

## Making Sense of Bitcoin as Virtual Currency

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**Abstract:** Bitcoin as a currency has an uncertain future. Its success or failure is largely determined by whether it achieves a critical mass that eliminates wild volatility, which is far from certain. The improvement of current payment technologies is one of bitcoin's primary challenges. MasterCard and American Express are making tremendous progress in reaction to digital currencies, and if they can give the same solutions that bitcoin does, bitcoin will cease to exist and will almost definitely remain a fringe currency. The hidden transaction fees and delay are clearly not a major enough barrier from established currency systems in the industrialized world, where you can swipe your credit card or pay with your phone at a cash counter. To gain widespread use, bitcoin's convenience would have to be comparable to that of credit cards and mobile payment methods. If established credit card or telecom corporations seize the market first, bitcoin will face the same issues it has in the poor world: it is a better system than the present one, but not superior enough to trigger a revolution. Citizens of nations with extractive political and economic institutions are already adopting bitcoin, according to the regression results. While this is encouraging and shows that some people are beginning to see the benefits, society has only just begun to tap into bitcoin's full potential. Unless it can be embraced on a larger scale, the price will remain erratic, and using bitcoin as a currency in everyday life will be impossible. The issue is that bitcoin's benefits will only be available through widespread use, and popular adoption is contingent on those benefits being available. The bulk of people in underdeveloped nations, who are already surviving on the absolute minimum, are unlikely to risk depositing much of their savings in a currency that could lose half of its value in a week unless the price stabilizes. If bitcoin doesn't find a home, it'll remain a volatile currency that will never reach its full potential.

**Keywords:** *Bitcoin, Virtual Currency, Developing world.*

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### 1.1 Introduction

Over the last few decades, the world has seen significant advances in cryptography and processing power, which has resulted in the emergence of a new type of currency known as cryptocurrency. Bitcoin, which was created in 2009, has emerged as the most viable and widely embraced cryptocurrency to date. The system is based on a distributed network of wallets and nodes that allows for faster, cheaper, and borderless transactions as well as complete anonymity if desired. The ability of bitcoin to circumvent financial institutions in developed countries has been the focus of previous research and interest, but the uncertainty surrounding bitcoin's future and its high volatility have been key impediments to widespread adoption in the developed world. This study focuses on underdeveloped countries, whose extractive political and economic structures have been exploiting their inhabitants for millennia. A technology like bitcoin has the potential to disrupt financial and government structures in these countries, giving citizens more power and financial liberty. Bitcoin's early adopters were primarily libertarians who opposed all forms of government and anyone selling illegal goods. They desired to reject the government and its economic role simply because they desired more personal freedom. This has tainted bitcoin's image, but this article argues that bitcoin has valid uses in countries where the government's policies are actually antagonistic to the needs of the people. Government policy evasion could lead to faster economic growth and development in these countries, as well as less corruption among government officials. This article will discuss the foundations for bitcoin as a technology and a currency, as well as some of the good and negative repercussions that will occur if it is extensively accepted in poor countries. While data on bitcoin transactions is scarce, data from bitcoin currency exchanges, or places where users buy bitcoin with their native currency, is abundant. The relationship between the extractivity of a country's economic institutions and the use of bitcoin in that country will be investigated using this data to see if bitcoin is being used to circumvent tight financial rules and reckless monetary policies in that country.

### 2.2. Money and Bitcoin

#### 2.2.1 Money

Money is the foundation of the contemporary economy, allowing civilizations to go from low-efficiency subsistence farming to today's highly efficient and specialized marketplaces. Currency has three primary functions: as a store of value, a unit of account, and a means of exchange. This means it maintains its value over time, sets prices for products and services, and can be easily transferred from one party to another, signifying universal acceptance. If any one of these elements is lacking, the currency loses a lot of its value. Since the dawn of humanity, currencies have evolved dramatically. Initially, commodities like salt and barley were utilized as currency. These were straightforward and easy to comprehend since they had inherent worth that was ensured by their multiple applications. Many of the goods utilized, however, were perishable and didn't act as good stores of value, nor did they serve as good mediums of exchange because their value to weight ratios were poor. As a result, the system turned to precious metals, which were scarce and hence had a higher value-to-weight ratio. This was also an interesting departure from a system based on inherent worth. While gold has a real market value, it is not based on any practical application. Precious metals are rarely used in industry, with the exception of a few medical and scientific uses. They have worth because we, as humans, have assigned it to them. Whatever the source of such worth, society agreed centuries ago that precious metals were desirable and so served as an ideal currency. They could be subdivided indefinitely without losing value, transported

quickly, and retained worth throughout time. People no longer wanted to carry gold and silver around with them, so they placed them in the bank in exchange for bank notes that guaranteed their deposits. Governments eventually began creating national currencies that were backed by gold or silver. It was widely accepted that this currency had no intrinsic worth and could only be redeemed for gold housed in a vault. Nearly all countries have recently severed this link. This has resulted in "fiat currency," which is essentially worthless money that retains its value due to our acceptance of it and the backing of the government. The value of the US dollar is determined by the fact that it may be used to pay US taxes and hence has some value guaranteed by the US government. Bitcoin, the subject of this article, has emerged in the last six years as a completely new and unusual sort of currency. Bitcoin did not develop through the same routes as other currencies; it has never been backed by a commodity and is not even represented by a physical thing. Instead, it is a coding-based system that allows users to store and transport value anywhere in the globe at the touch of a button.

### **2.2.2 Bitcoin**

The goal of this study is to comprehend bitcoin's uses in the real world rather than delving into its technical features. To comprehend the benefits and limitations of bitcoin, however, a basic understanding of its structure and operation is required. Bitcoin is a peer-to-peer network that is totally decentralized. There is no central administrator or point of control as a result of this. 4 Users of the network hold all of the bitcoin in the world in their personal bitcoin wallets. These wallets, also known as bitcoin clients, are divided into three types: complete clients, lightweight clients, and web clients. 5 Each one provides varying levels of control and anonymity. Third-party administrators manage lightweight and web clients, whereas a complete client allows you to initiate transactions directly. These clients, regardless of the technique, allow users to access their wallets and send and receive bitcoin. Each wallet has one or more bitcoin addresses, which are similar to email addresses in that they allow anyone with your address to send you money at any time from anywhere in the world. Every wallet, likewise, has a key that allows the wallet's owner to access the bitcoin held therein.

