

Opting Out

The Drivers of Bitcoin Adoption in Venezuela and Argentina



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Abstract

Bitcoin has been hailed by some as the future of finance, providing a way out of badly functioning financial orders for the world's poor. Argentina and Venezuela fit the description of malfunctioning economies and they are the 10th and 7th highest global adopters and the two top adopters in Latin America. This paper attempts to answer the question 'What factors lead to the adoption of Bitcoin in Venezuela and Argentina?' In order to do this, economic issues are first identified which Bitcoin could potentially solve and then it is analysed to see if (and if yes, how) Bitcoin solves these issues. Bitcoin, among the limited numbers of users in both countries, is used as a value storage tool in the context of limited alternatives as well as a means of moving funds cross international borders when this is otherwise inconvenient or impossible for the person who owns the funds. This means that both inflation as well as the inability to conveniently transfer across political borders leads to the adoption of Bitcoin. Bitcoin is viewed and used as a value storage option in both countries. There is convincing evidence that inflation is effectively hedged by Bitcoin in Argentina. In Venezuela, although Bitcoin should theoretically hedge inflation, it cannot be said with certainty that it does due to lacking data. The use of Bitcoin in this context also depends on the availability of alternatives. Several groups also make use of Bitcoin to transfer funds across otherwise difficult to 'cross' borders. However, they only use it as a single step in an international economic exchange. It does not replace fiat in international transactions, it just allows the crossing of difficult to cross borders. Importing fiat currencies is not found to be a driver of adoption.

Keywords

"Bitcoin"; "Dollarization2.0", "Latin America"

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List of Abbreviations

CPI – Consumer Price Index (a measure of inflation)

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1 Introduction

We are living through the first period in recent history where there is a feasible alternative to the currencies and financial systems traditionally monopolized by the state. This development is blockchain technology, and more specifically the Bitcoin network which started it all. It has been hailed by some as the future of money and a complete scam by others (Ammous, 2018a; Stankiewicz, 2021). Regardless of the true nature of Bitcoin – interest is increasing (Google Trends, 2021). Two factors make its study interesting. Firstly, Bitcoin's increasing use by people has the potential to seriously disrupt governance, in particular in relation to fiscal and international trade policy. Secondly, there is very little that any government or international body could actually do to prevent the use of Bitcoin even if they wanted to. This is due to Bitcoin's decentralized nature (Nakamoto, 2008). Therefore, investigating the factors which lead to Bitcoin's use is important so that governments, but also individuals can prepare themselves as they see fit.

Academia fairly confidently identifies wealth (and the use of Bitcoin as an investment vehicle) as reasons for Bitcoin adoption in developed countries. Those who are wealthier will be more likely to put their money into a highly volatile vehicle like Bitcoin. However, for developing countries the story is not so clear, hindered by limited availability of long-term data. This is because most Bitcoin adoption in developing countries happened after 2015, while by this time developed countries already had well established Bitcoin communities (Parino et al., 2018). Inflation and capital controls have been argued as important in the adoption of Bitcoin, however some authors argue these factors increase Bitcoin adoption while others argue they decrease adoption. Lacking economic freedom in the form of taxation as well as the use of Bitcoin in criminal and immoral ('sinful') activities have also been argued as causes for adoption. However, there is no consensus.

Venezuela and Argentina are the 7th and 10th highest adopters in Bitcoin in the world and the top two adopters in Latin America, they are also countries which suffer from the issues which the literature has argued is important in the adoption. Their study can thus shine light on the factors which promote Bitcoin adoption. Thus, the research question "What factors lead to the adoption of Bitcoin in Venezuela and Argentina?" is chosen to develop a field with little consensus and to address an important concern which policymakers and individuals may have. While this is not a study of all countries with economic issues which Bitcoin could solve, it does provide some level of generalizability to other areas which suffer from similar problems. Bitcoin adoption is defined as people adopting Bitcoin to fulfil any of the three functions of money (store of value, means of exchange, unit of account). This is derivative of Calvo (2002)'s definition of dollarization.

To evaluate the factors which could lead to the adoption of Bitcoin in the chosen countries, the following structure is used. In the next subsection it is clarified why Bitcoin has the potential to disrupt governance and a background is given to help the reader understand arguments later down the line. A literature review is conducted to guide the empirical search. The lead question for the review is what drives Bitcoin adoption? However, the review does start off with a discussion of dollarization which is useful as it is an example of people using alternatives to their local financial system. I then briefly discuss the methodology. In the empirical section, I compare the problems Bitcoin could solve in the countries (guided by the literature review) and then see if (and if yes how) the problems are actually solved. A holistic discussion, conclusions and answer to the research question follow.

I argue the thesis that Bitcoin adoption is driven by inflation in the context of limited value storage alternatives and the need to transfer across international borders by groups for which this has traditionally been impossible or inconvenient.

1.1 Relevance

Government's options to intervene in the economy will be reduced with increased Bitcoin adoption. Bitcoin is a currency, which, while regulatable, cannot be controlled in the same way a government could with their native currencies, which has a number of effects. Government's sovereignty over its spending and the economy's money supply could be reduced if people adopt Bitcoin. In a situation where people demand to be paid in Bitcoin, government spending would be restricted to its borrowing and taxation. Seignorage revenue would be eliminated since there is no way to 'produce' Bitcoin, like fiat currency (Buiter, 2007; Nakamoto, 2008). Governments would have to either install their own Bitcoin mining operations or trade it for the proceeds of a government enterprise.¹ This is different to how governments today can change base money creation as they please with the only limits being political (Kelton, 2020). This has implications for both fiscal policy (spending is now intrinsically restricted) and monetary policy (there are now intrinsic restrictions to the supply of money, meaning interest rates must take this into consideration).

Partial use of Bitcoin in an economy would also mean that the relative prices of Bitcoin to the local currency would be determined largely externally. Central banks could try and influence the price of Bitcoin as an economic policy; however, they would likely fail. Studies show actions taken by central banks do not have any significant effects on the price of Bitcoin, even when the (arguably) most powerful US central bank is making those decisions (Brzeszczyński et al., 2020; Vidal-Tomás & Ibañez, 2018). Currently, cryptocurrencies (so not just Bitcoin) represent a small amount of value compared to fiat currencies. As of January 2018, around \$800 Billion was the valuation of all cryptocurrencies compared to an estimated 90 trillion in coins and banknotes as well as checking, money market and savings accounts (Elliot

¹ See Section Background for an explanation of Bitcoin mining. It is how someone who does not own Bitcoin can obtain them by performing work for the Bitcoin network.

et al., 2018). If cryptocurrencies use and their value increases then this could cause price volatility of all goods effecting the whole economy (Baur et al., 2015).

Capital movement is increased by Bitcoin. The exact way this works is always determined by local factors especially how easy the exchange of Bitcoin for another currency is in any given country (Elliot et al., 2018). Pieters (2016) argues the emergence of Bitcoin has made the Unholy Trinity obsolete, since Bitcoin will in practice mean that most capital can move freely.² Countries currently restricting capital movements would have to re-think their policy. One study by Hu et al. (2021) found that over 25% of all Chinese Bitcoin trading volume is associated with people moving their wealth into another country, they did this by attempting to identify trades used to circumvent capital controls by looking at their pattern (bought using the Chinese Yuan, quickly moved and sold back for a fiat currency in a more free country). The practical side of moving fiat currency into a restricted economy has not been convincingly argued in the academic literature. Nevertheless, more Bitcoin in an economy could mean that capital controls are harder to enforce – reducing policymaker's options.

Since Bitcoin adoption has the potential to disrupt the economic fundamentals of all kinds of economies - big or small, rich or poor – it is worth to analyze what can cause their adoption. In this way, governments, firms and individuals can prepare themselves how they see fit.

1.2 Background - What is Bitcoin?

This section provides a context specific introduction to Bitcoin. The main takeaway for readers is that there is very little any government can do short of confiscating computers and shutting down the internet to prevent the use of Bitcoin (Androulaki et al., 2013). Nakamoto (2008) created Bitcoin, envisioned to "allow online payments to be sent directly from one party to

² Countries can never have: Free Movement of Capital, Independent Monetary Policy and Fixed Exchange Rate. One must be 'sacrificed' in order to pursue the other (Pieters, 2016).

another without going through a financial institution" (Nakamoto, 2008, p. 1). To achieve this, the network uses a decentralized approach. This means that no single entity or trusted third party is responsible for keeping the records of transactions. To make sure no one spends more than they have, the blockchain is used.

The blockchain is a virtual record, of every bitcoin transaction ever, this keeps the 'score' between accounts and ensures no one spends more than they have received on their accounts. If a computer tries to spend a bitcoin, or part of a Bitcoin, which they do not own, the other computers on the Bitcoin network will recognize this. Any one fraudulent transaction attempt will always be 'outvoted' by the many other computers who know the correct balances of account, the true value should always be retained. This is how Bitcoin prevents the double spending problem of digital money, which is that identical copies of information (such as a file) can be made with negligible cost. If this problem was not avoided, everybody could 'Copy and Paste' their units of account and the currency would lose its value (Ammous, 2018a; Nakamoto, 2008; Roy, 2017).

Blockchain technology has also been used in other applications. If the application using blockchain technology is privately issued and tries to replicate one or more of the functions of money, they are referred to as cryptocurrencies. Another application of blockchain to replicate the functions of money are Central Bank Digital Currencies (CBDCs), which use the blockchain technology to replicate cryptocurrencies' benefits. However, these violate Bitcoin's spirit of (pseudo)anonymity and freedom, since they require users to make accounts with a government entity, who will have ultimate control over the funds (Bank of England, 2021; Herrera-Anchustegui & Hunter, 2018). Out of all cryptocurrencies, Bitcoin has always had the largest market share of all cryptocurrencies, in June 2020 it sat at 73% (Sabry et al., 2020). See Figure 1 below.

