Cryptocurrency and Capital Controls

Jill Carlson

June 2, 2016

University of Oxford

ABSTRACT

The development of cryptocurrency technology has made it possible to transfer value securely and instantaneously without a third party intermediary such as a bank or financial institution. This is an exploratory analysis of where and why this technology has gained traction. In particular, I focus on the hypothesis that the relative popularity of cryptocurrency in Argentina can be explained by the presence of long-term capital controls. To test this hypothesis, I conducted expert interviews with market players. The main conclusion is that cryptocurrency can and has been used to evade capital controls. However, it is unlikely that substantial volumes have been moved via this mechanism. Cryptocurrency's popularity in Argentina is attributable to more than the country's history of capital controls or high rates of inflation. Other factors, including tax rate, levels of corruption, and history of multiple exchange rates have also contributed to adoption of this technology in Argentina. I propose further case study research on cryptocurrency in additional countries in order to develop these theories.

Electronic copy available at: https://ssrn.com/abstract=3046954

TABLE OF CONTENTS

Electronic copy available at: https://ssrn.com/abstract=3046954

I.

INTRODUCTION

The risks and benefits of financial globalization have reemerged as a topic of contention since the financial crisis. In light of conversations about contagion and "hot money" capital flows, academics, policymakers, and central bankers are reconsidering isolationist and nationalist economic policies. In 1999, Paul Krugman predicted that "we will have to turn the clock at least part of the way back: to limit capital flows… to reregulate financial markets…" (Krugman 1999: 74). He said this in the wake of capital account liberalization among emerging markets and in anticipation of the creation of the European currency union. The primary method of mitigating the perils of globalization that he discussed was capital controls.

Capital controls limit the flow of capital into or out of a country. Directed toward inflows, they are used to prevent fast-moving money, such as hedge fund investments, from overheating an economy and leaving it vulnerable. When applied to outflows, capital controls are normally associated with crisis, preventing bank runs or dramatic drops in the value of the local currency. Since 2008, amidst fears that globalization has gone too far, capital controls have regained a spotlight in policy debates.[1]

Meanwhile, financial technology has reduced frictions and paved the way for globalization, enabling a more interconnected and interdependent financial infrastructure, from the retail level up to the institutional. Perhaps the most literal instance of financial globalization has been the development of cryptocurrencies that allow for the immediate

[1] I have intentionally structured this introduction to echo Edwards (1999). I intend for the following work to speak directly to his paper on "The Effectiveness of Capital Controls."

transfer of value digitally. This technology, which knows no borders and can enable evasion of local regulations, has implications for the global financial order.

In the summer of 2015, Greece instituted capital controls to prevent bank runs in the lead up to and aftermath of the referendum on exiting the Eurozone. In the weeks following the announcement of the controls, which prevented Greeks from withdrawing more than 60 euros per day from the bank, deposits at the primary Greek bitcoin exchange rose 400 percent (Petrakis and Root 2015; Kelly 2015). Informational guides appeared on blogs and forums providing instructions on how Greeks could use bitcoin to evade the new regulations (Insomnia 2015). This phenomenon received attention from the likes of CNN, CNBC, Reuters, and Bloomberg (Pagliery 2015; Barnato 2015; Kelly 2015; Darwish 2015). If bitcoin could render capital controls obsolete, this would have consequences not only for Greece and the Eurozone, but also for financial regulation and economic governance globally.

Regardless of the press focus, flows into bitcoin remained small in Greece during this time, with likely no more than about 60,000 euros per day coming into the asset class (Papageorgiou 2016). Because the capital controls came and went suddenly, there was little scope to develop the awareness and the infrastructure necessary for large-scale bitcoin adoption (Papageorgiou 2016). Furthermore, Greece's economy is inextricably linked to the rest of the Eurozone, making diversification away from the euro, even in the most turbulent times, uninviting (Papageorgiou 2016). But Greece is not the only area to receive publicity surrounding bitcoin in the face of capital controls.