#### **2.2.2.1 Transaction Verification**

How transactions are recognized and validated is initially one of the most perplexing features of a peer-to-peer system with no centralized authority. This is where the four characters appear. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, Andreas M. Antonopoulos, Andreas M. Antonopoulos, Andreas M. Antonopou (O'Reilly Media, Sebastopol, 2014), 1. Bitcoin's ingenuity really shines through. Bitcoin uses a decentralized consensus method rather than depending on a trusted authority to clear all transactions in the network, which is how credit card transactions are validated. 7 This decentralized confirmation system is accessible to anyone operating a full client or full node. When a user allows a transfer from their wallet to another wallet on the network, some of the world's nodes quickly log the transaction. The transaction is quickly propagated throughout the ecosystem since each receiving node communicates it to all of the other nodes it is connected to. Each transaction includes a proof of ownership that can only be unlocked and spent by the destination wallet's owner. As a result, it doesn't matter if all of the world's nodes observe the transaction because they can't access the value it contains. 8 Because it is accessible by that wallet's key, the wallet that received the transaction will register it within a few seconds and will immediately recognize it as an incoming payment. Bitcoin develops a chain of transactions as it transfers from wallet to wallet, with each new transaction citing the prior transaction as the bitcoin's source. 9 All of this data is organized into blocks, which are verified by all of the system's nodes through rigorous computation. If you run a

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full client on your computer, some of your computer's processing power is dedicated to confirming bitcoin network transactions. Computers all across the world compete to confirm these blocks, with one computer succeeding every 10 minutes, after which all of the computers restart on a new block. 10 Each block is confirmed by a computer and then added to the public blockchain, which is a log of all bitcoin transactions ever made. The difficulty of the computations required to confirm or "mine" a block is modified so that it takes around 10 minutes regardless of the amount of computing power used or the number of transactions that have occurred since the previous block was mined. 11 Because each new block is predicated on the prior block and provides a confirmation of the previous block, the legitimacy of past transactions is strengthened with each new block. 12 A malevolent user would need a node that could change and confirm blocks quicker than any other node in the system to undo any transaction (i.e. double spend bitcoin). Once a transaction is a few blocks deep in the chain, that node must alter and affirm the original block, as well as all subsequent blocks, in the time it takes another node to only confirm the most recent block. This ensures that confirmed transactions are safe and secure, and that they be completed fast. 13 At the moment, mining a block requires a tremendous amount of processing power, and some organizations commit all of their resources to it. You might be wondering why people are prepared to use their computers' processing capacity to validate other people's bitcoin transactions. Each block mined rewards the miner with 25 newly minted bitcoins, which are now valued around \$8000 USD. 14 This not only ensures that enough nodes remain operational to maintain the system's credibility, but it also provides a means for bitcoin to be added to the system, similar to a central bank creating money in a traditional currency system. Because bitcoin is impervious to excessive inflation, this controlled and consistent growth in the supply is critical for the consequences presented in this paper. Because the total number of bitcoins on the network is limited to 21 million, bitcoin is a deflationary currency. By the year 2140, the system is predicted to hit this limit, at which point mining will be rewarded with tiny transaction fees rather than newly minted bitcoin.

### 2.3 Acquiring Bitcoin

While mining is one way to obtain bitcoin, there are other options that do not necessitate the intensive computer processing required by mining. Your typical bitcoin user has three main avenues for acquiring the cryptocurrency, each with its own benefits and drawbacks. The first option is to use a web-based currency exchange to purchase bitcoin using fiat money. This necessitates the disclosure of a great deal of information in order to comply with regulatory guidelines, which is unappealing to those who prefer to remain anonymous. Alternatively you can buy bitcoin from someone who has it and is willing to sell it. This could happen through a friend or through a bitcoin classifieds website that connects you with a potential seller. Selling a product or service in exchange for bitcoin is the final option for obtaining bitcoin. There are some companies that pay their workers in bitcoin and some freelance software developers that request to be paid in bitcoin.

### 2.4 The Blockchain

Your bitcoin address becomes public as soon as you make a transaction, and anyone in the world can see it. Most people associate bitcoin with privacy and secrecy, so when the public nature of the system is explained to them, they are taken aback. Every transaction is made public on the blockchain, along with the amount of the transaction, the time of the transaction, the sender's address, the receiver's address, and the node that confirmed the transaction. 16 Anyone with an Internet connection can access and explore all of the information on the blockchain. The blockchain, on the other hand, contains no information about who owns the wallets involved in a transaction or where those wallets are stored on

physical servers. Furthermore, a bitcoin transaction is completely irreversible once it is completed. The system's anonymity and irreversibility are both amazing and controversial, and the applications that result from them will be crucial for the implications discussed in this paper.

### **3. Benefits of Bitcoin Over the Existing Financial Systems**

The decentralization and ease of transactions have gotten bitcoin a lot of praise. Satoshi Nakamoto, the bitcoin creator, first proposed bitcoin as a way to circumvent the current banking system's inefficiencies in a paper published in 2008. In the current financial system, a credit card transaction takes three business days to be confirmed, whereas bitcoin is registered globally in seconds and added to the blockchain in less than ten minutes. 17 Credit cards levy significant transaction fees, ranging from 1-3 percent for a standard, non-international purchase. 18 Credit cards place a limit on the size of transactions that can be made, preventing people from purchasing items below a certain price point. Finally, a single credit card transaction frequently requires cooperation from nine different parties, including merchants, banks, card associations, and payment processors. 19 When your transaction is conducted internationally or involves currency exchange, the number of parties involved as well as the fees associated with it increases. 20 All of these drawbacks were necessary prior to bitcoin to ensure the system's proper functioning. Counterfeiting and double-spending are the two most serious issues with fiat currencies. To avoid this, banks must confirm and clear each and every transaction that occurs in the network, which is a costly and time-consuming process. All of this is avoided due to the distributed nature of bitcoin's confirmation system, and the costs are covered, at least temporarily, by the currency's expansion. Even after all bitcoins have been mined, the transaction costs collected as an incentive by miners will be significantly lower than those collected by credit card companies. 21 While the groundbreaking circumvention of financial institutions has the potential to revolutionize our financial systems and is one of bitcoin's most impressive features, this paper focuses on government circumvention. This chapter will look at how some countries' economic and political institutions are extractive, as well as how bitcoin can help mitigate the negative effects of those institutions and policies.