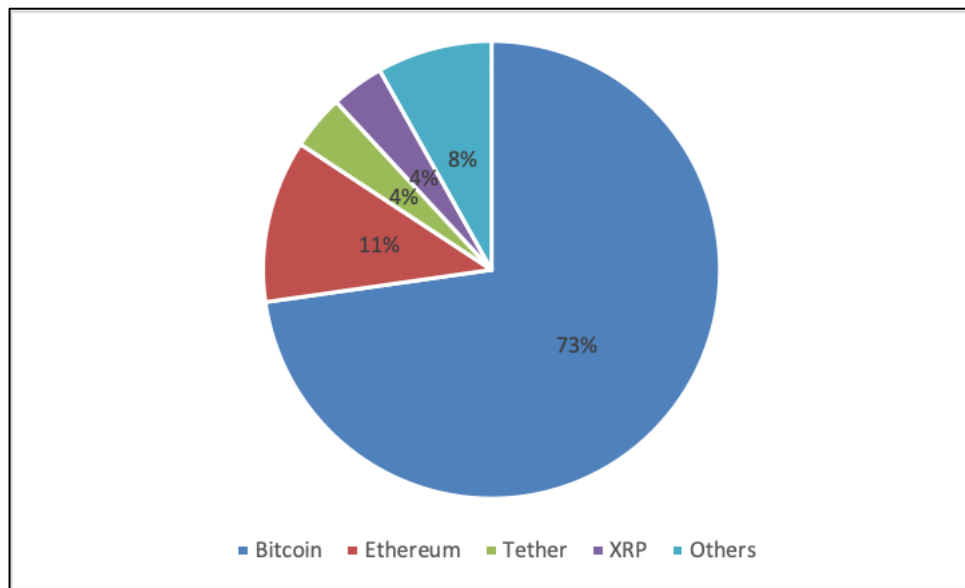


Figure 1: Overview of 4 Largest Cryptocurrencies by Relative Market Share (%) as of June 2020. Source: Sabry et al. (2020).

The units of account in the Bitcoin network are the Bitcoins and Satoshis. One Satoshi represents a hundredth of a millionth of a Bitcoin. Users can trade Bitcoin with one another for goods (including fiat currency) and services. These units can also be earned by computers (i.e. their users) participating in updating and verifying the blockchain's legitimate transactions (Ammous, 2018a). The network will release new Bitcoins into the network until there are approximately 21 million. As of late 2021, already 18 of the 21 million Bitcoins that will ever exist have been mined (Y Charts, 2021). After all, approximately 21 million new Bitcoins have been mined, computers verifying transactions will be rewarded only by a fee from the sender of transactions they verify, as opposed to with the creation of new bitcoins. Because of this, the network has been dubbed deflationary (Ammous, 2018b).

Van Alostine (2014) argues Bitcoin has value because people accept that it has some useful benefits. These range from freedom from government, the networks credible commitment to a stable and predictable growth in the supply of Bitcoin and lower transaction fees. The price of Bitcoin has increased many times over. Between late 2013 and late 2021 Bitcoin made a gain of over 8000% (See Figure 2).

Anyone can freely use Bitcoin as long as they have a computer with any number of potential application to use their Bitcoin wallets (where people can store, send and receive Bitcoins) and an internet connection (Böhme et al., 2015). Of course, national legislations apply (Lansky, 2018). However, attempts to ban the use of Bitcoin have been unsuccessful. A prominent example of a country which has forbidden the use of Bitcoin multiple times is China, although it has struggled to enforce this law due to the aforementioned ease with which people can use Bitcoin (Chan et al., 2019; Sander, 2021). It is not like a traditional payment system where there is a central point (such as a financial institution) which the government can legislate to do something. As such, the use of Bitcoin is borderless in the sense that political borders do not intrinsically hinder anyone from making payments.

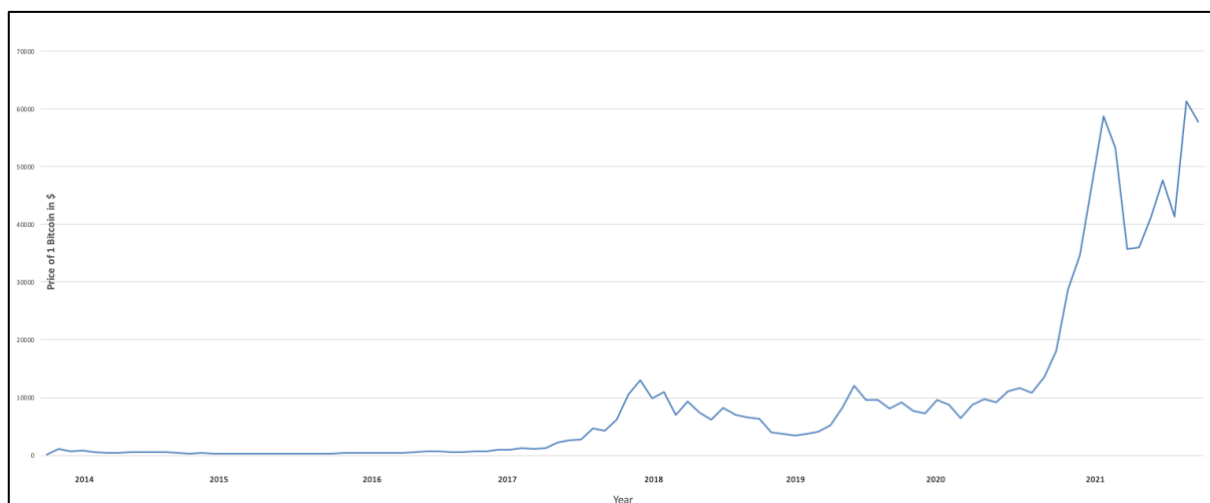


Figure 2: Chart Showing the Price of 1 Bitcoin in \$ between October 2013 and November 2021. Source: Statista (2021b).

The literature review now discusses briefly, why people adopt foreign currencies as opposed to their own. It then discusses the current (lack of) consensus on why people adopt Bitcoin.

2 Literature Review - The Drivers of Bitcoin Adoption

2.1 Non-Bitcoin Alternatives to Traditional Financial System

Before looking at what drives Bitcoin adoption it is useful to look at what makes people seek alternatives to their local fiat. Before Bitcoin, people already worked around their financial systems, one of the most well-known examples of this is dollarization, defined as the prevalent use of foreign fiat currencies for any of the three functions of money in an economy (Calvo, 2002). People use foreign currencies in response to issues with their local fiat currency. A primary issue is inflation causing dollarization. People realize that their local prices (in local currency) will go up and so choose a currency where this is less likely to happen (Mourmouras & Russel, 2000; Vieira et al., 2012). The dollarization of economies can persist even after the high inflationary periods are long over, due to adaptations in the financial system (such as foreign currency denominated investments) and people getting used to using the foreign currency (Calvo & Végh, 1992; Kamin & Ericsson, 2003; Quisepe-Misaico, 2000; Uribe, 1997). While domestic inflation is primarily identified as the cause of dollarization, governments which do not credibly commit to a stable exchange rate have higher rates of dollarization. Stable exchange rates means a stable value in terms of buying imports and being able to move the currency later, if desired (Honig, 2009).

Foreign currencies are just one of many assets people may purchase during inflation: foreign bank account deposits, domestic interest bearing assets or even real assets of various kinds, ranging from inventories of goods to real estate can also be used to protect against inflation (Dornbusch et al., 1990; Fujii, 2013; Sugema et al., 2010). This always depend on how easily any of these alternatives are available and the level of inflation may be too high to get a positive inflation adjusted rate of return on certain real-estate and financial assets, making foreign currencies or inventories the only feasible option in very high inflation settings. Now, the drivers of Bitcoin adoption which have been identified in the literature are discussed.

2.2 Investment

A considerable amount of studies on Bitcoin have identified investment and wealth as a cause or correlated factor with adoption. These studies focus predominantly on rich countries. Three studies of interviewees focus exclusively on North Americans (Esmailzadeh et al., 2019; Schaupp & Festa, 2018; Voskoboynikov et al., 2020). Of these, only Voskoboynikov et al. (2020) makes a concrete conclusion, which is that investment is (one of) the main intended use amongst non-users of cryptocurrency. The other two surveys propose models far too generalized to be used here, Esmailzadeh et al (2019) for example argues that those with a positive view of Bitcoin will be more likely to adopt it. Thankfully, there is more literature. Glaser et al. (2014) use a more global approach. They analyze data from the now defunct Japanese cryptocurrency exchange, Mt. Gox finding investment, not payment is the main use of users on the exchange. Because, while the value of cryptocurrencies on individual accounts changed, the total value of all cryptocurrencies on the exchange itself did not change significantly. This suggests users were shuffling cryptocurrencies between themselves, but not transferring them to parties outside of the exchange, as would be seen in payments. Finally, wealthier people (as measured by asset wealth) and countries (as measured by GDP) have higher rates of Bitcoin ownership (Lammer et al., 2019; Parino et al., 2018). This could indicate that highly volatile assets like Bitcoin are only purchased by those who can take temporary losses when the price is in a downturn.

2.3 Economic Freedom

Economic freedom has been argued as an important factor in the adoption of Bitcoin. However, the existing literature does not allow conclusion to be made at this point. While, Parino et al. (2018) do find economic freedom (Overall Freedom and Freedom to Trade variables by the Heritage Foundation) to be a key variable which correlated positively to the adoption of Bitcoin

between (2011-2014), this is inconclusive. This study failed to capture the increased demand of poor countries for Bitcoin after 2015, which the authors themselves argue/disclose (Parino et al., 2018). However more crucially, as wealthier countries (who have been argued to be higher adopters) tend to be more free ones, it may just be the case that the wealth and freedom predictors are correlated (Cole, 2005; de Vanssay & Spindler, 1994).

In addition, even the studies which argue economic freedom is important to the adoption of Bitcoin are severely limited upon closer inspection. Viglione (2015) runs an econometric analysis of 22 countries and the euro region between 2013 and 2015. The findings to him indicate that different markers of economic freedom (as measured by the Heritage Foundation's Economic Freedom Index), are positively associated with the premium paid on Bitcoin. To him this premium represents "extra demand" (Viglione, 2015, p. 6) and thus he uses this as a proxy of Bitcoin adoption. He finds countries which pay a higher premium (thus, more supposed Bitcoin demand) tend to be the ones less economically free. Variables that were particularly strongly associated with an increased adoption of Bitcoin were the corporate tax rate, as well as the scale to which investment opportunities are limited by restrictions on foreign exchange and capital movement. However, this premium might simply be due to the fact that taxation and other cumbersome regulation can increase the costs to cryptocurrency exchanges which are then passed down to the consumers in the form of a premium, which has been studied to be the case by Choi et al. (2018).