Argentina has had some form of capital controls in place since 2001 (Dominguez and Tesar 2009: 317). The duration and severity of these financial restrictions have resulted in

considerable financial innovation in circumventing the regulations (Auguste et al. 2005). As in Greece, the use of bitcoin for this purpose in Argentina has received mainstream press.[2] Here, however, the technology has demonstrated some staying power and picked up substantial interest. The bitcoin ecosystem there has developed to consist of a variety of start ups, regular "meet-ups" among enthusiasts, and even a dedicated *Espacio Bitcoin* for hosting these companies and conferences. What caused bitcoin to catch on in Buenos Aires? If the answer is the presence of long-term capital controls, then this poses problems for the capacity of Argentina—or any other country—to turn the clock back and limit capital flows.

WHAT IS BITCOIN?

Bitcoin is a form of electronic cash that allows for value transfers to be made digitally, without the need for a third party intermediary (Nakamoto 2008). The peer-to-peer nature of the transaction implies the circumvention of traditional financial channels. Once bitcoins are acquired, they can be used to move capital instantaneously around the world without interacting with a bank or other financial institution until the coins are cashed out into a local currency.

Transactions in bitcoin broadcast the transfer through a public, distributed ledger called the blockchain. Each transaction becomes a part of a block in a continuous, tamper-proof chain of documentation on this ledger (Nakamoto 2008). Every block contains a record, or hash, that captures all of the previous blocks as well as information about the present transaction, including the addresses of the sender and receiver and the amount of bitcoin moved (Nakamoto 2008). A network of nodes, or servers, verifies each block by

[2] e.g. Wells 2013; Matonis 2013; Economist 2014; Mander 2015.

competing to solve a cryptographic function based on information in the new block. Servers that verify blocks are incentivized to contribute their computing power to the system because they are rewarded with a set number of bitcoins that are newly generated or "mined" from the network whenever they successfully verify a transaction (Dwyer 2014: 82-83). The total number of bitcoins that can be generated is fixed at 21 million, structured such that these mining payouts will gradually diminish and then stop altogether, rendering it deflationary (Dwyer 2014: 82-83).

The way Satoshi Nakamoto devised bitcoin in his 2008 whitepaper endowed it with specific features. It meets four of the six generally accepted characteristics of money: durability, portability, divisibility, and limited supply (Wolla 2012). It fails to meet uniformity, given that each bitcoin transaction will carry a different trail of previous transactions (Nakamoto 2008). Bitcoin also has not yet achieved widespread acceptability, though some mainstream merchants have begun to accept it as a form of payment (Wolla 2012). Bitcoin is decentralized, governed by code and by the network itself as opposed to by a central bank. Bitcoin, as mentioned, is pseudonymous, hiding identity behind an address that cannot be directly mapped to a user (Nakamoto 2008). Bitcoin dramatically decreases friction and the cost of transferring value: the average transaction takes minutes to execute and settle and is effectively free of charge (Nakamoto 2008).

Bitcoins are stored in virtual wallets associated with one or more addresses that can be used for used for sending and receiving (Dwyer 2014: 84). Unlike a bank account, wallets can easily be obtained on a variety of online platforms, often with minimal barriers to entry. Bitcoins are acquired through the mining process, by transacting with an owner of bitcoin, or through purchase on an exchange. Exchanges range in the degree to which they are regulated

and considered legitimate. For example, Mt. Gox, the largest bitcoin exchange until 2013, suffered cases of hacking and fraud and eventually filed for bankruptcy, bringing bitcoin's reputation down with it. Similar scandals and criminal cases have been a hallmark of the cryptocurrency's short history.

BITCOIN, REGULATION, AND GOVERNANCE

BITCOIN AND CRIME

How to classify bitcoin has stumped established governing and financial systems. Regulators and lawmakers have variously treated it as currency, commodity, and property (Higgins 2016). For the most part, bitcoin remains unregulated. Notable exceptions to this exist in China, which has banned financial institutions from transacting in the cryptocurrency, and Russia, which is in the process of instituting a blanket *de jure* ban (Bloomberg 2013; Adrianova 2016).