#### **3.1 Extractive Political and Economic Institutions**

People's trust in the central bank is essential in a fiat currency system. Central banks have the ultimate power in a monetary system since they have the ability to produce money and so reduce its worth. People who use that system have faith in the bank's promise not to devalue the currency. In order to foster trust and allow the central bank to properly focus on the needs of the people, several countries, including the United States, have distanced the central bank from political interference. In industrialized countries, these mechanisms normally work well, and trust breaches are uncommon. Many emerging countries, on the other hand, suffer from bad governance and leadership, as well as an underdeveloped financial system. The basic factors that have led to huge worldwide inequality have been the subject of extensive inquiry. Many theories focus on culture, geography, and environment as the primary causes of economic growth or stagnation, yet each of these theories has numerous counterexamples. Acemoglu and Robinson construct a hypothesis in *Why Nations Fail* that focuses on the economic and political institutions that were formed during colonization. 22 This idea explains a lot of the confusing income redistribution that occurred after the colonial period. Mexico and Peru were well ahead of what is now the United States in terms of native population affluence, population size, and natural resource abundance in the 1500s. Today, this relationship has completely shifted, and the border between Mexico and the United States displays one of the world's most extreme contrasts of inequality. 23 According to Acemoglu and Robinson, because the Spanish colonized in an exploitative

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manner, they destroyed most of the region's economic potential, resulting in tremendous inequality and a lack of incentive to work for the bulk of the population. This pattern has lasted, and it has been supported by economic and political institutions. The United States and Canada of today, on the other hand, have experienced a totally different type of colonization.

The native people were neither large or wealthy enough for the colonists to survive off of indefinitely from the first instance of settlement on US soil. Because they couldn't exploit the natives, the elite in these new colonies had little choice but to give good incentives for the colonists to be productive. This approach laid the path for more inclusive political and economic structures that encourage economic development. Acemoglu and Robinson argue that countries fail due to a lack of inclusive economic and political structures that promote growth. These institutions safeguard private property rights, encourage private investment and innovation, and ensure that all individuals have access to economic possibilities. Extractive political and economic institutions, on the other hand, have a ruling body that exploits its political and economic authority to oppress and exploit the bulk of the population. <sup>24</sup> It is extremely difficult to break free from an extractive model since the loop is self-reinforcing. Extractive institutions produce unstable administrations that are readily destabilized by popular revolt. New leaders are then confronted with the same motivations as previous leaders, and they rarely alter much. Few countries have ever been able to break free from the shackles of extractive institutions, and those that have always had a convergence of variables working in their favor. The conclusions of this study presume that a country's economic stagnation is caused by the extractive nature of its institutions, rather than geographical or cultural considerations. The following section of this article will look at how bitcoin can assist alleviate some of the symptoms of extractive institutions, as well as contribute to the convergence of elements that can help break the extractive cycle.

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### **3.2 The Superiority of Bitcoin**

While the majority of people in wealthy countries are scared of bitcoin and do not see it as a credible alternative to the traditional financial institutions, the developing world is primed for a bitcoin revolution. Extractive institutions have resulted in financial systems that are either non-existent or inadequate in many developing countries. People who have lived in these facilities have had to deal with dangerous financial arrangements and money transfers, as well as holding high-inflation currencies. Many of the risks linked with bitcoin aren't nearly as frightening for these people. Furthermore, the developing world is a particularly entrepreneurial place, with many tiny enterprises operating on a low profit margin. Cutting expenses is critical for many organizations, and bitcoin offers a way to do just that. Finally, bitcoin allows money to travel cheaply into and out of countries, facilitating investment and humanitarian relief from developed countries.

#### **3.2.1 Currency Controls and Inflation**

While significant inflation is a thing of the past in the United States and many other industrialized countries, inflation is still rampant in many developing countries. Savers are forced to look for a more stable long-term store of value when their currency is inflating. The situation is exacerbated by the fact that many countries intentionally raise their exchange rates in order to boost the value of their indigenous currency. As a result, no one wants to hold the inflationary, artificially priced currency, and a flight to foreign reserves takes place. A government can only keep up with the increasing demand for foreign reserves for so long before it has to impose limits to protect its reserves. Citizens in these countries are compelled to either keep inflationary currencies and see their savings dwindle, or purchase foreign reserves on illicit underground markets. When it comes to black market currency trades, Argentina has been a popular research topic. The Argentinian peso has seen yearly inflation rates of over 10,000 percent in the past, with unofficial inflation rates hovering around 30% in recent years. Due to present high inflation and a history of hyperinflation, a culture of saving in a foreign currency, ideally the US dollar, has developed. The Argentinian tax department ceased approving requests to buy

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dollars in 2011, thereby removing any legal alternative for Argentinians to keep their money in dollars. This strategy was terrible for many Argentinians, as it erased the only genuine store of value they possessed. The ban on purchasing foreign reserves was imposed because the Argentinian government's reserves were rapidly depleting. The prohibition on buying foreign currency spawned a booming black market, with the Argentinian banking sector offering an exchange rate of 9.06 pesos per dollar in 2014, while black market currency exchangers offered. Pesos per dollar have increased by approximately 50%. Many countries are experiencing a similar scarcity of foreign reserves, and these countries are the greatest places for bitcoin to take root.

While the illegality of the black market appears to be of little concern to Argentinians, the inefficiencies that the black market introduces are an incentive to move to a bitcoin-centric economy. If an Argentinian wanted to keep his or her money in dollars, he or she would have to go to a black market exchange to acquire dollars, then return to another black market exchange to convert the dollars back into pesos when the time came. Dollars are only useful when converted back into pesos at the black market rate because they are valued at the official exchange rate when utilized in stores. Argentina now lacks a currency that truly satisfies the three basic components of a currency. Dollars are primarily used as a store of value rather than a unit of account or a means of exchange, whereas pesos are not used as a store of value. This results in considerable travel and time inefficiencies, as well as a loss due to the buy-sell spread when converting pesos for dollars. While bitcoin is now only usable in a comparable capacity to the dollar (it is a terrible unit of account), if merchants begin taking bitcoin payments, the system will vastly improve. If a critical mass of bitcoin-accepting retailers is reached, the economy will be able to function without the use of pesos or dollars, and huge inefficiencies will be eliminated. Bitcoin will serve as a store of value, a mechanism of exchange, and a unit of account. At this point, it's reasonable to question bitcoin's utility as a store of value. Bitcoin is well-known for being a very volatile currency, even excessively so. While this is true, bitcoin has risen in value against the Argentinian peso and the US currency during the last five years. While bitcoin is more volatile than the Argentine peso, it may be preferable to inflation. At the very least, when you invest in bitcoin, you're putting your money into a currency that has a track record of increasing in value. In addition, as seen in Figure 1, bitcoin's volatility has decreased considerably over the last five years. Price 18 fluctuations of 100 percent each month were usual in the past, but volatility has dropped dramatically in the last year.