2.4 Capital Controls

Capital controls show some importance in the literature for the adoption of cryptocurrencies. Carlson (2016) finds from interviews with a number of experts that while capital controls do limit the options that Argentinians have to participate in the global economy, it is not that controls themselves which can explain all of the adoption of cryptocurrencies. She argues that it is a combination of both the current limitations of the Argentine economic system, but also

the turbulent economic history which makes people much more open to exploring alternatives to the local currency. The potential and active use for the circumvention of capital controls using Bitcoin is argued by Pieters (2016). She argues Bitcoin is used as a vehicle currency to move funds while avoiding financial institutions and thus any capital controls which these institutions enforce. A situation where controls are evaded is visualized in Figure 4 while the traditional situation of moving currency using a financial institution is visualized in Figure 5. The institution represents a single point of failure which can enforce limits on users. Hu et al (2021) would support Pieters (2016), as they study Chinese Bitcoin trading data, finding that at least 25% of all volume is people trying to circumvent the limitations on moving foreign currencies out of the country.

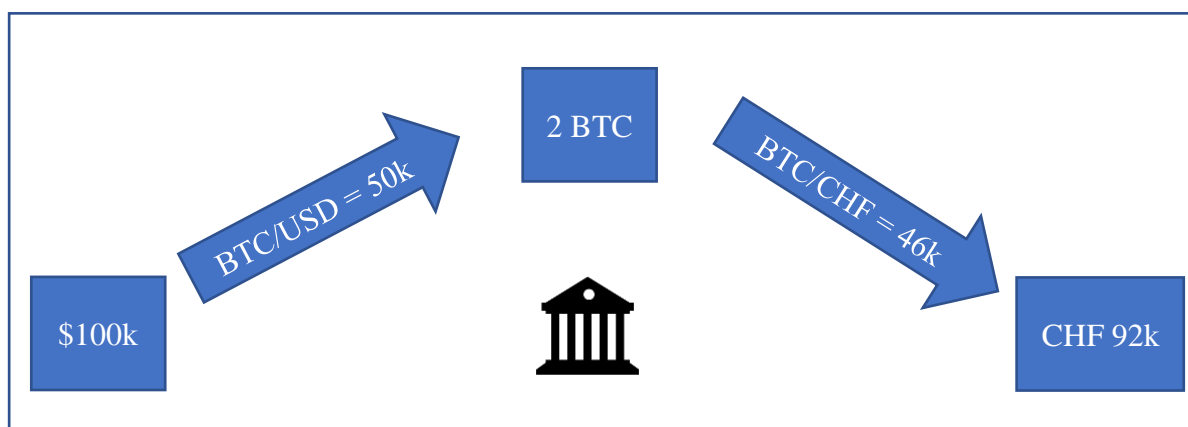


Figure 3: Bitcoin Acting As a Vehicle Currency To Move Between Two Open Economies (Here: USA and Switzerland Transferring Dollar to Swiss Franc respectively) Without Use of a Financial Institutions. Adapted from Pieters (2016).

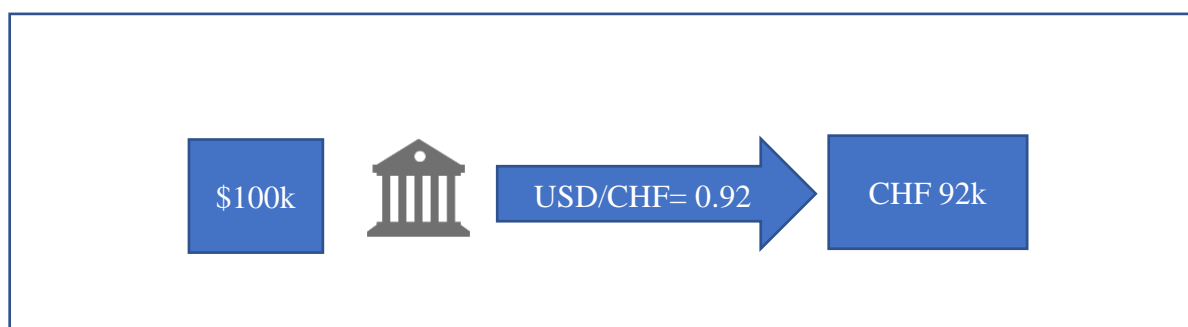


Figure 4: Transferring Money Through International Borders Using a Wire Company. Adapted from Pieters (2016).

2.5 Sinning - Criminality and Sanctions Evasion

Bitcoin has also been associated with a number of 'sinful' practices: ranging from payment for various traditional crimes such as extortion, terrorist financing and the evasion of international sanctions (Brill & Keene, 2014; Kethineni & Cao, 2020; Macfarlane, 2020). Scholars have argued for the creation of an international treaty or other form of collaboration to deal with these issues, as perpetrators often cross international borders (Brill & Keene, 2014; Macfarlane, 2020). Despite an international treaty not materializing, the capabilities of governments to respond to Bitcoin related crimes is increasing despite the pseudonymous nature of Bitcoin. The American FBI managed to shut down both of the Silk Road website, where people sold a variety of illegal services, using Bitcoin as a means of payment (Roy, 2017). The FBI also recently recovered approximately 64 of the 75 Bitcoins taken as ransom in the Colonial Pipeline Incident, where ransomware was used to disrupt the operations of the pipeline until a payment was made. The FBI followed the trace of transactions on the Blockchain, however it is unclear how they obtained the private key (like passwords) necessary to transact the funds back to a secure address (Melendez, 2021).

The evasions of sanctions is another area which the literature has focused on. There are a number of ways this can be done. In Iran, it is mining Bitcoin. Iran can trade their mining services for Bitcoin because it is not possible for the transacting parties to select who does or does not verify their Bitcoin transaction. Thus, Iranians can trade a service (mining) for a reward (Bitcoin) despite international sanctions on the country which would usually forbid this. The proceeds can then be traded internationally for willing buyers (Konowicz, 2018). Academics in Iran have even researched how to use cryptocurrency to settle debts of countries importing oil from Iran, since traditional channels are often not available for such deals due to the sanctions (Sarvi, 2020). Another way in which countries attempt to evade sanctions is through creating their own Central Bank Digital Currencies (CBDCs) (Macfarlane, 2020). The

Venezuelans got the furthest with their Petro, which did launch, however it has not lived up to the promise of working around international sanctions. There is no recorded interest in the Petro cryptocurrency and its trading has been banned in the US (Kethineni & Cao, 2020; Liao, 2018).

2.6 Inflation

The literature on inflation as a cause of Bitcoin adoption is inconclusive – diverse points of view are represented. Viglione (2015) does not find evidence that inflation is a predictor of the adoption of cryptocurrency. This might happen because of the 22 areas he studied only six showed an inflation rate of above 2.5 during the study period (World Bank, 2021d). Furthermore, as already argued the poor countries (of which high inflation rate countries are part of) saw a spike in adoption only in 2015 (Parino et al., 2018). This means it is unlikely that they would show meaningful response of Bitcoin adoption to inflation before that point. Carlson (2016) supports this idea. She says that there is "little evidence – empirical, anecdotal or otherwise" (Carlson, 2016, p. 32) that would suggest inflation is a factor in Argentinian adoption of Bitcoin. A similar limitation applies here in terms of the timing, adoption only took off just before her study was conducted.

There are also studies which actively oppose the idea that inflation is related to the adoption of Bitcoin. Convincingly so is only Parino et al. (2018) whom finds a negative correlation of adoption and inflation. As mentioned multiple times now, they were not able to consider adoption of Bitcoin by developing countries post-2015. Along similar lines, Ricci (2020) finds countries with a low and stable rate of inflation have a higher Bitcoin adoption as measured by the geographical location of transactions, however they only consider the "top 70 economies" (Ricci, 2020, p. 134). Unfortunately, it is never disclosed, which economies are studied.

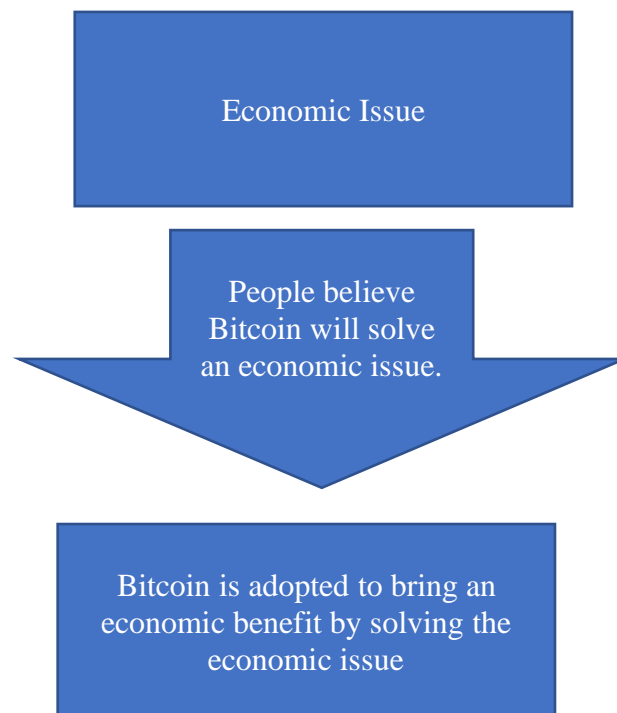
However, there are a number of sources which credit inflation as a source of Bitcoin adoption. Taskinsoy (2019) in a case study of the Turkish economy makes this argument explicitly – the Turkish lira is a volatile currency and in times of heightened volatility Bitcoin becomes more attractive. He makes the argument that dollarization (along with inflation) causes Bitcoin adoption, by creating a potential for an asset-liability mismatch crisis, which people are trying to protect themselves against. In the USA, Conlon et al. (2021) find a positive correlation between US Bitcoin and the 5 year forward inflation expectation as published by the FED, they find this correlation however only since the beginning of the COVID-19 pandemic. Finally, Ammous (2018b) makes the implication that inflation is important. He argues the only thing holding back Bitcoin from its adoption as a true currency is the price volatility. This condition is exclusive to Bitcoin according to him, all other cryptocurrencies studied (4 others) would not be useable even if the fluctuations in their prices (for those coins which have price fluctuations) were to stop. This statement can be extrapolated to mean that the relative fluctuations of price in relation to its alternatives is important. If this is a stable currency like the USD then Bitcoin does seem like a volatile option, but if the other option is a currency who sees its value drop (measured either by an increase in the exchange rate or an increase in prices expressed in that currency), then Bitcoin may start looking like a much more stable option. The table on page 15 summarizes the literature review.

