitative analysis (an interpretivist analysis method) components of the research will use both content analysis and constant comparison analysis (Onwuegbuzie et al., 2012). This is because constant comparison analysis attempts to make sense of existing data (Strauss & Corbin, 1998) and works effectively when reviewing existing documents.

Content analysis is being used as it can be used to determine cultural patterns – which can be useful when attempting to determine the human factor behind the growth in cryptocurrencies. In addition to this, content analysis will also be used as it supplements other analytical methods (Harwood & Garry 2003).

Due to qualitative research being criticised for lacking rigour, steps will be taken to prevent this (Mays and Pope, 1995). To ensure rigour, the methods being used during each phase of the research paper will be reiterated and the context will be described throughout the paper (Mays and Pope, 1995).

Quantitative analysis will be used when comparing values and financial factors and advantages (hence the need for positivism) and this analysis will be understood through qualitative analysis of the results. Kaplan and Duchon (1988) highlight the value behind combining qualitative and quantitative methods in information system research. Existing literature that incorporates both quantitative and qualitative analysis methods will be examined to provide guidance.

Quantitative data being analysed will be extracted from existing literature. When possible, multiple sources will be used to eliminate any potential bias. All literature being used has been grouped based on content so as to ensure all related literature is investigated in a coherent manner. This was done using content analysis, which allows for grouping into defined categories for better analyse and interpretation (Harwood & Garry 2003).

Additionally, all literature expected to be utilised has been visually represented and categorised in the form of a mind map. Caution will be taken to ensure that qualitative and quantitative research is evaluated against the appropriate criteria, as it is erroneous to apply them to the same criteria (Krefting, 1991).

1.4 Research contribution

Grinberg (2012) discusses Bitcoin in detail, noting its growing value and suggesting some reasons for its popularity. Additionally Bitcoin is compared to other e-commerce currencies as well as gold-backed currencies. It is suggested its decentralisation and anonymity is responsible for its growth.

Fridriksson and Jacob (2014) look at how cryptocurrencies differ from fiat monetary systems, focusing primarily on Ithaca Hours, a currency used in Ithaca, and investigate evidence in support of alternate currencies like cryptocurrencies. The paper provides a starting point as to what factors can be credited for the growth in cryptocurrency popularity. Dollars (2014) partially expands on this, contrasting cryptocurrencies against electronic money.

Hauschildt (2012) examines the advantages of cryptocurrencies over fiat monetary systems. Maurer, Nelms and Swartz (2013) look at the practical advantages of Bitcoin, citing its anonymity, low transaction costs and decentralised/de-institutionalised workings. Jeong (2013) investigates the socio-political factors driving the initial development of cryptocurrencies, dismissing claims of radical intent.

Upon completion, a clear answer to the posed questions should be provided. Reasons for the rapid growth in cryptocurrencies and their adoption should be fully covered and understood. Additionally, the possibility and plausibility of Bitcoin, or another cryptocurrency, becoming a world currency will hopefully be decided.

However, fully breaching the gap between what is known and what is being researched is limited by the paper ultimately being an extended literature review.

1.5 Document structure

Given that the paper is for a joint degree (60% Information Systems and 40% Computer Science), it is limited to a review of literature.

CHAPTER 2
Review of Literature

2.1 Introduction

Cryptocurrencies are decentralised, peer-to-peer internet mediums of exchange. They allow the user to perform anonymous yet transparent transactions with other users (Nakamoto, 2008). Unlike traditional monetary systems, which have some sort of intrinsic value derived from paying government taxes, cryptocurrencies have no intrinsic value but instead find their worth from their subjective value given to them by users. Being decentralised (and not regulated) and having no intrinsic value causes cryptocurrencies to have continually fluctuating values (Dollars, 2014).