Despite the public nature of the ledger, bitcoin is very difficult to trace. It is therefore no surprise that the technology has been rejected in countries with low measures of transparency and personal freedoms. Many governments associate bitcoin with illegal markets, including drug trading, human trafficking, weapons dealing, and money laundering. The Silk Road, a now defunct site that leveraged bitcoin to create a global and open drug market, has fuelled this perception of bitcoin. Because of its ties to illegal markets, institutions ranging from INTERPOL to local drug enforcement agencies have expressed interest in regulating cryptocurrencies (Perez 2015b). In this way it parallels cash. Rogoff (2014: 5) points out that roughly 78% of the total value of outstanding US cash is held in the highest denomination, $100 bills, and about one-third of Euro cash is held in 500 euro notes,

famously used in the narcotics trade. Rogoff (2014: 4) estimates that over 50% of cash is used to hide transactions.

Bitcoin and Inflation

Bitcoin is not just a private means of transaction. It can also be used as a speculative investment or store of value. Its price volatility has largely precluded it from being used in long-term savings, though it has been suggested that this use case is relevant in areas that experience hyperinflation. In places like Venezuela or Argentina, where double-digit inflation annually wears away the value of the country's local currency, bitcoin could offer diversification (Singh and Vega 2016; Mander 2015). Cryptocurrency might appear particularly attractive in this context, in which individuals and businesses have been trained not to trust fiat currency. In the most extreme cases, bitcoin could serve as protection not only from erosion of value, but also from seizure of assets by the government or the central bank, as in the case of Cyprus in 2013 (Papageorgiou 2016). Erosion of value and distrust of money, government, or institutions more broadly may thus drive interest in this decentralized, unregulated, and relatively easy to access asset.

Bitcoin and Capital Controls

In areas with capital controls, the appeal of bitcoin may lie in its application in carrying out transactions. At various times, the price of bitcoin has notably risen following announcements of capital flow restrictions in Cyprus, Greece, and China (Kelly 2015; Perez 2015a; Farrell 2013; Christensen 2013; Cox 2013). However, there is little to suggest that these rallies were driven by substantial local interest as opposed to foreign speculators

(Papageorgiou 2016). Regardless of the source of the price action, the market has drawn a link between capital controls and bitcoin.

When flow of currency into or out of a country is restricted, this creates problems for businesses with suppliers or consumers abroad. To solve this, international businesses can transact in bitcoin, converting to or from local currency on either end. This infrastructure can keep local businesses running in the face of strict financial regulation.

While the theory behind the use case of bitcoin in areas with capital controls is oft cited, no formal study has been done to demonstrate the extent to which this phenomenon occurs. Exploring whether and how bitcoin is used in this context has practical implications for policymakers. If bitcoin gains widespread adoption in evasion of capital controls, it could completely erode the effectiveness of these regulations, and policies will have to be rethought. This could challenge states' sovereignty, capacity to regulate, and ability to construct and control borders. Cryptocurrency could make it more complicated for central banks to control inflation levels, exchange rates, and money supply.

While bitcoin constitutes only a tiny fraction of the global economy, its unique characteristics endow it with the capability to disrupt the status quo of global economic governance. At the 2016 conference of the World Economic Forum, Managing Director of the IMF Christine Lagarde made this point, saying that her colleagues had recently begun to do their "homework" on this area, despite the fact that the total market value of virtual currency at the time stood at only 7 billion US dollars (WEF 2016). As she pointed out, this share of the economy is dwarfed by the total US currency in circulation, which sums to 1.4 trillion dollars, or the total US money supply, which comes in at 12 trillion dollars (WEF

2016). Nonetheless, she said, the technology could have important positive and negative applications within the global economy (WEF 2016).

BITCOIN APPLICATIONS AND TAXONOMY

International organizations are just beginning to examine the prospects and problems posed by bitcoin as an economic instrument. Applications of bitcoin, particularly in the developing world, have gained frequent attention. The media, the start-up community, and international institutions are eager to employ bitcoin as a medium for global remittances, an alternative to volatile or high-inflation currencies, and an avenue for evading protectionist economic policies. In the first half of 2016, international organizations including the United Nations and the IMF published their first overviews of cryptocurrency and its possible uses.