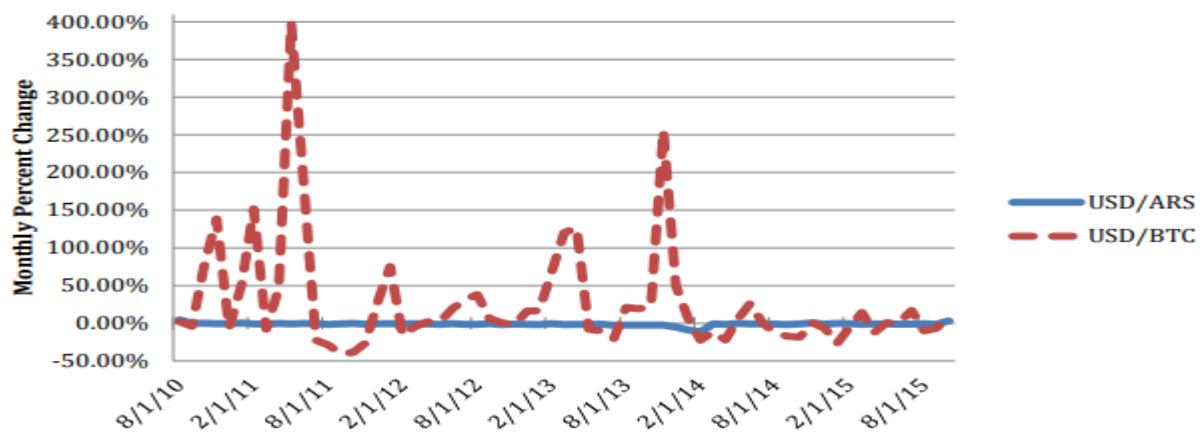


Figure 1: Volatility of bitcoin (BTC) and Argentinian pesos (ARS) compared to the United States dollar (USD) 3031 While volatility is a major detractor from bitcoin, Figure 2 shows the dramatic strengthening of bitcoin against the Argentinian peso, albeit with a large spike and subsequent crash.



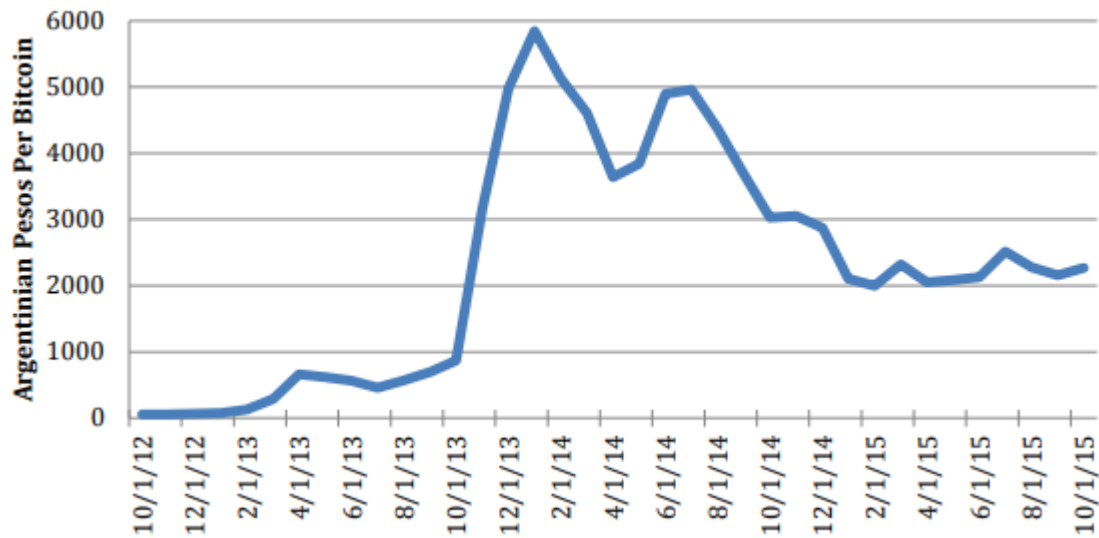


Figure 2: The exchange rate between the Argentinian peso and bitcoin. Although bitcoin entails a high level of risk, it does have the potential to retain or increase the value of your investments, which is more than the Argentinian peso can claim. One must strike a balance between volatility and inflation, which is frequently determined by people's opinions about the future of cryptocurrencies. If you believe that bitcoin acceptance will grow over time and that it will become a more widely accepted currency, short-term volatility should not be a major issue, given the long-term deflationary trend and rising stability. If, on the other hand, you are doubtful about cryptocurrency's viability, long-term stability is far from guaranteed. The difficulty with all cryptocurrencies, given this premise, is that each of these predictions is self-fulfilling; acceptance produces stability, while rejection causes volatility.

When this study is expanded to a worldwide scale, it becomes clear that many countries face a dilemma comparable to Argentina's. Many parts of West Africa, Eastern Europe, Central and South America, and the Caribbean have experienced inflation rates of above 15% and numerous exchange rates. <sup>34</sup> It's also worth noting that actual inflation rates in some of these nations may be substantially higher than stated; for example, Argentina's rate is considered to be more than double the official figure. <sup>35</sup> While few people in developed countries with stable currencies would maintain any significant percentage of their money in a currency that swings as much as bitcoin, our research suggests that bitcoin may have a substantial market in countries with high inflationary fiat currencies.

### Decreasing Payment Processing

Costs Bitcoin has a lot to offer merchants on the other side of the coin, in addition to helping savers escape inflation. Payments made by tourists using foreign credit cards must be processed through the banking system. Merchants are charged the official exchange rate for these dollars, in addition to the expenses connected with credit card processing, and lose a considerable amount of the potential value. Merchants who take bitcoin avoid both costs by converting bitcoin to pesos at a rate of roughly 11 pesos per dollar (at the time of writing), saving over 40% in total. <sup>36</sup> This is a significant change that might mean the difference between a small firm succeeding and failing. Argentina's real poverty rates are unknown, but with unofficial estimates as high as 30%, any extra savings that Argentinians can obtain is quite beneficial.

### Investment and Humanitarian Aid

Bitcoin solves many of the challenges connected with international investment and humanitarian relief, in addition to avoiding inflation and payment processing fees. When it comes to transporting money between countries, the current international financial system is inefficient. Rates put on to transfers out of the United States can reach 10%, with certain nations seeing fees as high as 20%.<sup>38</sup> When exchange rate fees are factored in, a transaction's loss can be as high as 30%.<sup>39</sup> This causes a great deal of friction in the international aid and remittance networks, which are vital to many countries. Bitcoin has already progressed to the point where it can be used to send aid to any country in the globe at a low cost. Bitcoin's promise is not completely fulfilled when used solely as a means of payment. If bitcoin develops to the point where it can be used not only to send money for aid but also to administer it, money donated in wealthy countries would be able to help the poor in a much more effective way. The public blockchain also has appeal when it comes to regulating aid groups and determining where money is spent. Anyone might tell where an agency's inflows and outflows of money came from by simply checking up that address on the public blockchain if it made its bitcoin address public. This is the ideal method for preventing corruption and embezzlement.