The most notable example of a cryptocurrency is Bitcoin, created by Satoshi Nakamoto – a man whose real identify remains unknown to this day. Initially, despite the inherent risk in using a currency that has a seemingly volatile worth, Bitcoin has grown in popularity and value extremely rapidly since its inception. Iwamura et al. (2014) reported a 10 000% growth in the value of Bitcoin since 2012.

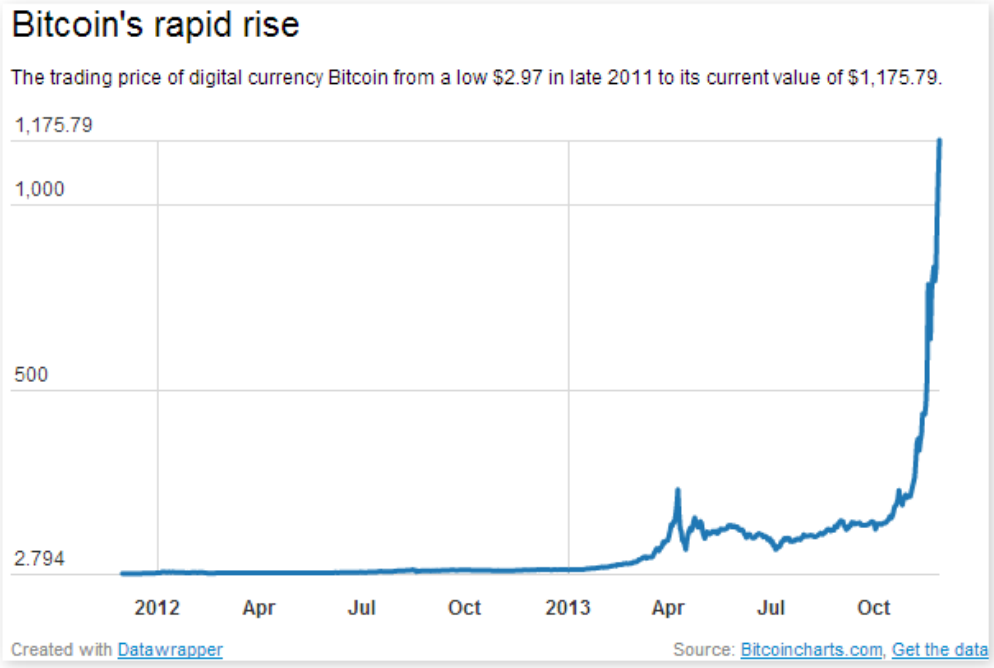

Figure 1: Graph showing rise of Bitcoin value

With this growth, Bitcoin and cryptocurrencies still however remain a rather esoteric topic-faced with much scepticism from the public. Yermack (2014) explains how cryptocurrencies are primarily used by technology enthusiasts looking for alternatives mean to perform transactions. However, he goes on to suggest as more businesses move to online platforms more of them will begin to make use of currencies such as Bitcoin for transactions.

The advantages, already identified, of cryptocurrencies like Bitcoin, as well as what could be inhibiting its adoption as a global currency (with specific reference to volatility) will be the focus of this literature review.

2.2 Fiat Currencies

Before discussing the advantages of cryptocurrencies, or defining cryptocurrencies, it is necessary to first identify what a fiat currency refers to. Rollins (1917) defines fiat money as money accepted as legal tender by a government. It is considered to have no pure intrinsic value, or rather has more face value than real value. In this literature review the term will be used to refer government backed or issued currencies, such as the dollar, Pound Sterling and South African Rand.

Since some cryptocurrencies, like Bitcoin, have been declared by governments as legal tender, they too, in theory, are a fiat currency. However, in the case of this literature review the term "fiat currencies" will be used to differentiate between cryptocurrencies and existing, traditional government monetary systems and currencies.

2.3 Cryptocurrencies

There is a large number of cryptocurrencies available at present, including Bitcoin, Litecoin, Peercoin, Dogecoin and many more less popular cryptocurrencies. Of all of these, Bitcoin is the most popular and widely used cryptocurrency (Ahamad et al., 2013). It is for this reason that Bitcoin will be focused on and specifically referred to throughout this paper. However, it is necessary to properly understand cryptocurrencies conceptually before delving further into the topic.