Themes / Groups	Direction / Mechanism	Author(s)	Method	Findings
Investment and Bitcoin.	Investment is a primary use of Bitcoin.	Voskoboynikov et al. (2020)	Interviews.	Investment main intended use among North American non-users.
		Glaser et al. (2014)	Quantitative.	Users on the Mt. Gox exchange shuffled funds between themselves and did not use them for payment, this suggest they were investing.
	Richer people tend to buy high risk assets like Bitcoin	Parino et al. (2018)	Quantitative.	GDP and BTC use are correlated. Wealth is needed to invest.
		Lammer et al. (2019)	Quantitative.	Wealthier individuals on a German banks trading platform are much more likely to invest in Bitcoin.
Economic Freedom and Bitcoin.	More economic freedom increases adoption.	Parino et al. (2018)	Quantitative.	BTC adoption and key economic freedom variables are positively correlated.
	Less economic freedom increases adoption.	Viglione (2015)	Quantitative.	Variables of economic repression (in particularly taxation, limitations on investment) were positively associated with premiums on bitcoin. To Viglione (2015) this premium represents extra demand.
Capital Controls and Bitcoin.	Capital controls increase Bitcoin adoption.	Carlson (2016)	Expert Interviews.	Controls as well as a history of controls explain Bitcoin adoption in Argentina.
		Pieters (2016)	Quantitative Analysis.	Co-movement of black market exchange rate and Bitcoin prices in Argentinian Pesos suggest people are using Bitcoin to buy and sell foreign currencies in Argentina.
		Hu et al (2021)	Quantitative.	At least 25% of China's Bitcoin trading volume is people moving their money out of the country using Bitcoin.
Sinful Uses and Bitcoin.	Terrorist financing and other crimes.	Brill and Keene (2014) and Kethineni and Cao (2020)	Literature Review.	Cryptocurrencies can and are being used for economic and violent crimes.
	Bitcoin is not as anonymous as it may seem (to the detriment of criminals).	Roy (2017) and Melendez (2021)	Literature Review.	FBI managed to shut down both Silk Road website, where illicit goods were traded as well as track the Colonial Pipeline hacker's funds and return them.
	Sanction Evasion by Mining Bitcoin.	Konowicz (2018)	Literature Review.	Miners are paid by whoever uses the network, including those who are not barrier from dealing with them. It is not possible to select who mines ones Bitcoins.
	Payment under Sanctions.	Sarvi (2020)	Literature Review and Model	Bitcoin is one of 3 cryptocurrencies suitable for Iran to get paid for her petroleum exports.
	Central Bank Digital Currencies used to evade sanctions.	Macafarlane (2020) and Konowicz (2018)	Literature Review.	CBDC are created in an attempt to evade international sanctions, notably by Venezuela.
Inflation and Bitcoin.	No direction of association between Bitcoin adoption and inflation.	Viglione (2015)	Quantitative.	Find no correlation between inflation and Bitcoin adoption in 22 countries.
		Carlson (2016)	Expert Interviews.	Finds no evidence to support the idea that Bitcoin adoption has been caused by inflation in Argentina.
	Negative association between Bitcoin and Inflation	Parino et al. (2018)	Quantitative.	Find negative correlation between inflation and Bitcoin adoption in 22 countries.
		Ricci (2020)	Quantitative.	Finds a correlation between Bitcoin adoption and having a low and stable rate of inflation in the "top 70 economies" (Ricci, 2020, p. 134).
	Positive association between inflation and Bitcoin adoption.	Taskinsoy (2019)	Case Study.	Argues Bitcoin adoption in Turkey has been driven by inflation and risks of inflation from asset-liability mismatch (due to dollarization).
		Conlon et al (2021)	Quantitative.	Bitcoin price and US 5 year forward inflation expectations are positively correlated
		Ammous (2018b)	Literature Review	Bitcoin is the only cryptocurrency that can fulfill the role of money if its fluctuation are low relative to the fiat currency.

Table 1: Table Summarizing the Relevant Literature on Bitcoin Adoption.

3 Methodology

In order to answer the Research Question "What factors lead to the adoption of Bitcoin in Venezuela and Argentina?" the two countries will be analyzed and compared in terms of their economic issues and how Bitcoin solves them, a narrative is built around their reasons for adoption of Bitcoin. The view is taken that people adopt Bitcoin because (they believe) it solves an issue. This is derivative of Van Alystine (2014) proposition that people buy Bitcoin because they accept it has useful benefits. If Bitcoin solves an issue which leads people to buy/adopt it, then those issues must be the ultimate cause of Bitcoin adoption. I assume this issue is of an economic nature.



To answer the Research Question the economic benefit which Bitcoin brings must be found. The literature review (See Table 1) will be the guide for the kind of issues Bitcoin might solve for individuals. The structure of the two cases will be first a discussion of economic issues which Bitcoin could solve and then trying to see if there is sufficient evidence that Bitcoin does

solve or alleviate this issue. If it does, this issue can be viewed as the ultimate cause for Bitcoin adoption.

Measurements of Bitcoin adoption is the 2021 adoption index release by Chainalysis (2021) in their Geography of Cryptocurrency Report. Although this measures cryptocurrency adoption as a whole and not Bitcoin adoption, this is not a critical issue. Cryptocurrency adoption can be used as a proxy for Bitcoin adoption as most cryptocurrency trade volume is Bitcoin due to the 73% market share of Bitcoin compared to all other cryptocurrencies combined (Sabry et al., 2020). In some cases where other sources citing cryptocurrency adoption as a whole, these will be used as evidence of Bitcoin adoption. See **Error! Reference source not found.** for an overview of the top 10 countries adopting cryptocurrency according to this index as well as a more detailed breakdown of their methodology. Importantly, wealth of countries is accounted for across the index by using purchasing power parity.

Country	Rank on Chainalysis (2021) Global Crypto Adoption Index	Score on Chainalysis (2021) Global Crypto Adoption Index	Percentage Increase Number of Bitcoin Trades with local Fiat currency March 2015 and November 2018. Source: Johnson (2019b)
Venezuela	7	0.25	36000%
Argentina	10	0.19	809 %

Table 2: Table Showing Rank and Score of Venezuela and Argentina on Chainalysis (2021)'s Global Crypto Adoption Index and Percentage Increase in Number of Bitcoin Trades With Local Fiat Between March 2015 and November 2018 as Calculated by Johnson (2019b).

3.1 Generalizability

This research is applicable in a limited scale beyond the case countries. In particular areas which have high rates of inflation as well as regulations which substantially raise the costs or make it impossible to transact funds across political borders or certain groups of people.

4 Venezuela

4.1 Venezuela - Economic Issues

4.1.1 Inflation

Venezuela has a catastrophic rate of inflation. It is the highest in the world (See Table 3) and has been above 100% per year since 2015, as measured by the Venezuelan CPI (See Table 4). This increase in inflation began in the early 2010s with a steady rise in public spending to support redistributive policies, from 2011 to 2015 the nominal M1 money supply increased 25-fold. In addition, state revenues decreased significantly following the oil price crash. The Venezuelan government received \$100 per barrel in mid-2014, by 2016 this had dropped to \$24. For an economy as dependent on oil as Venezuela, this was the final straw (Pittaluga et al., 2021; Su et al., 2020). Inflation took off and by 2018 the peak annual inflation rate of 65374 was recorded – meaning the country was officially in hyperinflation, defined as annual CPI changes over 1000% (Frankel, 2010; Statista, 2021e). Inflation has since somewhat recovered (see Table 4) but Venezuela has not lost its hyperinflationary status – in practical terms this decrease makes little difference.

What are consequences for people of this inflation? A strong drop in GDP and shortages of all kinds have been associated with the inflation. GDP has been contracting by more than 10% per year since 2015. Stores are unable to be profitable at the set prices meant to combat inflation and this has resulted in shortages of various kinds. Entrepreneurs which charged above the set prices were arrested and publicly denounced (Iyer & Rodríguez, 2021). The most crucially shortages are in food. Around one third (9.3 million people) of the population are classified as food insecure by international organizations. The shortages extend to other areas and have been the cause for violent protests in 2020 (Daniels & Rangel, 2020; Food and Agriculture Organizations of the United Nations & World Food Programme, 2021).

Country / Region	Rank	Percentage Change in CPI in 2020 compared to 2019 (%)
<u>Venezuela</u>	1	2355
Zimbabwe	2	557
Sudan	3	163
Lebanon	4	88
<u>Argentina</u>	5	42
South Sudan	6	37
Iran	7	36
Suriname	8	34
Yemen	9	26
Haiti	10	22
World Average	N/A	2

Table 3: Inflation Rate in 2020 of the 10 Highest Inflation Countries and the World Average: Source: Statista (2021c) and World Bank (2021c).

Year	Annual Change in CPI Relative to Previous Year in Venezuela.
2010	28
2011	26
2012	21
2013	40
2014	62
2015	121
2016	254
2017	438
2018	65374
2019	19906
2020	2355
2021	2700 (forecast)

Table 4: Table showing Annual Change in CPI Relative to Previous Year in Venezuela between 2010 and 2021. Source: Statista (2021e).

4.1.2 Limited Options to Protect Against Inflation

Dornbusch et al (1990) discuss options to protect against inflation: Foreign currencies and durable goods are two of the main ways people can protect their wealth against inflation. The foreign currency situation is discussed in the next section ("Capital Controls and Limited Access to Foreign Currencies"). For now, the situation with purchasing durable goods is addressed. A way to protect oneself against the effects of inflation is to purchase durable goods at an earlier point in time, in order to avoid having to pay the higher price (due to inflation) at a later point

(Dornbusch et al., 1990; Fujii, 2013; Sugema et al., 2010). This is difficult in Venezuela due to the shortages, which include durable goods (Daniels & Rangel, 2020; Food and Agriculture Organizations of the United Nations & World Food Programme, 2021). In an economy which had these goods available, people could at least purchase such goods in an attempt to store their wealth there. This is not an option in Venezuela.