### Banking the Unbanked

Bitcoin provides a way to dramatically extend financial services in the underdeveloped world, in addition to avoiding exploitative governmental and economic institutions. Approximately 2.5 billion adults worldwide are unbanked, meaning they are unable to benefit from financial services.<sup>40</sup> These people are unable to open savings accounts or utilize credit cards, and are thus largely excluded from the financial structures that have enabled industrialized countries to attract significant investment. For these people, cash and other commodities become their only store of value, drastically limiting the ease with which value can be transferred from one person to another without a physical interaction. The majority of these people are unbanked because they lack the necessary identification or collateral to open a bank account. For bitcoin, none of these factors are relevant. Several firms have already begun to facilitate bitcoin transactions in underdeveloped nations by utilizing people's cellphones, which have grown widespread in countries where the bulk of the population lacks access to even the most basic financial products.<sup>41</sup> Allowing all of these unbanked people to access bitcoin wallets via their cellphones would give them with not only the benefits of a bank account, but also a bank account with minimal fees. We've already seen what M-Pesa and other mobile payment systems can achieve for underdeveloped countries. Bitcoin has all of the advantages of M-Pesa, but with reduced transaction costs and no geographical restrictions. M-Pesa was a breakthrough in mobile payment technology that demonstrated the viability of such a model to the rest of the developing world, but it is limited in its potential to serve people in the rest of the developing world. A mobile bitcoin system would be transnational in scope, allowing for both local and international transactions. Allowing for the inefficiencies and lack of transparency of huge aid groups, bitcoin has the ability to build a system in which consumers can donate directly to needy individuals in poor nations. People may start personal requests for money on websites like Tilt, which would be met by people in developed countries. International humanitarian help would become much more personal, and the advantages would be much more visible, under such a framework. Bitcoin could permit small-scale investment in initiatives from anywhere in the globe, in addition to simple charity. Bitcoin's widespread adoption has the ability to break down barriers between the rich and the poor, as well as totally transform the way aid and investment are distributed on a global basis.

## 4. Empirical Analysis

### 4.1. Bitcoin Data

Bitcoin data is tough to work with because it is completely anonymous. All of the transactions are visible to the public, but no information about where they are taking place or who is originating or receiving them is available. It would be good to have data on bitcoin usage within each country in order to analyze the relationship between the extractivity of a nation's political and economic institutions. While it is impossible to geolocate bitcoin transactions, there are a few additional measures that can be used to gauge bitcoin usage. The first is the number of downloads of bitcoin client software by country. This is a somewhat decent proxy for the amount of people using bitcoin in a certain country, however it excludes all third-party hosted wallets. Using downloads also provides no indication of the amount of money being transferred. The second approach, which is the focus of this study, is to examine the amount of each fiat currency used in bitcoin transactions on exchanges. Bitcoin Charts is a website dedicated to the bitcoin network's data. While it is impossible to geolocate transactions involving solely bitcoin, transactions involving a fiat currency are logged when utilizing an established exchange. Bitcoin Charts collects data in real time from over 40 different exchanges. <sup>42</sup> In this article, data from one of those exchanges, Local Bitcoins, was used for analysis. Local Bitcoins isn't the busiest exchange, but it was chosen since it serves the most nations. The exchange is a classifieds website that works similarly to Craig's List and allows users to post ads for buying and selling bitcoin. The exchange is available in practically every region, and while it only accounts for 22% of overall bitcoin traffic, it accounts for a significant fraction of the bitcoin usage studied in this article. The great majority of bitcoin transactions take occur on a few large bitcoin exchanges like Ok Coin, Huobi, and Bitfinex, which are mostly utilized for speculative trading. The goal of this study is to see if bitcoin is being used in developing countries for non-speculative purposes. Local Bitcoins data captures a considerably greater fraction of the bitcoin use I'm seeking to examine in pursuit of that goal. This study does not include data from other smaller, non-speculative bitcoin exchanges that would be of relevance, but only data from local bitcoins is used for consistency. Table 1 shows the results of the data collection for 21 different countries. The final bitcoin variable chosen for the regressions was bitcoin usage in 2015, which was log transformed to determine the percentage influence of the regressors on bitcoin usage.

### 4.2 Regressors

The goal of my empirical study is to see how widely bitcoin is being used in the real world to get around extractive regimes. To this goal, bitcoin usage is regressed against a number of extractive institutions-related variables. Financial openness, as measured by the Chinn-Ito Financial Openness Index, and inflation are the two most important factors. Measuring financial openness across countries is challenging for a variety of reasons. For example, many countries, such as Argentina, use capital controls without enacting explicit regulations, resulting in inflated financial openness indices. Capital regulations, on the other hand, can sometimes be easily bypassed by the private sector, hence financial openness is undervalued. <sup>44</sup> Menzie Chinn and Hiro Ito have devised what they feel is a more comprehensive measure of financial openness in response to this difficulty. Multiple exchange rates, limits on current account transactions, and the obligation of surrendering export revenues are all part of their plan. <sup>45</sup> It is a broad indicator of how easy or difficult it is for citizens to get foreign currency and transact capital. In this analysis, two different financial openness variables are used: a 45-year average of financial openness and the most recent financial openness data from 2013. Inflation is the second regressor, and it is seen to be one of the key drivers of bitcoin adoption in developing nations.

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The consumer price indices accessible from the Federal Reserve Economic Data from the St. Louis Fed were used to calculate the inflation rates used in this analysis. Annual inflation rates were calculated using a 46 percent change in the CPI over the previous year. The annual inflation rate in 2014 and the average annual inflation rate over the previous 35 years are the two variables used. Another factor for bitcoin adoption is that a big section of the population in underdeveloped countries does not have bank accounts. The percentage of the population with a bank account was added as one of the regressors to examine the link between bank account availability or usage and bitcoin usage. The data for this variable was taken from The World Bank's Global Financial Inclusion Database.