Cryptocurrencies are electronic/digital currencies that are intended to be anonymous and untraceable, but at the same time, transparent. They are transparent in that every transaction that ever takes place is recorded, but the transactions themselves are encrypted so as to leave the users involved anonymous (Skudnov, 2012).

With Bitcoin, users operate using their Bitcoin wallets- essentially virtual bank accounts. Within these wallets are the user's Bitcoins. They are able to transfer money from their wallet to another user's wallet using private and public encryption keys. Every transaction that takes place is recorded in a public ledger, known as the block chain. It serves to account for every Bitcoin in circulation and prevents double spending (Nakamoto, 2008).

Users can earn bitcoins by setting up their computers (with Bitcoin software) to verify and record payments into the public ledger, in a process called mining. No single user is responsible for the mining process, but instead the process relies on multiple users connecting to form a network that then performs the verification. There is no physical proof of the transactions, only the digital proof in the block chain (Nakamoto, 2008).

Furthermore, it should be noted that with each cryptocurrency, there are only a limited/finite amount of units in circulation and produced. For this reason supply and demand plays a powerfully critical role in the value of a cryptocurrency as units can never be recreated nor destroyed (Ahamad et al., 2013).

All cryptocurrencies are essentially based on the same framework as Bitcoin, with slightly different attributes. For example some may have faster mining methods or more units in circulation (Ahamad et al., 2013).

2.4 Origins of Cryptocurrencies

Having investigated cryptocurrencies and Bitcoin briefly, their origins will be discussed. As already covered, Satoshi Nakamoto was the mind (or minds) behind the original cryptocurrency, Bitcoin. Due to the mysterious nature and uncertainty of the author, it is difficult to conclude exactly why they created Bitcoin. However, Nakamoto (2008) does go into some detail as to what they claim to be the reason for creating Bitcoin and their paper will used as a point of reference for this section.

Nakamoto (2008) begins their paper by pointing out that every transaction on the internet, "relies almost exclusively" on third party financial institutes to verify and process transactions. They expand on this by pointing out that, although fairly reliable, this third party model is dependent on a trust system. Furthermore, having third parties means incurring additional costs on transactions and thus places limits on the possibility of micro-transactions (Nakamoto, 2008). Moreover, Nakamoto (2008) states that a certain amount of fraud is unavoidable in most electronic transaction systems.

They go on to suggest a physical currency could resolve the issues stated, but a physical currency is obviously not possible for electronic payments. It is at this point Nakamoto highlights their reasoning behind creating Bitcoin; Bitcoin allows for electronic payments that rely on proof rather than trust (and no need for a third party), by essentially making transactions too impractical to reverse (Nakamoto, 2008).

The paper goes onto to discuss how Bitcoin removes double spending and trust problems by generating proof of the chronological order of transactions with correlated time stamps. Nakamoto's proof of concept was through Bitcoin, which grew to become the "gold standard" for all cryptocurrencies worldwide (Ahamad et al., 2013). It should be noted that Nakamoto makes no mention of Bitcoin replacing traditional fiat currencies.

2.5 Advantages of Cryptocurrencies

In Nakamoto's seemingly unassuming paper, there is no forecast for the rapid growth of Bitcoin that took place after its launch. In their paper, they examine the advantages of cryptocurrencies (like Bitcoin) over existing electronic payment systems (as covered in the preceding section). Yet the paper doesn't account for the advantages over fiat monetary systems. The following section studies the advantages of cryptocurrencies over fiat monetary systems, as well as the implications of the advantages.

2.5.1 Decentralised

As previously noted, Bitcoin and other cryptocurrencies are intended to be decentralised currencies that work on peer to peer transfers. This means the currency isn't regulated by any central group, government or party. The only monetary "policies" it abides to are those in its protocol and encryption algorithms (Nakamoto, 2008).