Bitcoin is not the only asset that represents these possibilities. Other cryptocurrencies modeled on the Bitcoin protocol share its characteristics and prospects.[3] Because bitcoin is the most commonly used and popularly known of these, it is the focus of this research, but the findings ought to be applicable to cryptocurrencies more generally. There is some dissension among academics, policymakers, and the private sector over terminology and taxonomy of digital, virtual, electronic, and cryptocurrencies.[4] It is worth noting that in general, my attention is geared towards cryptocurrencies, which are decentralized, cryptographically secure, and pseudonymous (He et al. 2016: 7). The conclusions I draw about bitcoin are intended to be generalizable to other cryptocurrencies, but not necessarily to

[3] Convention dictates that bitcoin the currency is lowercase while Bitcoin the protocol or network is capitalized.
[4] For a comprehensive review of this, see Hileman (2013).

government-issued digital currencies or other forms of financial technology.[5] When I refer instead to virtual or digital currencies, it is only to remain consistent with the terminology being used by another source, as in the case of the IMF.

RESEARCH QUESTION

In this paper I conduct an exploratory analysis of the uses of cryptocurrency and the reasons it gains traction in some areas more readily than others. I focus on one of the most discussed and most relevant applications of cryptocurrency: circumvention of capital controls. In January 2016, the IMF published a note addressing bitcoin and other cryptocurrencies: "the potential for VC [virtual currency] schemes to serve as an avenue for the evasion of capital controls is obvious" (He et al. 2016: 31). However, no studies have been done to investigate this use case.[6]

The suitability of capital controls can be viewed from two angles. Their first-order efficacy is whether they in practice perform their intended function of managing capital flows to or from a country. Meanwhile, the second-order success of controls looks at whether the controls result in stability or another metric of economic prosperity.

I contemplate here the first of these considerations. The question of whether capital controls function as intended needs to be updated to account not only for a new, post-2008 financial order, but also for advancements in innovation and technology. There exist many explorations of methods of capital control circumvention, including financial engineering,

[5] Examples of other relevant cryptocurrencies include ether and Litecoin.
[6] "As of yet, however, there appears to be little robust empirical evidence on the extent to which such use of Bitcoin is occurring. There are many anecdotal examples (found on online forums, media sites and social media feeds) of people using it to make international transfers, or using it to buy goods internationally from small merchants, but no systematic studies beyond proxy studies of Bitcoin users" (Scott 2016: 5).

derivatives trading, and merely disguising one type of transaction as another. I update the literature on financial innovation and capital control evasion. What follows is intended to speak to this literature as an exploration of how bitcoin may affect state capacity to implement financial regulation. This study must precede any normative evaluation of the use of cryptocurrency or the implementation of capital controls. As such, I see the following research as a foundation for further discussion of these topics, both in academic circles and in policymaking spheres.

Finally, in addition to addressing this gap in the economic literature, I also seek to build upon the nascent literature examining factors surrounding cryptocurrency adoption. A handful of studies have looked at the drivers and dynamics of regional interest in or use of bitcoin. I engage with the hypotheses of these studies and develop additional theories on the topic.

RESULTS

Based on this analysis, I conclude that cryptocurrency does hold the power to enable capital control circumvention. However, it has not yet been used in this way in any significant size. As such, it may not yet be of substantial interest to enforcement agents, but does still raise theoretical questions of state control and implementation of economic policy.

I also find that the presence of capital controls should be observed as neither a necessary nor sufficient driver of interest in the technology in Argentina or any other region. Instead of according capital controls undue attention, additional factors and use cases must be considered.

I identify three other variables that could contribute to outlier adoption of cryptocurrency. Chief among these is tax rate, and therefore tax evasion. Relative to other problems surrounding bitcoin, including capital control evasion and money laundering, tax evasion has received relatively little attention. Yet it may be, or become, one of the main drivers of interest in the technology. Cultural and ideological factors should also be given more weight. Cryptocurrency is conventionally associated with libertarian or anarchist views, but it may also be attractive to skeptics of corruption in a more mainstream sense. Finally, the presence of multiple accepted currencies and exchange rates may play a critical role in acceptance of a new entrant into the economy.

AUDIENCE AND AGENDA

One of the issues of writing on this topic is the need to speak to a diverse group. This subject should be of interest to policymakers who are beginning to consider the implications of cryptocurrency on economic governance. This exploration also speaks to academic conversations in economics, politics, and computer science and cryptography. Finally, the concerns of this analysis should inform issues considered by the private sector, whether by the media, venture capital funds, or the financial community. I have therefore attempted to make my discussion and analysis as accessible as possible to a multidisciplinary audience.