**Table 1: Bitcoin data by country**

<b>Country Name</b>	<b>Bitcoin Usage 2015</b>	<b>Financial Openness 2013</b>	<b>45-Year Average Financial Openness</b>	<b>Inflation 2014</b>	<b>35- Year Average Inflation</b>	<b>Internet Penetration</b>	<b>Percent Banked 2014</b>
Argentina	4935.22	-1.89	-0.46		267.56	75.08	50.20
Australia	74843.3	1.61	1.14	6.3	344.75	90.15	98.86
Brazil	2182.84	-0.13	-1.2	2.5	4.38	53.27	68.12
Canada	17574.09	2.39	2.39	1.9	3.51	92.85	99.10
Czech Republic	946.39	2.39	1.76	0.4	3.32	79.19	82.18
Denmark	287.28	2.39	1.3	0.6	3.43	96.09	100
Hong Kong, China	3927.01	2.39	2.35		4.54	79.42	96.15
India	7372.39	-1.19	-1.19	6.4	8.29	27.33	53.14
Israel	11.38	2.39	0.36	0.5	41.10	72.17	89.95
Mexico	5766.32	1.09	0.89	4	27.60	47.21	39.14
New Zealand	3365.78	2.39	1.38	1.2	5.27	92.29	99.53
Norway	4179.65	2.39	1.01	2	3.94	95.32	100
Poland	2932.44	0.04	-0.81	0.1	35.55	67.55	77.86
Russian Federation	73310.03	1.17	-0.19	7.8	78.64	60.82	67.38
Singapore	1636.11	2.39	1.82		1.84	85.07	96.35

Obviously, bitcoin utilization is greatly reliant on a country's Internet connectivity and technological capabilities. The level of Internet penetration was employed as a proxy for overall availability of technology and the Internet in order to adjust for the substantial variation in these factors across countries. The Internet World Stats website provided information on Internet penetration per country. 48 The website compiles information from all of the major regional Internet registries that regulate IP address space. The percentage of the population with Internet connection is the Internet penetration variable. GDP and Population were introduced as extra control variables, each of which was log transformed for the regression. The World Bank website provided the data for these two variables.

### 4.3 Results

Table 2 shows the regression results when the Log of bitcoin usage in 2020 is regressed against different combinations of the regressors. In order to relax the assumption of homoskedasticity, the regressions were computed using robust standard errors. Table 2: Regression Results. Asterisks represent different significance levels: \*-10%, \*\*-5%, \*\*\*-1%.

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Variable		Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Log Population	Coefficient	1.502 ***				
	Standard Error	0.278				
	P-Value	0.000				
Log GDP	Coefficient		1.545 ***	1.581 ***	1.48 **	1.257 ***
	Standard Error		0.377	0.378	0.513	0.362
	P-Value		0.003	0.001	0.018	0.010
Inflation Rate 2014	Coefficient	0.368 **	0.378 **		0.468 *	0.516**
	Standard Error	0.120	0.157		0.221	0.193
	P-Value	0.011	0.040		0.063	0.032
35-year Average Inflation Rate	Coefficient			0.00106		-0.00533
	Standard Error			0.00494		0.00392
	P-Value			0.834		0.216
Financial Openness 2013	Coefficient	-1.145 *	-1.473 *	-0.626		-2.194 ***
	Standard Error	0.613	0.690	0.660		0.625
	P-Value	0.089	0.061	0.360		0.010
45-year Average Financial Openness	Coefficient				-0.0761	1.135
	Standard Error				0.7928	0.776
	P-Value				0.919	0.187
Internet Penetration	Coefficient	0.253 ***	0.200 **	0.0151	0.798	0.170 **
	Standard Error	0.0679	0.0729	0.0467	0.103	0.0648
	P-Value	0.003	0.023	0.752	0.457	0.034
Percent Banked	Coefficient	-0.0828 *	-0.0922 *	0.0360	-0.0324	-0.0620
	Standard Error	0.0434	0.0490	0.0278	0.0841	0.0451
	P-Value	0.082	0.093	0.217	0.709	0.212
Intercept	Coefficient	-28.492 ***	-39.809 ***	-37.929 ***	-36.43 **	-32.172 **
	Standard Error	5.724	10.516	11.400	14.664	10.202
	P-Value	0.000	0.004	0.005	0.035	0.016
R-Squared		0.780	0.768	0.546	0.666	0.831

Regression 1 shows the coefficients, standard errors and p-values for a regression when controlling for population and regression 2 shows the results when controlling for GDP. These are the two regressions of most interest as they represent the most significant results and also yield interesting implications. You can see that all regressors are significant at the 10% level in both of these regressions and that all but percent banked and financial openness in 2013 are significant at the 5% level. When looking at inflation in the first regression we see that a one-percentage-point increase in the inflation rate in 2014 leads to a .368 increase in log bitcoin adoption. When the log is transformed ( $\exp(0.368)-1$ ), a one-percentage-point increase in inflation leads to a 44.48% increase in bitcoin usage in 2015 holding all else equal. When controlling for GDP in the second regression the result is a 45.94% increase in bitcoin adoption when inflation

Variable Regression 1 Regression 2 Regression 3 Regression 4 Regression 5  
 Log Population Coefficient 1.502 \*\*\* Standard Error 0.278 P-Value 0.000  
 Log GDP Coefficient 1.545 \*\*\* 1.581 \*\*\* 1.48 \*\* 1.257 \*\*\* Standard Error 0.377 0.378 0.513 0.362 P-Value 0.003 0.001 0.018 0.010  
 Inflation Rate 2014 Coefficient 0.368 \*\* 0.378 \*\* 0.468 \* 0.516\*\* Standard Error 0.120 0.157 0.221 0.193 P-Value 0.011 0.040 0.063 0.032  
 35-year Average Inflation Rate Coefficient 0.00106 -0.00533 Standard Error 0.00494 0.00392 P-Value 0.834 0.216  
 Financial Openness 2013 Coefficient -1.145 \* -1.473 \* -0.626 -2.194 \*\*\* Standard Error 0.613 0.690 0.660 0.625 P-Value 0.089 0.061 0.360 0.010  
 45-year Average Financial Openness Coefficient -0.0761 1.135 Standard Error 0.7928 0.776 P-Value 0.919 0.187  
 Internet Penetration Coefficient 0.253 \*\*\* 0.200 \*\* 0.0151 0.798 0.170 \*\* Standard Error 0.0679 0.0729 0.0467 0.103 0.0648 P-Value 0.003 0.023 0.752 0.457 0.034  
 Percent Banked Coefficient -0.0828 \* -0.0922 \* 0.0360 -0.0324 -0.0620 Standard Error 0.0434 0.0490 0.0278 0.0841 0.0451 P-Value 0.082 0.093 0.217 0.709 0.212  
 Intercept Coefficient -28.492 \*\*\* -39.809 \*\*\* -37.929 \*\*\* -36.43 \*\* -32.172 \*\* Standard Error 5.724 10.516 11.400 14.664