A decentralised system is advantageous for a number of reasons. One advantage of a decentralised currency is that they aren't controlled by monetary policies that could lead to economic disaster. For example, it is suggested that the monetary policies of a centralised system caused the 2007/8 economic crisis.

2.5.1.1 2007/2008 Financial Crisis

In the year 2004, banks in the United States of America (USA) provided loans and mortgages to citizens who were thought to be able to afford them. This, coupled with a dramatic increase in interest rates between 2005 and 2006, resulted in an economic crisis in the USA, as the

loans that were issued were overvalued assets that couldn't be repaid. The crisis had a ripple effect on the global economy and affected many countries worldwide through economic instability (Ivashina, 2008). Ahamad et al. (2013) suggest that the 2007/8 Global Financial Crisis lead people to seek alternatives to fiat currencies and thus turned to Bitcoin (and cryptocurrencies alike).

They argue that this can be attributed to cryptocurrencies, for being decentralised, that they can't be mismanaged, that they are free from controlling monetary policies and won't lead to the same social unrest as fiat monetary systems (Ahamad et al., 2013). However, claiming the economic crisis is primarily responsible for the rapid growth in cryptocurrencies like Bitcoin is nonsensical; Bitcoin saw the most growth from the year 2012, five years after the crisis first struck (Iwamura et al., 2014). It is still important to recognise that the economic crisis may have contributed towards the growth of Bitcoin and cryptocurrencies, just not on the scale suggested by Ahamad et al.

It should also be noted that, due to the limited amount of units in the decentralised system, for example the finite amount of bitcoins in the Bitcoin system, it is immune to inflationary value changes, but instead receives its value from other sources, such as value relative to other currencies and what users perceive its value to be (supply and demand) (Dollars, 2014).

2.5.2 Lower costs

Apart from being a decentralised alternative to traditional monetary systems, cryptocurrencies also allow for lower costs when performing transactions. This is achieved by removing the need for a third party to process and verify transactions (as, for example with Bitcoins, it is done by the community to earn Bitcoins through mining) (Nakamoto, 2008). This allows for goods to be sold at lower prices, as prices don't need to account for third party fees incurred. These fees are further reduced by the fact that goods and services offered are tax free, as the currency isn't aligned/under any legal jurisdiction (Marian, 2013).

Marian (2013) points out that being decentralised and tax free, cryptocurrencies can also be used for tax evasion and money laundering. Despite being illegal, this proves to be an advantage over traditional monetary systems. It allows those wishing to evade tax and launder money to do so fairly securely. With the growing popularity of cryptocurrencies, tax evasion and money laundering may eventually start severely affecting real economies.

If real economies suffer enough due to cryptocurrencies, governments may start taking actions against them, such as the eradication of cryptocurrencies by governments (by buying out all the available coins or setting up superior mining systems) (Marian, 2013).

The decentralised nature of cryptocurrencies allows for international trade to take place using the same cryptocurrency. There is no need to convert from one currency to another, which reduces costs even further as there are not currency conversion fees between transactions. Additionally, there is no need for the parties involved to meet up, produce a physical form of the currency or coordinate transfer times. By not being bound by these requirements, the cost is even further reduced (Plassaras, 2013).

Additionally, with the costs incurred by just the US central bank for handling currency processing, transportation, security and accounting for storage estimated to $60 billion annually, cryptocurrencies could offer a massive decrease in costs by removing the need for this (Plassaras, 2013).

2.5.3 Anonymity

Bergman (2001) calculated that in the year 2000, the deep web was close to 500 times larger than the surface web. More recent estimates from 2008 put it at roughly the same number (Wright, 2008). The deep web refers to websites not accessible through standard search engines, such as illegal classifieds, hidden networks and servers, digital libraries and databases and content intended to be concealed. Some deep web servers require anonymous browsers for access, such as The Onion Router, more commonly known as Tor. With its vast size, it is of no surprise that the deep web is a meeting zone for various illegal (and legal) activities.