The state backed CBDC 'Petro' also does not act as a device to store value. In early 2018 the Venezuelan government launched their own CBDC, the Petro. This was widely suspected to be a device with which the elite could evade international sanctions (Konowicz, 2018). Officially however it was supposed to represent the owners claim on the country's natural resources and act as a way to promote the prosperity of the country. However, one cannot exchange their Petro tokens for oil and there is limited evidence that it is actually being used by anyone (Herrera-Anchustegui & Hunter, 2018). In a questionnaire made shortly after the Petro was issued, only 16% of surveyed Venezuelans believed that the Petro would improve the country's economic situation (Iyer & Rodríguez, 2021). Given these trading statics and public opinion surveys, it is safe to say that Venezuelans have not been putting their limited financial wealth into this asset.

4.1.3 Capital Controls and Limited Access to Foreign Currencies

Capital controls are another issue in the country which limit the options of people to protect their wealth. They were first introduced in 2003 to prevent a drop in the exchange rate following supply issues in the oil market due to a nationwide strike and an associated reduction in foreign currency inflow (Malone & Ter Horst, 2010). At present, according to the law firm, Norton Rose Fullbright, individuals and institutions are free to obtain Dollars in auctions (Andueza, 2017; Pons et al., 2019). However, ordinary Venezuelans are practically not able to do this, due to the restriction in the supply of foreign currencies. The government and state-owned industries are the only ones who can offer foreign currencies at these auctions. In the

first quarter of 2017, only \$32 million was offered (Pons et al., 2017). That is \$1.14 per Venezuelan, or just under \$4.6 per year if the figure is extrapolated.³ Given the increased demand for Western luxury goods by elites, it is safe to say that the benefit of this reform (access to Dollars) have not reached most Venezuelans (Kurmanaev & Herrera, 2020). With such quantitative restrictions Venezuelan's access to Dollars is limited even without laws limiting access.

Naturally, the Venezuelan economy does provide black market Dollars as well. However, these come at significant premiums. Santos (2017) estimates that the premium is between 300-400% over the official exchange rate. Nevertheless, according to a Bloomberg article by Rosati et al (2020) around 60% of Business is conducted in foreign currency.⁴ This shows how desperately the people need foreign currencies to do their daily business that they would be willing to pay several times over the official rate. Luckily for Venezuelans, Maduro has recently endorsed the Dollar as a means for local to exchange, even if he has not made any policy change in an attempt to facilitate the use, Venezuelans at least do not need to fear repression from for using the Dollar (Rosati et al., 2020).

4.1.4 Sanctions on the Elite

The economic issues discussed so far predominately effect 'ordinary' people. Those who do not have access to the official exchange rate, those outside the elite's circle. However, even for the privileged in Venezuela's economy, certain issues have arisen. In particular they can no longer make international payments due to the sanctions. This is an area where Bitcoin's borderless nature could provide a solution.

The United States and a number of international groups such as the European Union and Lima Group do not recognize the current president of Venezuela, Nicolas Maduro and his

³ (\$32 Million / 28 million Venezuelans) = \$1.14 per Venezuelan; $1.14 * 4 = \$4.56$ per Venezuelan

⁴ This information should be taken with care. This statistic was quoted in a Bloomberg article, I was not able to find the original source, by a Venezuelan data analytics company.

regime insiders (Aquino, 2020; Malone & Ter Horst, 2010; Seelke, 2021b, 2021a; US Department of State, 2021). Former US president Trump took the condemnation of the regime a step further and issued sanctions on individuals and nationalized industries. Most crucially, the Venezuelan state-owned Petroleum company is not allowed to do business with any US company. This is estimated to have singlehandedly cost the Venezuelan government 1/3 of their state revenue (Iyer & Rodríguez, 2021). The sanctions continue to this day. In 2021, 113 individuals were added to the sanctions list. This means, these people and many other individuals associated with the regime cannot transfer funds through almost any traditional bank (Seelke, 2021b). The next section looks at how Bitcoin has provided some solutions to the problems faced by various actors in the Venezuelan economy.

4.2 Venezuela - Solutions through Bitcoin?

4.2.1 Inflation

At least some Venezuelans are saving using Bitcoin to protect their wealth from inflation. Anecdotal as well as quantitative evidence suggest very few Venezuelans hold Bolivars unless they absolutely need to. Cruz (2016) conducted an interview with Rodrigo Souza, a developer at the blockchain firm Blinktrade, active in Venezuela. Souza stated that most people who use the exchange deposit small amounts of Bolivars for Bitcoin regularly, indicating they are saving in Bitcoin. This implies people obtain Bolivars through various means and then as soon as they have the chance, exchanging them for Bitcoin.

This idea was tested in an analysis of the Bolivar-Bitcoin trading data by Johnson (2019b). She found that the "large number of small trades" (Johnson, 2019b, p. 1) imply that people withdraw barely enough of their Bitcoin funds just in time to purchase whatever must be purchased in Bolivars. However since she looks at trades in both directions, this also supports the idea of Cruz (2016) that people save in Bitcoin. Between March 2015 and November 2018, the median transaction size of a Bitcoin/Bolivar or Bolivar/Bitcoin trade was between \$30 and \$50. For comparison, the Argentinian Peso – Bitcoin (and vice versa) transactions had a median value of \$200 from November to 2018, with a drop thereafter to around \$75 (Johnson, 2019b). These median values mean that half of all trades were above and below the respective amounts. Venezuela had the smallest sized trades out of all the countries studied.

Both of these pieces of evidence support the idea that Bitcoin is used to protect against inflation. It must be taken within the context of a situation where there are little alternatives to doing that. It is also likely to that this option is perused as an alternative when either: Black market Dollars are not available either to be purchased or a retailer does not accept Dollars (recall only 60% of business is done in Dollars according to Rosati et al (2020)'s article). In the

first situation the person must quickly get sell their Bolivar for Bitcoin before the exchange rate falls further due to the inflation (Goodhart & Hofmann, 2000). In the second situation they must quickly buy Bolivars and then rush to buy whatever they need to buy in Bolivars before the inflation raises the prices.

It is difficult to measure precisely how clearly well Bitcoin hedges against inflation in Venezuela due to lacking data. However, attempts can be made. Erb and Harvey (2013) define a perfect inflation hedge as one which moves 1:1 with the CPI. Since the CPI is an annual metric and the Bitcoin price changes every couple seconds, the latter must be annualized make a comparative analysis. The results are in Table 5 below.

Although Bitcoin has had truly spectacular returns by almost any metric (See Figure 2 or Column 2 of Table 5) it is not enough to keep up with the pace of Venezuela's inflation. Below is Table 5 which summarized the change in CPI in Venezuela and compares them to Bitcoin's annual return since 2013. The Table shows that despite the impressive annual returns (except 2014, 2015 and arguably 2019) Bitcoin has not managed to outperform the high levels of inflation in Venezuela in any year except 2017. This means that while the nominal returns of Bitcoin would be potentially quite large, in real terms they did not gain much in Venezuela. This method underestimates the gains of Bitcoin for people in Venezuela as the prices in of Bitcoin in Venezuelan fiat have almost certainly increased at higher rates than the Dollar prices due to the inflation. For this context Bitcoin is an asset, which like all goods sees its prices increased during an inflationary period (Goodhart & Hofmann, 2000). However, there is no consolidated data (Bitcoin prices in Bolivars) available for this, so it was not possible to analyze the change in real terms. Furthermore, this finding must be interpreted with caution, since the percentage change per year depends heavily on the methodology and time period cut offs used (See Appendix A).

Year	% Change CPI Relative to Previous Year in Venezuela	% Change in mean Monthly Bitcoin Price (\$) Relative to Previous Year (See Appendix A)	Status (See Table 10 in Appendix B) for a detailed explanation)
2014	62	-39.47	B
2015	121	-44.7	B
2016	254	112.16	B
2017	438	616.76	RPR
2018	65374	70.62	B
2019	19906	2.32	B
2020	2355	66.02	B
2021	2700	283.16 (up to 03.12.2021)	B

Table 5 Source: Table Showing Annual Inflation (% Change in CPI) in Venezuela and Bitcoin Price Change (\$) relative to Previous Year. Source: Statista (2021e) and (2021b).

4.2.2 Evading Capital Controls

There is limited and anecdotal evidence that Venezuelan migrants use Bitcoin to move their wealth out of the country. Venezuelan refugees arriving in Colombia are able to exchange their Bitcoins for Colombian Pesos at newly established Bitcoin tellers, who will buy the Bitcoins in exchange for Colombian fiat (Aguilar, 2019). The fact that there is demand for such a business could indicate that there are people who have their wealth in Bitcoin before leaving the country, cross the border and then immediately change it back to government fiat. Avoiding any complications with customs. If this were the case then Bitcoin would be used to evade Venezuelan capital controls forbidding the export of Dollars (Malone & Ter Horst, 2010).

However, this is circumstantial at best. It is unknown whether the people leaving the country trade Dollars, Venezuelan fiat or something completely different when buying Bitcoin before leaving their country. Given the high rates of unofficial dollarization in the country it can be speculated that they likely to be selling Dollars (Rosati et al., 2020). However, this is just that, speculation. If this was the case then the way these Venezuelans are evading capital controls is similar to how Pieters (2016) describes the potential of Bitcoin to be used as a vehicle currency (See Figure 4)

There may be practical advantages to carrying wealth in Bitcoin as well. Having funds digitally provides a level of security from the violent crime in the country. Venezuela has the second highest murder rate globally at 56 homicides per 100k people. Given that people often kill to steal something from another person, Venezuelans might choose to not make their funds and by extension themselves, vulnerable to theft by physically carrying them (United Nations Office on Drugs and Crime, 2019a, 2019b). Furthermore, the vast physical amount of Bolivar bills that one would have to carry might also incentivize the use of a digital method (whereby cryptocurrencies like Bitcoin are likely the only one available). So, while it is theoretically possible for Venezuelans to leave the country with their Dollars, there is little evidence that this is happening, though it is certainly possible.