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10.202 P-Value 0.000 0.004 0.005 0.035 0.016 R-Squared 0.780 0.768 0.546 0.666 0.831 29 increases by one-percentage-point. This large coefficient shows that inflation doesn't just have a statistically significant impact on bitcoin usage but also a large economically significant impact. This implies that bitcoin is in fact being used as a saving haven for those confined to inflationary currencies and that a small increase in inflation can lead to a profoundly large increase in bitcoin adoption. Financial openness, which was hypothesized to have a large negative relationship with bitcoin adoption proves only to be significant at the 10% level but nonetheless seems to follow the expected relationship. An increase in financial openness by one unit leads to a 1.15 decrease in log bitcoin usage in 2015 or a 216% decrease in bitcoin usage, all else equal. This seems impossibly large but when considering that financial openness across the sample only ranged from -1.89 and 2.39 it becomes more reasonable. A one-unit decrease in financial openness is highly unlikely, in fact only two of the countries in the dataset had changes to their financial openness indices from 2012 to 2013, Russia and Australia, and both of them had only a .26 increase to their financial openness indices. 51 Interestingly the significance decreases dramatically in the second and third regressions when historical inflation rate and historical financial openness are used. When the 35-year average inflation rate is used instead of the rate for 2014 the coefficients for all regressors except for log GDP become insignificant. The same results are observed when 45- year average financial openness is used in place of 2013 financial openness. These results are counterintuitive as it was expected that there would be a significant historical precedent driving bitcoin adoption. Historical inflation and financial openness in a country were expected to have a much larger impact on people's skepticism of government monetary policies than the most recent values for each of those measures. The regressions show, however, that recent numbers for both of these variables are much more influential in determining bitcoin adoption. One possible reason for this trend is that bitcoin adopters are more tech-savvy and therefore younger and haven't had to deal with past inflation or financial restrictions. Their decisions are being driven by more recent trends in inflation and financial openness. It would be interesting to examine the impact of financial openness and GDP over different time horizons to see whether this hypothesis holds up. The variance of inflation was also experimented with as a regressor, the logic being that high variance in historical inflation may also make people wary of their local currencies. It was found that while variance of inflation over the past 35 years had a statistically significant impact on bitcoin adoption, that impact was not economically significant. Including inflation variation didn't much change the impact of other variables. When examining the impact of percent banked we see that the results are as expected. A one-percentage-point increase in the percentage of people in a country that have a bank account leads to a 0.083 drop in log bitcoin usage, or an 8.65% drop in bitcoin usage, all else equal. This shows that a lack of established banking systems is driving people to use bitcoin wallets in place of traditional bank accounts. This could be motivated by a need to store money electronically or because people lack an efficient way to transfer money in an under banked country. It is clear from these results that 2014 inflation rates and 2013 financial openness, as measured by the Chinn-Ito Financial Openness Index, are the most significantly correlated with bitcoin adoption in a country, when all else is held equal. It is also interesting that higher R-Squared values are observed when controlling for population rather than GDP. This is unexpected as bitcoin adoption was assumed to be more highly correlated with GDP. I have thus far assumed that the relationships between variables are causal, however there are a number of reasons why causality may not hold. Any one of the four assumptions needed to ensure unbiasedness of the estimators could be violated. The most likely violations would be measurement error in inflation and omitted variables. As was acknowledged earlier, there is known misreporting of inflation for some developing countries. This could most certainly have an impact on the results of the regression but the hope is that very few countries in the dataset are misreporting their inflation numbers. Omitted variables are a problem with

any regression and time was taken to think about the economic drivers of bitcoin adoption. While the economic drivers are generally included, there may also be social drivers that are excluded and could be impacting the results. One example would be the social status bump received from the perceived technical ability that is necessary for using bitcoin. Another possible driver would be the sense of freedom that comes with bitcoin. Both of these factors are definitely significant drivers in developed countries. While these results are inspiring in that they show that bitcoin can be used as a viable alternative to the monetary systems established by extractive governments, bitcoin has a number of weaknesses that should be addressed as we consider the overall implications of widespread adoption.

## **5. Weaknesses of the Bitcoin System**

### **5.1 - Security**

One of the most serious issues with bitcoin is its lack of security. Because there is no central authority, the individual user bears more responsibility for security. 52 All bitcoin transactions are irreversible; if someone gains access to your account and spends your bitcoin without your permission, there is no way to reverse the charges. Bitcoin wallets, like any other account, are vulnerable to hacking, and there is no redress if your bitcoins are stolen. You do have the option of keeping your bitcoin wallet offline, which eliminates the majority of the risk of hacking, but this comes with a number of drawbacks. 53 If the wallet is saved on a local hard drive, it is possible that you will lose or damage the device, rendering it unusable. If this happens, all of the bitcoin in that wallet is lost or destroyed in the same way. Furthermore, if you lose your private key, you will be unable to access your bitcoins, which will remain in your wallet but will never be spent.

### **5.2 Volatility**

Price fluctuation is the second most serious problem. While fiat currencies in many nations can be a poor store of value, bitcoin's volatility has proved that it can also be a poor store of value. The price of bitcoin increased by 800% in October and November 2013, before plummeting by 50% in December 2013. 54 Bitcoin's price volatility will most likely continue in the foreseeable future. While this reduces the currency's utility as a medium of exchange, proponents of the system think that this is just a blip on the radar. Some even claim that volatility is beneficial in the early stages since it stimulates speculators, forcing the development of more advanced, safer exchanges that will eventually be used for non-speculative purposes. 55

### **5.3 Destabilizing Governments**

Governments today play a significant role in all parts of our lives. They are responsible for education, infrastructure, social welfare, commercial regulation, and security and defense. They require citizens to follow their rules and pay taxes in order to deliver all of these services. One of the most likely consequences of broad bitcoin acceptance is that it will jeopardize a government's capacity to deliver essential services. While rich countries are likely to be able to integrate bitcoin into financial legislation and tax it like any other financial system, underdeveloped countries may have a more difficult time doing so. Bitcoin is a far greater threat to a country that just creates money to pay off debts and manipulates exchange rates artificially. These countries have a motive to ban or restrict bitcoin, but they are up against a population that benefits from the technology and has no qualms about working outside of the legal system when it comes to personal finances, as evidenced by the thriving black market in many countries. In defense of bitcoin, the governments of the countries mentioned in this paper are frequently blamed for their economic woes. Acemoglu and Robinson argue that states fail economically

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because they are extractive and exploit their populace for personal gain. In this circumstance, citizens have every right to employ any means at their disposal to get around their governments. On the other hand, abandoning government institutions may not be the best way to economic growth in these countries. Governments' legitimacy will be harmed further if they are circumvented, as would their ability to continue the valuable benefits they offer to society. In the end, these countries need to see the adoption of inclusive government institutions rather than the complete elimination of government. Breaking free from the cycle of extractivity is a struggle, and bitcoin can assist. Bitcoin has the potential to promote short-term economic prosperity that will spread to all sectors of society. Simultaneously, it will unavoidably erode the existing government, potentially paving the way for a new system of government that recognizes the people's ability to work independently of the government. In order to achieve legitimacy and buy-in from the public, any new system would have to concede more to the people and be more inclusive. There's also the case where the government isn't wholly to blame for the stagnation of the economy. While this may not be the case in the long run, short-term economic downturns can undoubtedly be the case. Bitcoin has the potential to be the most harmful in these instances. Economic downturns might be exacerbated if an economy became overly reliant on bitcoin. Many countries have reckless monetary and fiscal policies, yet in times of crisis, they are the only options for stimulating the economy. The government will retain control of its fiat currency and will be able to extend the money supply to lower interest rates or implement fiscal stimulus. However, if a major percentage of the country's economy operates outside of fiat money, these regulations will have a considerably lower influence. Credit would dry up in an economic downturn, and it would be difficult for the central bank to act as the lender of last resort in an economy that is mostly based on bitcoin.