2.5.3.1 Black Market

Black market trade has an estimated annual value of 1.8 trillion US dollars according to Havocscope.com (2014). The deep web operates as one of the platforms for the black market, through networks such as Tor- allowing users to offer goods and services anonymously. Cryptocurrencies allow users to purchases these goods and services anonymously. Maurer et al. (2013) explains that bitcoins are a popular (anonymous) means of payment online, especially for illegal or uncouth goods and services.

Sites like The Silk Road and the HiddenWiki use bitcoins when performing transactions for a large range of good and services; ranging from legal items to illegal drugs, child

pornography, hiring contract killers and buying citizenship for certain countries (Brezo and Bringa, 2012). Additionally, the whistle blower website, WikiLeaks now uses bitcoins as its primary means of accepting donations (Maurer et al., 2013).

Hauschildt (2012) explains how one doesn't have to go through a registration process to start using Bitcoin. Instead, each Bitcoin account is given a long string of letters to identify it. Therefore, if a user doesn't link their account string to their real name, they are essentially anonymous. Anonymity is taken further with the additional encryption that accompanies each transaction (Hauschildt, 2012).

Despite the seemingly grim uses of the anonymity of Bitcoin, everyday people can make use of it they wish to keep their purchase/transactions hidden from the public. For these reasons, anonymity remains an important advantage of cryptocurrencies over other electronic payment methods (Hauschildt, 2012).

2.5.4 Secure

As previously mentioned, cryptocurrencies are decentralised and maintained by the community in a general ledger (called the block chain) in a process called mining. Apart from the listed direct advantages of being decentralised, security/stability of the system is an indirect advantage of decentralisation (Hauschildt, 2012). The reason for this is that the Bitcoin system itself can't be hacked – however individual users can have their bitcoins stolen from them (sufficient diligence around security on the user's side can help prevent this). Grinberg (2012) points out that even if a large number of users were somehow taken down by hackers, it would have little effect on the overall system.

The strength of the system security is an advantage, as users wouldn't have to worry about the cryptocurrency being taken down by hackers, as it is a difficult task.

2.5.5 Community and ease of access

The community is one of the more important components of Bitcoin and cryptocurrencies, as cryptocurrencies were created to exist in an environment that relies on the users. The dependence on the community is part of the reason why it is very easy to join a cryptocurrency community. Hauschildt (2012) explains how new users can come and go as they please, as the system can't reject any new users. Moreover, users are actually able to

make changes to some cryptocurrency systems if there is a majority agreement on a request (Hauschildt, 2012).

Another advantage of an active community means faster transactions, as users can add the transactions to the public block chain sooner. This allows users to perform transactions sooner and the transparent nature of the block chain allows users to see when payments have gone through.

Having highlighted the advantages of cryptocurrencies in the literature available, it is necessary to look at if it's possible for Bitcoin to become a world currency, with specific reference to the volatile nature of Bitcoin.

2.6 Bitcoin as a world currency

Considering all the advantages of Bitcoin, one might ask why they still haven't gotten much closer to becoming a single, mutually used, global currency. A number of authors have given their opinion on the matter and their papers are be summarised in this section.

2.6.1 Cost of switching

Luther (2013) argues that the primary reason Bitcoin hasn't gained widespread acceptance, or, become more like a world currency is due the costs of switching and the network effect. The cost of transitioning from traditional monetary systems to Bitcoin, make it too expensive according to Luther (2013). Additionally, the network effect states that the more that people use something, the more valuable that item becomes. Since so many people are using the prevailing monetary system, it is highly valued and it is unlikely people will switch from it to Bitcoin (Luther, 2013). Plassaras (2013) supports the power of the network effect, by noting that the more people using the prevailing monetary system, the more uncertainty there will be around Bitcoin.