4.2.3 Evading Sanctions

Venezuelan elites are promoting the adoption of Bitcoin in the country in an attempt to evade international sanctions and the US-led financial system as a whole after the failure of the Petro CBDC. As discussed previously, the US and other international bodies impose sanctions on Venezuelan elites, including a ban on the Petro CBDC (Iyer & Rodríguez, 2021; Seelke, 2021b). This makes it harder them to move their funds abroad. Bitcoin's borderless nature allows them to move their capital outside the country without the use of any financial institutions who are barred from doing business with them. There is evidence to suggest that this has prompted government officials to use Bitcoin and other cryptocurrencies to evade the sanctions.

The Venezuelan government originally started their own cryptocurrency exchanges to facilitate movement of their Petro CBDC, the exchanges also offer Bitcoin trading. However, these exchanges may be used for evading sanctions more than anything else. On one studied exchange, called Criptolago, 75% of all cryptocurrency transactions were \$1000 or more (Chainalysis, 2020). This is a large amount of money and not something most Venezuelans can

send between themselves (low wages), and it also does not come from remittances. The proportion of Venezuelans who have left the country and now send back money in these volumes is not sufficient to be $\frac{3}{4}$ of all trades. Table 6 below shows the behavior of remittance sending by Venezuelans abroad in countries analyzed by Orozco and Klaas (2020). The transfers do not even come close to \$1000. There are also no reasons why Bitcoin transactions would be larger in volume, and by extension lower in frequency. If anything, due to the low fees even at low amounts migrants using Bitcoin would be sending funds more frequently rather than less frequently (Böhme et al., 2015; Lansky, 2018).

	Chile	Colombia	Costa Rica	Panama	Spain	Mean
Mean Amount Sent per Transaction (\$US)	158	40	136	214	175	144.60
Mean Annual Frequency of Transaction	12.4	11.7	15.4	8.9	12.0	12.08

Table 6: Table Showing Mean Amounts of Money Transacted by Venezuelan Migrants in countries studied by Orozco and Klaas (2020).

Due to the different pattern in remittance sending, these cryptocurrency exchanges are used for evading international sanctions. This means elites in the country profit from any number of morally questionable reasons for which they have ended up on the sanctions list (Seelke, 2021b). They then transfer the proceeds using their own Bitcoin exchanges to a foreign cryptocurrency account with lax Know Your Customer (KYC) compliance or through an associate who is not on a sanctions list, in this way they can exchange their funds previously locked in the country to almost anywhere in the world (Makarov & Schoar, 2021). I estimate approximately \$26.6 million have been transferred out of Venezuela using this channel (calculation in Appendix C) between August 2019 and July 2020.

Evading sanctions is a feasible use case and has even been studied before, as seen in the literature review. As such, Venezuelan elites are trying to get out of a financial system does not work for them anymore – it is of course harder to feel sympathy for them who are complicit in the collapse of the economy.

5 Argentina

5.1 Argentina – Economic Issues

5.1.1 Inflation

Inflation is drastic in Argentina, having catastrophic effects on people's savings. The CPI changes are just shy of hyperinflation, as the official levels, reported by INDEC reaches above 50% per month (Trading Economics, 2021). This level is likely an underestimation, as Argentina has been known to manipulate their data at least since 2007. The new INDEC data is gather using a new methodology prescribed by the IMF (Coremberg, 2014). Even this, potentially underestimated inflation rate still shows Argentina to have the 5th highest rate in the world as of 2020, well above the World average of 2% (See Table 3). However not as bad as Venezuela. With such high levels of inflation, there are a host of theoretically conceived negative side effects: People's savings lose purchasing power, meaning savings (source of investment) is disincentivized. With, this reduced investment come issues like lower growth, unemployment and reduced innovation (Blink & Dorton, 2012). With this inflation level, it is no surprise then that Argentinians highlighted 'the economy' as their main concern for the September 2021 primary election (Portes, 2021). Showing that these concerns are more than theoretical.

5.1.2 Capital Controls

Another issue in the country are the stringent capital controls. These controls are enacted as a response to inflation and currency depreciation. The idea is that if people cannot sell their privately held Pesos for foreign currency, the Pesos will not depreciate in value. Domestic inflation is also tamed since all imports would become more expensive in Pesos, given a depreciation. Although Argentina only imports around 15% of their GDP annually since 2011, this can still have relatively drastic effect if key input goods are imported (World Bank, 2021b).

To curb inflation and depreciation, in 2011 Ernesto Kirchner's enacted a law that required individuals to receive permission from the government if they wished to obtain Dollars. This made it extremely difficult for ordinary citizens to obtain Dollars - Argentina's preferred foreign currency. Argentinians went to great lengths to obtain Dollars, for example using PayPal or Casinos in Uruguay - both methods involving the need to physically transfer the money, showing both the severity of these restrictions as how badly people wanted foreign currencies (Moreno, 2016). Since then, the amount of Dollars that can be traded per month by Argentinians has been \$10 000, and this year it was drastically tightened to \$200. (Gillespie, 2021; Khatri, 2019)

The black market for Dollars has flourished as a result of inflation and the capital controls. People do not want Pesos when they can get Dollars. The official exchange rate overvalued the Peso almost 100% between 2014-2015 (Pieters, 2016). This is evidence that Argentinians are trying to avoid these capital controls, even if it costs them financially. This gap closed as soon as the capital controls lifted by the new government of Mauricio Macri in late 2015 (Moreno, 2016; Pieters, 2016). However, in 2019 controls were re-introduced by the new Fernandez government and so the overvaluation came back, as of November 2020 it is 100% again. (Raszewski, 2021). Showing people still wish to avoid holding their Peso's, even with significant premiums.

5.1.3 Economic Freedom

The final issue in the Argentine economy where Bitcoin could provide a solution is over regulation. While this issue is not limited to receiving payments from abroad, this is the area where Bitcoin has provided a channel to work around the financial system. This is why it will be analyzed here. If an Argentine wants to export a service, they must receive their payment from abroad. However, there are cumbersome fees and other regulations associated with this. For example, there is a 30% tax on withdrawing foreign currencies from payments abroad,

even when these are immediately exchanged to Pesos. This is on top of any other taxes, which are also some of the most punishing in Latin America. The country stands at place 21 out of 32 in the taxation section of the 2019 Ease of Doing Business Index (World Bank, 2021a). Dollar trading quotas also change frequently, making it difficult to plan (Gillespie, 2021; Khatri, 2019). These constantly changing and punitive regulations are not looked upon favorably by Argentinians – businesses are made less competitive by a need to charge higher prices.

5.2 Argentina - Solutions through Bitcoin?

5.2.1 Inflation

Bitcoin is viewed as a solution to inflation by Argentinians. The cryptocurrency broker Paxful (2020) surveyed Argentinians and finds that 42% of respondents cited inflation as a direct reason for their purchase of cryptocurrencies, while with regards to Bitcoin specifically, 49% believed it to "provide security within an otherwise tumultuous banking system" (Paxful, 2020). In an email survey of an Argentine Bitcoin enthusiast group, master's degree student van Eekeren (2021) finds that the value storage function of Bitcoin was the single biggest reasons for use: 21 of 30 respondents cited this as their reason for adoption. Compared to Venezuela, even without accounting for the differences in the Bitcoin Peso exchange rate, Bitcoin hedges against inflation and even makes a decent return.

As Table 7 shows Bitcoin's performance relative to the Argentine CPI has been excellent since 2016, even when not accounting for the depreciating (black market) exchange rate. With the exception of 2019, in all these years Bitcoin has outperformed the increase in the CPI. This means that an Argentinian holding all of his wealth in Bitcoin from January to December of the given years would make a positive return, even when adjusting for inflation. Given the high level of inflation in Argentine relative to the rest of the world (Table 3) this is impressive. In the year 2019, as well as 2014 and 2015 this would not be the case. With the latter 2 years being situations where Bitcoin actually lost more value than the inflation increased, meaning an Argentinian would have been better off keeping their wealth in Pesos in those 2 years. In the 2019, although Bitcoin would have made a nominal positive rate of return, it would not be nearly sufficient to cover the inflation. As with Venezuela, the findings must be interpreted with caution since the annual returns are dependent on the time period used to calculate the annual returns.

Year	% Change CPI Relative to Previous Year in Argentina	% Change in mean Monthly Bitcoin Price (\$) Relative to Previous Year (See Appendix 1)	Status (See Table 10 in Appendix B) for a detailed explanation.
2014	10.00	-39.47	W
2015	22.00	-44.7	W
2016	40.00	112.16	RPR
2017	25.68	616.76	RPR
2018	34.28	70.62	RPR
2019	53.55	2.32	B
2020	42.02	66.02	RPR
2021	50% (forecast)	283.16 (up to 03.12.2021)	RPI

Table 7: Table Showing Annual Inflation (% Change in CPI) in Argentina and Bitcoin Price Change (\$) relative to Previous Year. Sources Statista (2021a) and Statista (2021b).

In addition to the inflation hedging potential of Bitcoin, there is evidence that Bitcoin trading increases as the Argentine currency depreciates, suggesting people are using Bitcoin to move to safer assets in the face of looming inflation. Chainalysis (2020) runs a correlation between the Dollar exchange rate of native currencies and the peer-to-peer cryptocurrency trading volume. They find among the 4 Latin American countries studied (Argentina, Colombia, Chile, Uruguay), Argentina has the highest correlation, at 0.76 (See Figure 5). This means that as the currency loses value the trading of Bitcoin increases.

This finding, compared with the survey results indicating that people are concerned with the security of their wealth from erosion - people are moving their money into cryptocurrencies like Bitcoin directly as a response to the currency losing value internationally and potentially fears of resulting in imported inflation. But why does Argentina have the highest correlation? They have the strictest capital controls (See Table 8)! They incentivize people to use Bitcoin as their preferred inflation hedge, as opposed to foreign currencies. Foreign currencies are available in limited supply and only at premiums due to the capital controls, making Bitcoin a more attractive hedge. This is strong evidence that the availability of hedging alternatives influences the adoption of Bitcoin.