In Section II, I place my research in the context of the academic literature. I first review existing academic debates surrounding capital controls and methods used to circumvent them. I go on to critique the limited formal exploration of the economic drivers of cryptocurrency adoption.

Section III consists of an overview and justification of my methodology. When undertaking this research, I initially set out to perform an empirical, quantitative analysis of this subject. I outline here other attempts at such a data-driven analysis and demonstrate why this approach is problematic. I explain why my alternative qualitative methodology, which relies on expert interviews, is more suitable at this juncture.

I proceed to analyze the case study of Argentina in Section IV. I begin by detailing the recent history of economic events and policies in Argentina. I explain how cryptocurrency has been and could be used to evade capital controls. This represents an update to the literature on capital control circumvention to include this new technology. I go on to survey the Argentine bitcoin ecosystem, concluding that it has not been harmed by the election of Macri and the opening of the economy. I engage in causal process tracing of this case to conclude that many factors, including, but not primarily, the presence of capital controls, coalesced to render Argentina fertile ground for the adoption of cryptocurrency technology (Beach and Pederson 2013).

In Section V, I summarize my conclusions about the efficacy of capital controls in an age of cryptocurrency technology. I also review my theories about regional drivers of cryptocurrency adoption. Finally, given that this is a highly exploratory analysis, I offer suggestions for further research.

II.

LITERATURE REVIEW

CAPITAL CONTROL EVASION

To discuss capital controls is to refer to a broad range of policies and instruments used to limit inflows or outflows to or from a jurisdiction. Capital controls can be used as short-term tools to fortify an economy in the face of cyclical instability. More frequently, they are employed as part of long-term monetary and fiscal strategy (Eichengreen and Rose 2014). Much debate surrounds appropriate uses of capital controls: in handling wage distortions, managing swift surges or declines in fund flows, manipulating terms of trade, or maintaining financial stability in the face of a liquidity crisis (Eichengreen and Rose 2014: 2). Over the last two decades, the pendulum of popularity surrounding capital controls has swung back and forth in both academic and policy arenas.

Before the desirability of capital controls can be debated, however, their efficacy must be addressed. Carvalho and Garcia (2006: 3) distinguish between *de facto* application of capital controls and their *de jure* imposition, positing that "developed and sophisticated financial markets present diverse substitute assets that may be used to engineer financial transactions that avoid part or all of the costs incurred by the capital controls." This has been a keenly studied area for the last two decades, particularly focusing on circumvention of capital controls in Latin America.

The literature of the late 1990's and early 2000's details many forms of financial innovation geared towards taking advantage of loopholes in evading capital controls. These include: disguising short term trades as foreign direct investment, relabeling fixed income

flows as equity investments, masking investments as export trading operations, financial engineering with derivatives, employing Box strategies (replicating a bond through options), and embedding put options in long-term bonds to render them short-term loans (Carvalho and Garcia 2006; Garcia and Valpassos 2000). Investors also make use of the blue chip swap, which entails the transfer of foreign assets to an offshore branch of a local financial institution, bypassing taxes on currency conversion (Carvalho and Garcia 2006: 26-27). Desai, Foley, and Hines (2005: Abstract) add to this list, outlining how "firms attempt to circumvent capital controls by reducing reported local profitability." Multinationals can relocate profits or alter their attribution in order to evade these regulations (Desai, Foley, and Hines 2005: 14). The use of ADRs, or locally traded shares of a foreign company, is another popular method. For example, as Auguste, et. al. (2005: 10) detail, in Argentina under the *corralito*, it was common for Argentines to buy local stocks, convert them into ADRs, and liquidate them in the United States. Based on their survey of various methods of evasion, Carvalho and Garcia (2006) conclude that the "market, then, appears to always find a means of circumventing restrictions placed on foreign capital, rendering capital controls ineffective in the medium term" (Carvalho and Garcia 2006: 31).

The investment community's creativity has evolved to find loopholes to exploit in evading capital controls. Simone and Sorsa (1999: 4) offer the illustrative example of Chile in the 1990's. The policy in place there from 1991 until 1998 was the unremunerated reserve requirement (URR), or the *encaje*, which was gradually expanded over time. Simone and Sorsa (1999: 12) propose that "the actual behavior of the individual components of capital inflows in Chile suggest a pattern of migration between covered and uncovered inflows in response to the various tightenings of the URR." For example, when the URR was extended

to include secondary ADRs, FDI flows accelerated. When FDI was brought under the URR, trade credits increased (Simone and Sorsa 1999: 12-13). All of this is to demonstrate that the financial sector will find ways to evade controls, no matter the degree of regulation in place.