Luther (2013) goes on to suggest, even if Bitcoin is superior to the prevailing monetary system, it will take government involvement or economic instability for Bitcoin to gain wide acceptance or to become a global currency. Nevertheless, this doesn't disqualify Bitcoin as a potential candidate for a world currency.

It should be noted that, as mentioned previously, the US central bank spends $60 billion annually on maintenance costs not incurred by cryptocurrencies. If the government were to start using cryptocurrencies they would be able to put the $60 billion towards covering switching costs. This solution obviously relies on government involvement, something cryptocurrency enthusiasts oppose.

2.6.2 Hayek's economic model

Hauschildt (2012), in his Bachelor's thesis, relates Bitcoin to Friedrich August von Hayek's, "Denationalisation of Money: The argument refined". Hauschildt attempts to fit Bitcoin into Hayek's "perfect monetary system".

Hayek's economic model depends on competition between currencies so as to encourage currencies to maintain their value and quality to win people over. Since Bitcoin is open source, the code is readily available and so people can make competitors, (as they already have with the likes of Dogecoin and Litecoin) to ensure competition remains consistent.

Furthermore, Hayek's model relies on the decentralisation of currencies and central banks to prevent over spending and in turn instability. On these grounds, Bitcoin fits the model as it completely decentralised and is a currency amongst other competitive currencies (Hauschildt, 2012).

Hayek's model and Bitcoin differ when it comes to the supply of the currency. Hayek argues a (decentralised) bank should be able to control the amount of a currency in circulation, as something is more valued the scarcer it is. Bitcoin has no controlling bank and has a fixed limit on the number of coins that will ever exist (21 million to be exact) and can be considered valuable, as the difficulty behind mining bitcoins makes them scarce and therefore valuable.

Beyond this, Hauschildt (2012) argues that the a major issue preventing Bitcoin from becoming a world currency is the lack of regulation within Bitcoin to keep it stable when faced with challenges. Furthermore, the system doesn't allow for commercial loans or borrowing, which makes it less appealing than prevailing monetary systems.

The paper concludes by stating the biggest issue is the volatile value of Bitcoin, and that it would be wiser to treat Bitcoin more as an investment rather than a currency. He does however mention that most of the issues relate to Hayek's proposed system and that it is still

possible for Bitcoin to become a dominant world currency (and that it simply wouldn't fit Hayek's model properly).

2.6.3 International Monetary Fund

Plassaras (2013) goes on to support Hauschildt's subtle concluding remarks on the possibility of Bitcoin becoming a dominant world currency. He remarks on its popularity and growth, considering its relatively young age. He expands on this by noting the possibility of it becoming a world currency and upsetting the world economy if not regulated by the International Monetary Fund (IMF).

Moreover, given the nature of the ever increasing complexity of the Bitcoin algorithm, the longer the IMF takes to try gain some sort of control (by acquiring their own bitcoins), the harder it will become to do so (Plassaras, 2013). This ties in with a point noted previously, from Marian (2013), that it may be necessary for the IMF to buy out all bitcoins in circulation to maintain global economic stability.

Since it is not governed by the IMF, an organisation established to ensure global economic stability, Bitcoin could be used to launch a speculative attack on other currencies worldwide in the future, causing economic instability worldwide (Plassaras, 2013). This makes Luther's (2013) argument of, global economic instability being a necessity for Bitcoin to gain acceptance, a possible reality.

2.6.4 The need for regulation

The paper concludes with Plassaras pointing out that a lack of regulation is inhibiting the growth of Bitcoin- as this results in it having a volatile value. However, it still remains a theoretical threat to the global economy and should be controlled by the IMF sooner than later (to avoid economic disaster). Under the control of the IMF, it could be regulated and could become a functioning, stable, global economy- however no proposed regulation is given (Plassaras, 2013).