### **6 - The Future of Bitcoin**

#### **6.1 - Internet Penetration**

While the findings suggest that bitcoin is being utilized as a legitimate means of circumventing exploitative institutions, there are still some significant obstacles to bitcoin's widespread adoption. To begin with, Internet penetration, which has had a big impact on bitcoin acceptance, is badly missing in many places of the world where bitcoin may be most beneficial. As previously mentioned, the introduction of data-enabled cellphones has drastically improved Internet access in many poor countries. Even phones without Internet connectivity might be used to access bitcoin wallets hosted by a third party company via an MPesa-like mechanism. With these two options, it's unlikely that technology will continue to be the primary barrier to adoption in the coming years.

#### **6.2 - Government Regulation**

Government regulation and volatility, which are both closely linked, are the next two major impediments to adoption. Bitcoin is mostly used in industrialized countries to ease commerce and as a speculative commodity. While these aren't the applications that many bitcoin supporters had hoped for, they nonetheless constitute a significant source of bitcoin demand. Large developed countries utilizing bitcoin as an auxiliary currency might supply enough demand to stabilize bitcoin, making it a much more feasible currency for developing countries. People in wealthy countries have been leery of the new, uncontrolled currency in recent years, thus this auxiliary market is strongly reliant on regulation. As a result, it's useful to look at some of the regulatory approaches and obstacles. The bitcoin network's decentralised nature poses the most significant regulatory problem. Because there is no central authority over which to implement financial regulations, top-down regulation of bitcoin is impossible. Governments could also try to control bitcoin from the bottom up, making it illegal to own bitcoin.



While this may be doable in other nations, doing it in the United States would be extremely tough. People being prohibited from holding bitcoins are effectively being prohibited from possessing a piece of computer code, which is essentially just a form of communication. If a government were to establish some legal grounds to prohibit bitcoin, policing it would be a considerably more difficult task. The fact that bitcoin is fully anonymous is one of the reasons it has become the dominant money in unlawful internet markets. Any regulatory entity would have a tough time determining who holds bitcoin. 37 There is, however, a way for regulators to exert influence on bitcoin. A certain level of technical expertise is required for someone to personally maintain a bitcoin wallet, as stated earlier in this paper. As a result, the market for bitcoin exchanges and third-party platforms has grown significantly. When you consider that merchants frequently desire third-party payment processors to handle any bitcoin payments, it's clear that private enterprises working in the bitcoin space are in high demand. These businesses are all ripe for regulation, and many industrialized countries have already followed this route. Bitcoin exchanges have been incorporated into financial rules in the United States, the United Kingdom, Canada, and other developed countries, requiring compliance with anti-money laundering legislation and other financial regulations. 5657 With the exception of the libertarian bitcoin crowd, most individuals see these principles as a validation rather than a constraint. Furthermore, several governments have enacted favorable rules or have maintained a hands-off stance. Bulgaria has formally acknowledged bitcoin and imposed a 10% tax on bitcoin-related revenue. 58 Switzerland indicated that it would not put any further controls on bitcoin beyond the existing banking standards, while a number of Caribbean and English Channel island states are welcome bitcoin exchanges with little or no regulation. While many western countries have embraced the message, others have taken a more direct approach. All Chinese banks were forbidden from engaging with bitcoin enterprises by the People's Bank of China in 2014. 60 In developing countries, there have also been regulatory acts that have proven detrimental. Bolivia and Ecuador have explicit restrictions on bitcoin, while Columbia has made it illegal for banks to engage with bitcoin companies. 61 While these legislative moves appear to rule out the possibility of bitcoin being a big player in the developing world, this is not always the case. Despite government prohibitions, currency underground markets are widely used in many nations with currency controls. This demonstrates that people in these countries are used to and prepared to work outside of the law when it comes to personal finances. Users of bitcoin can thus benefit from the stability that comes with legal adoption of bitcoin in developed countries, regardless of their native country's regulatory framework. Finally, the fate of bitcoin in major developed economies is still being debated, and as a result, bitcoin's utility in undeveloped countries is still unknown.

## 7 – Conclusion

Bitcoin as a currency has an uncertain future. Its success or failure is largely determined by whether it achieves a critical mass that eliminates wild volatility, which is far from certain. The improvement of current payment technologies is one of bitcoin's primary challenges. MasterCard and American Express are making tremendous progress in reaction to digital currencies, and if they can give the same solutions that bitcoin does, bitcoin will cease to exist and will almost definitely remain a fringe currency. 62 The hidden transaction fees and delay are clearly not a major enough barrier from established currency systems in the industrialized world, where you can swipe your credit card or pay with your phone at a cash counter. To gain widespread use, bitcoin's convenience would have to be comparable to that of credit cards and mobile payment methods. This would require practically all retailers to take bitcoin, the acquisition of bitcoin to be straightforward and quick, and the technology to be simple enough for the layperson to use without much training. While this is a possibility, credit card firms are attempting to streamline their operations and may be able to stay ahead of the curve by reducing the prices and

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inconvenient aspects of their systems just enough to prevent a critical mass of customers from transferring to bitcoin. The race is on to be the first to incorporate those in the poor world who lack access to financial items such as credit cards and bank accounts. This is a market that will be technologically ready for mobile payment and banking in the near future, and bitcoin has the ability to meet that demand while also providing all of the benefits discussed in this article. If established credit card or telecom corporations seize the market first, bitcoin will face the same issues it has in the poor world: it is a better system than the present one, but not superior enough to trigger a revolution. Citizens of nations with extractive political and economic institutions are already adopting bitcoin, according to the regression results. While this is encouraging and shows that some people are beginning to see the benefits, society has only just begun to tap into bitcoin's full potential. Unless it can be embraced on a larger scale, the price will remain erratic, and using bitcoin as a currency in everyday life will be impossible. The issue is that bitcoin's benefits will only be available through widespread use, and popular adoption is contingent on those benefits being available. The bulk of people in underdeveloped nations, who are already surviving on the absolute minimum, are unlikely to risk depositing much of their savings in a currency that could lose half of its value in a week unless the price stabilizes. If bitcoin doesn't find a home, it'll remain a volatile 2currency that will never reach its full potential.

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