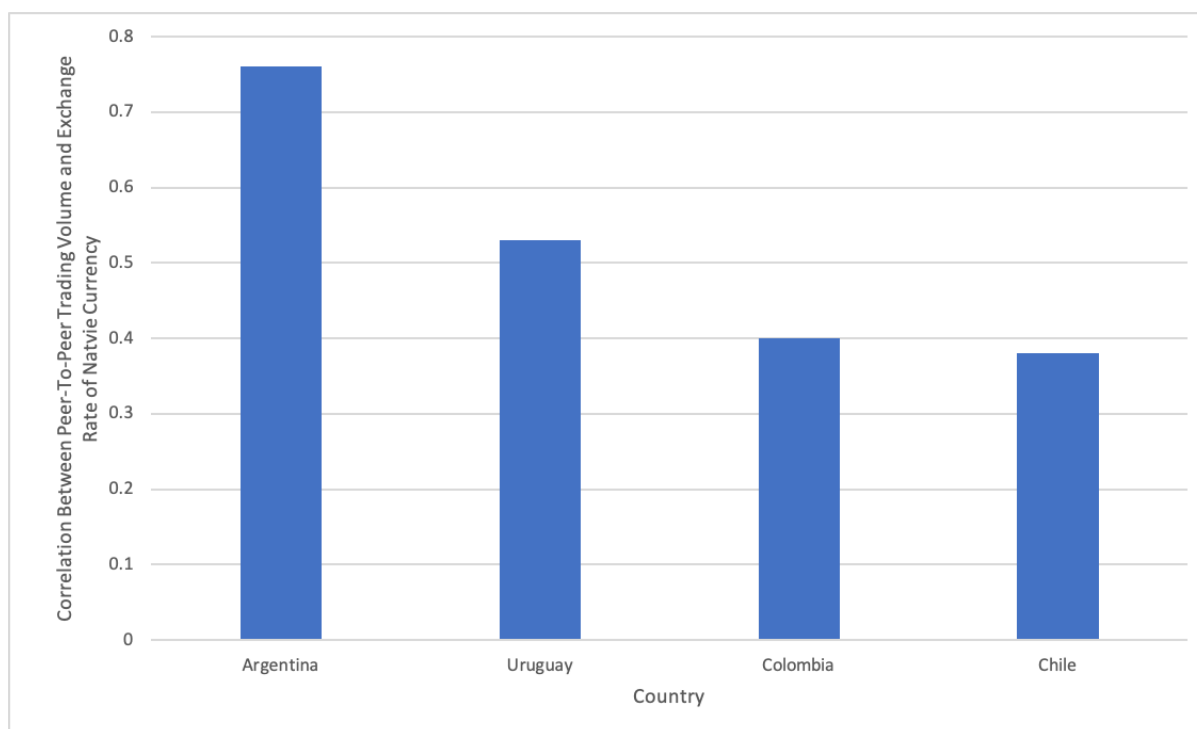


Figure 5: Correlation between Bitcoin Peer-to-Peer Trading Volume and Exchange Rate of the Native Currency to USD. Source: Chainalysis (2020).

Country	Rank	Overall Restrictions Score 2015 (This Best Represents 2020)
Argentina	1	0.90
Colombia	2	0.58
Chile	3	0.13
Uruguay	4	0.00

Table 8: Chart Showing Overall Capital Movement Restriction in 2015 in Argentina, Colombia, Chile and Uruguay. Source: Fernández et al (2016). A Higher Restriction Index Means More Severe Restrictions on the Movement of Capital. See Appendix D for an Explanation of why the Year 2015 Best Represents the State of Capital Controls in 2020.

5.2.2 Investment

With such drastic increases in value of the asset, it is unsurprising that many Argentinians also consider Bitcoin a good investment. In the Paxful (2020) survey, 54% responded that they purchased Bitcoin after consideration of its "global potential" (Paxful, 2020), indicating an expectation of growth. However, the language of the survey is too vague to make a concrete statement about intent, as "potential" (Paxful, 2020) can mean a number of different things. Van Eekeren (2021) find that 17/30 people consider Bitcoin a speculative investment, while this is the 4th most common use, it cannot be said to be a dominant use. This would be supported by the literature, which has shown many westerners view Bitcoin mostly as an investment. With

an asset such as Bitcoin in an economy like Argentina, the line between an investment and a hedge against inflation has become blurred. Many may buy it just because they believe it makes them money, the inflationary protection may be an afterthought.

5.2.3 Capital Controls - Limited Evidence

It has been argued capital controls are evaded using Bitcoin, however this argument is not convincing. While a number of newspaper argue this, the only academic study which has argued this is Pieters (2016). She argues that because of the co-movement of the Bitcoin-Peso exchange rate and the black market Dollar-Peso exchange rate, Bitcoins are being used to evade capital controls in Argentina. However, there is no explanation of how this mechanism would work in Argentina. She explains the mechanism in an open economy, where currency A is used to buy Bitcoin and then the Bitcoin is used to buy currency B. Ignoring fees, in an open market, this transaction would have been the same had it been made with a foreign exchange broker directly. This is because in a situation when there are differences in the fees, these will be exploited, and the price will change due to the laws of supply and demand. See Figure 4 and Figure 5 for how this works. Bitcoin is used as a vehicle currency to avoid the use of a financial institution to transfer the money internationally.

However, Argentina is not an open economy in the sense that people cannot exchange their Bitcoin for Dollars freely, due to the aforementioned limits on the purchasing of Dollars (Gillespie, 2021; Khatri, 2019). An Argentinian would still have to travel somewhere where these restrictions do not apply and sell their Bitcoin for Dollars. At this point they could just sell their Pesos directly for Dollars. The co-movement of the two exchange rates also begs the question of why anyone would use this channel over the regular black market, if the exchange rates are the same? There is no real benefit of doing this compared to the traditional black market. Bitcoin does not provide a solution to the capital controls.

5.2.4 Economic Freedom

Bitcoin is used to circumvent punishing regulations on international transfers in Argentina. Especially small-medium size business owners who can fly under the radar of authorities have been using Bitcoin to increase their competitiveness. Over 200 hotels and 156 stores as well as several independent producers transact with foreign clients in Bitcoin, using it as a vehicle currency. They receive their payment in Bitcoin, and then exchange the Bitcoins for Pesos from local vendors, which do not charge any tax on withdrawals. In this way, they circumvent any regulation on the withdrawal of funds (Moreno, 2016; Popper, 2015). With such complicated and stringent regulations as discussed previously, it is understandable that business owners have decided to try to avoid these now that there is a feasible alternative thanks to Bitcoin. 14/30 Argentinians from van Eekeren (2021)'s Bitcoin enthusiast group survey say that for them, Bitcoin facilitates international payments. This is a respectable number since not every Argentinian regularly transacts internationally or owns a business that does. Thus, Bitcoin allows people to work around the stringent banking system which has to comply with the national law on taxation. Permitting them to be more competitive and avoid a system that they feel does not work for them. Even if a taxation on Bitcoin transactions law was to be enacted, it is unlikely these would be observed by most people, and due to the decentralized and pseudonymous nature of Bitcoin.

6 Discussion

6.1.1 Storage of Value

Bitcoin provides opportunities to store value in the high inflation environment. The currency depreciating (both domestically via the CPI and internationally via depreciation) are issues from which the people of both countries have sought refuge. Venezuelans rush to exchange their Bolivars into Bitcoin as soon as they are earned and wait until the last second to sell their Bitcoins for Bolivars (Johnson, 2019b). In Argentina this phenomenon happens too. Cryptocurrency is viewed as a way to protect against inflation and it really is! (Paxful, 2020; van Eekeren, 2021). Even before accounting for the depreciation of the USD versus the Peso, Argentinians would have made a positive inflation adjusted return in 5 out of 8 years since 2013 (See Table 7). They also put more of their wealth into Bitcoin as the Peso depreciates relative to fiat currencies than comparable Latin American countries with less stringent capital controls, because they do not have such easy access to alternative wealth storage options (See Figure 5).

In both Venezuela and Argentina, the limited options to hedge against inflation available to citizens must be taken into account. Foreign currencies, a prime way to hedge against inflation is only available at premiums in both countries (Dornbusch et al., 1990; Moreno, 2016; Santos, 2017). While in Venezuela, the other prime option to protect against inflation, the purchase of durable goods, is inaccessible due to the shortages (Daniels & Rangel, 2020). With such limited options, the easily accessible Bitcoin starts to look more attractive, which is precisely why it is used to guard against inflation. It is this lack of value storage options in a high inflation environment which propels both countries to the top of Chainalysis (2021)'s index and the fact that Venezuela's options are even more limited is why they are Latin Americas top adopter.

6.1.2 Means of Crossing International Borders

Bitcoin also facilitates exchanges of funds across borders when this is problematic otherwise, it helps fiat currencies fulfill their exchange function by allowing users to cross international borders. This mechanism is used by Venezuelan refugees who have trouble taking their wealth abroad due to the capital controls and violence (Aguilar, 2019; Malone & Ter Horst, 2010; United Nations Office on Drugs and Crime, 2019a, 2019b). Evidence of the scale to which this is happening is limited, but there are people who have made a business out of allowing Venezuelan refugees to exchange their Bitcoin for non-Bolivar fiat (Aguilar, 2020). On a grander scale rich Venezuelans, almost certainly regime insiders, are using Bitcoin evade the sanctions placed on them. Argentinians also evade parts of their own financial system, the part that deals with international transfers and charge excessive fees. Bitcoin is used here because it is a feasible alternative and facilitates the avoidance of punitive regulations and excessive taxes which could mean the difference between survival for some businesses (Popper, 2015). The need to have funds cross international borders where this would otherwise be cumbersome or impossible for users is the second factor leading to Bitcoin adoption in the countries.

In all of these cases Bitcoin acts as a vehicle currency, but it does not replace the whole financial system. Unfortunately, the motivations and behavior of people who use Bitcoin to move across political borders is not always clear. However, it is likely that most of them transfer back to fiat. The refugees use the exchange at the border to obtain Colombian fiat and Argentinian exporters use Bitcoin vendors to exchange back to Pesos (Aguilar, 2020; Popper, 2015). Elites are not content with keeping their money in a not widely acceptable currency, and thus use means to launder it into fiat (Makarov & Schoar, 2021). So rather than being a medium of exchange, Bitcoin is a means of crossing international borders otherwise difficult to cross for individuals. The importing of foreign currencies as suggested by Pieters (2016), and

Johnson (2019a) is not found to be happening and even if it were would not provide useful benefits.