To reflect, it has been consistently noted in the papers covered so far, that a lack of regulation and government involvement in Bitcoin is inhibiting its growth as a world currency. Additionally, if the governments of countries worldwide were to support Bitcoin and cover the switching costs, the lack of regulation would still remain a problem (as the value of Bitcoin would still be too volatile). A number of further sources support the need for

regulation, such as Twomey (2013), Jeong (2013), Stevenson (2013), Brezo and Bringas (2012) and Reber and Feuerstein (2014).

Barber et al. (2012) offers solutions to deal with the volatile value of Bitcoin as well as solutions to a number of other problems, such as accidental loss of coins and how to improve the encryption process. Barber et al. (2012) argue modifying the Bitcoin protocol would allow for this. Given the nature of Bitcoin, the recommended changes would be better suited for an entirely new cryptocurrency. Some suggested changes include a new filter service, new private key generation methods, and storing wallets across multiple computers.

Reflecting on the work covered, one could argue regulation through banks within the system (that could bring about a more stable value) is more important than just volatility itself. The reason for this is that banks could then offer loans, control fluctuating values, facilitate the recovery of lost money and deal with money backs up. Although, one needs to ask whether or not addressing the volatile nature of Bitcoin, would put it in a position for being a world currency.

Social factors that may be inhibiting its growth lack significant investigation and coverage in literature. For example, purely hypothetically, people without access to computers may suffer if Bitcoin becomes a world currency- therefore further inhibiting its growth. Another example is cyber terrorism – if currencies were to become purely electronic cyber terrorists may have far more power over the economy- and their existence may deter people from using electronic currencies.

2.7 Bitcoin in practice

Having discussed the areas surrounding cryptocurrencies and Bitcoin in a theoretical manner, some actual practical examples of Bitcoin in the world will be examined next. Continuing on the topic of Cyber terrorism, a Kaspersky Lab study showed a surge in cybercrime around Bitcoin in 2013 (Kaspersky, 2014). The study revealed that attacks related to cryptocurrencies have increased by 150%. These attacks were primarily done by stealing the wallets of Bitcoin users- done using malware such as keyloggers stored in programs presenting themselves as Bitcoin mining software.

Building on this, Barton (2010) highlights the lack of computer and network security knowledge of students at a varsity level, with his study revealing that only 67% of participants were able to pass a basic computer security test. With roughly 3 billion internet

users worldwide, if the 33% was assumed to be the global level of computer security illiteracy, it would equate to 990000000(nine hundred and ninety million) people being vulnerable to cybercrime.

If Bitcoin were to become a global currency, cyber terrorists and cyber criminals could hypothetically have close to a billion "easy" targets to attack. Of course this is all based on smaller scale studies and assumptions, but the point remains that cybercrime and terrorism stands to become a much bigger threat if Bitcoin were to become a global currency (assuming volatility and other issues were resolved).

Therefore, it can be argued that it is necessary to consider cybercrime when considering Bitcoin. It should be noted that regulation and controlling of Cryptocurrencies, like Bitcoin, may help fight cybercrime and prevent the theft of bitcoin wallets. This adds to the reasons why it may be necessary for Bitcoin to be regulated and to have one central authority. This may come at the cost of losing some anonymity – to help track activity- and increased transaction costs, to pay for the expenses incurred whilst regulating and monitoring the currency.

Cases where the government does take control have already begun to appear. For example, the government of Ecuador has placed limitations on the usage of Bitcoin (as well as other cryptocurrencies). Instead of using any existing cryptocurrencies, like Bitcoin, the government is introducing their own state driven digital currency- which will have the backing of the assets from the central bank (Cryto Coin News, 2014).

In the past Ecuador has used the US dollar as its primary currency; the new digital currency will now be used alongside the dollar as the country's primary currency. Additionally, the currency will be regulated and monitored by the government – which is unlike Bitcoin (which has no single central authority that regulates it or manages it). As previously stated, cryptocurrencies may need a central organisation/authority that regulates them to gain more widespread usage – which the new Ecuador currency is hoping to have in place. However, since the new digital currency being introduced by the government is still very new, whether or not this will increase the popularity of using such currencies remains to be seen (Cryto Coin News, 2014).

Educator is not alone in its realisation of the potential power of cryptocurrencies. In early 2014, US Senator Carper requested that Bitcoin be regulated by the US treasury. Acknowledging the downsides of Bitcoin and other cryptocurrencies, such as using the currency for illegal transactions, Carper went on to suggest cryptocurrencies should be given a chance to grow before being shut down. He followed this up by highlighting some of the advantages of cryptocurrencies, such as improving international trade and the lower transaction costs. Carper went on to suggest that regulating currencies like Bitcoin may lead to a faster realisation of the positive side of cryptocurrencies (Coin Desk, 2014).

Figure 2: Map showing number of shops that accept Bitcoins per country

More drastically, US Senator Manchin called for a ban on Bitcoin. In a letter addressed to the US Treasury (as well as several other financial agencies in the United States) Manchin requested Bitcoin be banned. Manchin cited the apparent disruptive effect Bitcoin has on the economy as the reason for wanting it banned. However, the Bitcoin community backlashed, stating Manchin lacked a good understanding of cryptocurrencies, like Bitcoin, to make such requests (Crypto Coins News, 2014).

After a trial by company Switchless, using Bitcoin, the South African Reserve Bank warned South African citizens to stay away from cryptocurrencies. The South African Reserve Bank pointed out that there was no legal Framework around Cryptocurrencies. However,

Mathebula of the South African Reserve Bank did go on to say the development of cryptocurrencies was being monitored and means of regulation were being considered (Crypto Coins News, 2014).

On a more practical level, South African Energy Company Invirohub (more commonly known as Invirotel), recently announced the option to pay electricity bills using Bitcoin. Invirohub will calculate the exact prices of Bitcoin up to the minute when performing transactions and provides users with the equivalent amount in electricity. This will all be done using their custom made prepaid electricity meters (The Coin Front, 2014).

These are just a few examples of the growing presence of Bitcoin and approaches surrounding it. A point to take away from this is that government involvement is growing more and more. It should be noted that, the effect of this remains to be seen, however, as previously suggested, government involvement (or more specifically Bitcoin regulation) may lead to Bitcoin becoming a global currency in the future.

Furthermore, the issue of a lack of regulation, as well as a lack of government backing around Bitcoin (raised earlier), being resolved may not be as farfetched as perhaps originally thought to be. However, even Bitcoin were to receive government backing and regulation, whether or not the issue of volatility will be resolved in practice, remains to see.

2.8 Concluding remarks

At this point, the realised advantages of Bitcoin and cryptocurrencies, in the literature available, have been covered. Additionally, the effect of the volatility surrounding Bitcoin has been examined.

It was found the primary advantages of Bitcoin over fiat monetary systems include reduced transaction and running costs, reduced/removed mismanaged monetary policies that affect the currency, improved anonymity, improved security and a strong community with easy access.

It was noted that much literature is dedicated to addressing the volatile nature of Bitcoin and even attempting to find solutions for it. Whether or not it is just the volatile nature of Bitcoin inhibiting its growth requires further research, as social issues haven’t been rigorously covered in literature. Bitcoin and cryptocurrencies in the media have received much interest, with some countries already attempting to regulate Bitcoin.

The effects of this looked at in theory, have not been covered in practice and require empirical investigation and analysis. Due to the early age of such regulations it will take some time before any results can be concluded.

Moving forward, further investigation into the listed advantages will be required. Moreover, research into the social advantages of cryptocurrencies requires examination, as there is a little information on the matter. Any further research will need look into additional possible inhibitors to Bitcoins growth as a world currency, apart from its volatile value. Lastly, solutions to dealing with the volatile value and government regulation should be explored.

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