6.1.3 Limited Adoption

The fact that people can and do use Bitcoin successfully in these countries to solve the issues of inflation and restricted international transfers should not be confused with saying that there is a great prevalence of Bitcoin use in Venezuela and Argentina. While Argentina is a top adopter of Bitcoin, this still only represents a minority of people who actually use it. Statista (2021d) conducted a survey to ascertain the numbers of Bitcoin users. Only 14% of people, the 8th biggest adopter! The top adopter in their survey, Nigeria (place 7 in Chainalysis (2021)) came in at only 31%. This means Venezuela, who was not studied by Statista (2021d) is likely somewhere between these 2 values. With maximum a third of people using Bitcoin, it cannot be said Bitcoin solves economic issues for the country. The increasing numbers of transactions (Table 2, Column 4) do hint at more people are waking up to Bitcoin's potential. Despite the limited use, for those people who use Bitcoin to protect against inflation or have their funds cross political borders which are usually problematic.

Themes / Groups	Argentina	Venezuela
Inflation	Yes - Bitcoin acts as a value storage.	
Capital Controls	Yes - international withdrawal taxes avoided.	Yes - when refugees leave the country.
	No evidence that foreign currency is brought into the countries, except Pieter (2016) who does not sufficiently explain mechanism. Even if they were brought into the country, the co-movement of the unofficial exchange rate and the Bitcoin-black market dollar exchange rate would mean there is no benefit (Johnson, 2019a; Pieters, 2016).	
Sinning (Sanctions)	No evidence - but there are also no reasons that Argentinians would have to evade sanctions.	Yes - sanctions are evaded by elites.
Investment	Investment more an accidental benefit from solving economic benefit.	

Table 9: Table Summarizing Key Findings Guided by the Literature Review.

6.1.4 Investment as a Side Effect

From the limited evidence available I would argue that investment was more a 'nice side effect' rather than a reason for adoption. As described, Bitcoin has been used in Argentina for some time now. In 2015 they already had a well-developed sector (Moreno, 2016; Popper, 2015). This is quite early, as Parino et al. (2018)'s data shows developing countries (like Argentina) only began adopting in 2015. Investment was likely not the cause for this development since 2014 and 2015 were both years where Argentina's CPI actually increased by less than the amount that Bitcoin lost relative to the previous year (See Table 7). Holders of Bitcoin would have been worse off than those holding Peso. However, it did solve the issue of the burdensome international transfer taxes. This developed the industry of Bitcoin Peso exchanges, and got Bitcoin's awareness up. Later, when the Bitcoin made gains everywhere, people were able to use this to protect against inflation and even make a profit. But the cause of this was ultimately that it solved the international border transfer issue. It is possible to extrapolate this to Venezuela, where Bitcoin is primarily intended as a store of value or international transfer tool but ends up making a positive inflation adjusted return in many cases (assuming that asset price inflation also occurs in the price of Bitcoin in Bolivars).

6.2 Limitations

A primary limitation of testing the idea that inflation was related to Bitcoin's adoption was it is not possible to say how well Bitcoin actually protects against inflation, since there is no data (in a useable format) available on the Bitcoin/Peso and Bitcoin/Bolivar exchange rate, instead the Dollar price of Bitcoin was used as a proxy. However, this seriously underestimated Bitcoin's performance relative to the country's CPI. While for Argentina this was not a grave analytical problem, since even the underestimated value still showed the performance was sufficient to cover inflation. In Venezuela, the raw numbers show that Bitcoin would not have

hedged perfectly (or better) against inflation in any year except 2017. However Bitcoin in Bolivars likely made significant gains during the period of inflation as a prices, including those of highly liquid assets like Bitcoin should rise with inflation (Goodhart & Hofmann, 2000). Future researchers could test this idea by using historical prices of Bitcoin in local fiat against the local CPI.

Another limitation was limited comparability and data availability. Unfortunately reporting by both countries is questionable at best. For this reason, various international organizations and authors make their best guesses. However, these are not nearly as reliable as something produced domestically in good faith. Furthermore, Chainalysis (2020, 2021) do not disclose why only certain areas are analyzed at certain times. For example, in the correlation between the local fiat exchange rate and the cryptocurrency trading volume, 4 countries in Latin America are analyzed, it is unclear why others (particularly useful would have been Venezuela) were not.

A further issue was that the information regarding the crossing of international borders by various groups in both countries was limited, limiting the claims which can be made. Many of the conclusions here are based on conjecture rather than empirical evidence (for example saying that because there are Bitcoin to Colombian fiat exchanges on servicing Venezuelan refugees, refugees must be using Bitcoin to move their wealth). Such limited evidence hinders the claims that can be made.

Finally, when evaluating the sanction evasion use case, the selection of Argentina as a case country is not ideal due to no sanctions being placed on them and no major crime organization's existing in the country which would necessitate evading the international financial system (Insight Crime, 2018). Nevertheless, the evidence that sanctions evasion is driving adoption in Venezuela is convincing, so this limitation is not as serious as it might seem.

6.3 Conclusion and Further Research

This paper has tried to investigate the factors leading to the adoption of Bitcoin in Argentina and Venezuela by first identifying the areas where Bitcoin could provide a solution and then analyzing if it does. There are two key factors leading to adoption of Bitcoin: inflation within the context of limited alternatives to store value and the need for certain groups to make payments across international borders when this is otherwise difficult for them.

The key findings are that Bitcoin is used as a store of value in both countries, meaning inflation is one factor leading to adoption. However, I was only able to show that inflation is hedged in Argentina, in Venezuela the data was insufficient to make this claim, even though theoretically it should.

The need to transfer internationally for groups who have some restrictions imposed on them in this regard is the second reason for adoption. This is a very diverse group consisting of business owners, refugees and corrupt officials alike. However, Bitcoin is only used to cross borders and very quickly sold for fiat, it is thus not acting as a medium of exchange, but just as a medium to cross international borders. In Argentina, this border crossing function had economic usefulness before Bitcoin's inflation hedging or investment function did.

Further research could consolidate the data on prices of Bitcoin in local currency to see how well Bitcoin hedges against inflation in these environments, in addition, quantitative methods could be employed to see which of the factors found here (inflation with limited value storage alternatives and need to cross international borders) has a greater effect on the adoption of Bitcoin). Finally, research should distinguish between restrictions on capital inflows and outflows as this works fundamentally different in the context of Bitcoin.

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Appendix A

In order to annualize the Bitcoin prices, the data on average monthly Bitcoin prices by Statista (2021b) was taken. The mean monthly prices for the period January – December for each year were taken (as they are presented in the source) and the mean of those (means) was calculated. This represents the average yearly price of Bitcoin. The percentage change from one year period compared to the previous one is how the percentage change (Column 3) was obtained. This method is chosen in favor of a Year-over-Year measurement since it accounts for the heavy fluctuations of the Bitcoin prices in between the beginning and end of the years – this is a more realistic approach for people who might have to quickly sell their Bitcoins to cover expenses.

Appendix B

Symbol	Meaning	Explanation	Implication
W	Worse	Bitcoins % decrease was larger than the % increase in the CPI in one year compared to the previous.	People would be better off holding the fiat currency, since Bitcoin lost more value than the prices in the fiat currency rose.
B	Better	Bitcoins % increase was smaller than the CPI % increase in one year compared to the previous.	Bitcoin gained value nominally, but not enough to hedge effectively against the inflation. It still performed better than the fiat currency.
RPR	Real Positive Returns	Bitcoins % increase was greater than the % increase in CPI in one year compared to the previous..	Holders of Bitcoin in could have sold their Bitcoin at the end of the year and would have not only protected their wealth against inflation but actually made a profit.

Table 10: Table Showing Interpretation of "Status" Column in Table 5 and Table 7.

Appendix C

Chainalysis (2020) explores Criptolago, which is 1 out of the 7 state owned Venezuelan cryptocurrency exchanges which transfer cryptocurrencies (cryptocurrency transactions are used as a proxy for Bitcoin transfers). They select one exchange randomly. On this exchange \$380 000 worth of cryptocurrencies have left the country with 75% of transaction being over \$1000. The size of these transactions suggests it is wealthy regime insiders conducting these payments, who cannot use the international payments system due to sanctions. If it is assumed all other exchanges have similar volumes then this would mean across 7 exchanges a total of $7 * \$380\,000 = \26.6 million is transferred out of the country between August 2019 and July 2020. This is a rough calculation which rest on the assumption that all exchanges transfer the same volume. This is an ok assumption to make sense there is no indication that Criptolago would have any more or less transactions than the others.

Appendix D

The reason that the year 2015 is compared for currency controls is that this was the last year for which the Fernández et al (2016)'s dataset had data which was representative of Argentine capital controls. Although the dataset did get updated until 2019, since restrictions were only re-imposed in late 2019, this new data did not accurately represent the state of capital controls in that year (BBC, 2019). A 2020 set was not available. Thus, the year 2015 is used as this is the last year where capital controls were in effect and most accurately reflects the state of capital controls in 2020, due to the policy shift back to capital controls in late 2019. The year 2020 is interesting because this is the year where Chainalysis (2020) runs their analysis. Chile, Colombia and Uruguay have not had any changes in their capital controls laws since 2015 to the best of my knowledge.

Appendix E

Rank (Globally)	Country	Score
1	Vietnam	1
2	India	0.37
3	Pakistan	0.36
4	Ukraine	0.29
5	Kenya	0.28
6	Nigeria	0.26
7	Venezuela	0.25
8	USA	0.22
9	Togo	0.19
10	Argentina	0.19

Table 11: Table Showing (Relative) Rankings of Top 10 Countries' Cryptocurrency Adoption as Measured by Chainalysis (2021).

The index reflects: the value in cryptocurrency received, the retail value received and the peer-to-peer trading volume. All of these three values are normalized to account for the wealth of the residents (using purchasing power parity) and access to the internet in the case of peer-to-peer exchanges. Unfortunately, the authors did not disclose why internet access was only controlled for in the peer-to-peer exchange volume measurement, which is a limitation skewing the results of the index in favor of countries with more internet access. A higher score on the index means a country's residents use more cryptocurrencies than a country with a lower score. If a country has lower internet access or a lower wealth as measured by the purchasing power parity, but the same adoption as another, it will be given a higher score on the index. The score of the case countries can be seen in Table 11 below. The index ranks countries on their relative scores, meaning a country's place in the ranking can change, even if the underlying patterns of that country did not change, simply because the countries around it changed. This limits comparability of the index across time, which is not a big issue here as no panel data is created.