Not only does capital control evasion seem to be inevitable, but this phenomenon may also be detrimental to the economy. Forbes (2007: 295-296) builds on this idea in her study of Chilean firms engaged in practices that allowed them to substantially avoid the *de jure* controls in place in the 1990's. She argues that capital controls unfairly punished small businesses that did not have the resources to evade the *encaje*. And this may not be the only negative economic outcome of capital controls and their accompanying circumvention. Carvalho and Garcia (2006: 31) say that the market's negative view of capital controls, which results in demanded interest rates and weaker investor sentiment, may hurt economies over the long term. Meanwhile capital controls are only effective until firms and investors innovate around them. As Garcia and Valpassos (2000: 181) put it, "the ways that are being found by the financial markets to circumvent the restrictions are responsible for its long run ineffectiveness."

Despite the resurgence in debate around capital controls among academics and policymakers, the literature on mechanisms of evasion has not been updated. Now, in addition to factors of financial engineering, accounting, and labeling practices, advancements in technology must also be considered in this conversation. In particular, it is crucial to seriously contemplate the role of decentralized, disintermediated, borderless assets. So, what is the role of cryptocurrency in capital control evasion?

BITCOIN APPLICATIONS AND ADOPTION

The topic of bitcoin as a means of avoiding capital controls has become a commonly cited use case of the technology. Dwyer (2014: 90), in his overview of the economics of bitcoin, concludes by highlighting that bitcoin can be used to avoid currency controls. As he suggests, governments can regulate exchanges that engage in bitcoin transactions, but cannot prevent peer-to-peer use of cryptocurrency. He suggests that while use of bitcoin in foreign exchange flows is "hardly zero marginal cost, the marginal benefit to the purchaser can be substantially greater than the marginal cost" (Dwyer 2014: 90). He points in particular to the case of Argentina, where dollar-sniffing dogs are employed to prevent cross-border currency flows (Martinez-Carter 2012 cited in Dwyer 2014: 90).

The potential to use bitcoin to evade capital controls, especially in Argentina, is also explored by Hileman (2014) in his Bitcoin Market Potential Index, which ranks the potential utility of bitcoin by country. Like Dwyer, he highlights that bitcoin can "be used to circumvent capital controls, restrictions on ownership of gold and foreign banknotes, or other forms of financial repression" (Hileman 2014: 3). He uses 40 variables that span measures of inflation, black markets, remittances, technology penetration, financial crises, financial repression, and bitcoin penetration (Hileman 2014: 5-6). Hileman's work on where bitcoin is most applicable is of interest to a wide variety of individuals and institutions, as evidenced by the United Nations' citation of the index in their own investigation of bitcoin and blockchain applications (Scott 2016: 6).

As the first attempt at such a measurement, Hileman's index is groundbreaking. However, he relies on preconceived assumptions about how people and institutions across a global range of cultures and economies will collectively want to use this technology. While

this positivist approach is admirable insofar as it attempts to generate macro level insights, it does not consider context. Bitcoin arguably represents very different things to people in different circumstances. It is therefore problematic to study its adoption inductively. At this early stage of research, a more contextualized approach is needed to understand how bitcoin has been and might be used differently in each country or situation (Reed 2010; Beach and Pederson 2013).[7]

It is necessary first to be deductive in examining the determinants of bitcoin adoption. It is not enough to say that bitcoin could be used to evade capital controls and therefore the presence of capital controls is a driver of potential bitcoin use. Rather, the relationship must first be established. A thorough analysis of existing and emerging cryptocurrency applications is necessary, lest the academic, policymaking, or business community overestimate a factor of adoption or overlook a driver altogether.

Viglione (2015) theorizes about one potential factor in examining regional bitcoin dynamics. He looks at cross-country differences in bitcoin prices and hypothesizes that the cryptocurrency is more expensive in areas with limited economic freedoms, particularly foreign exchange and capital controls. Viglione finds a correlation between bitcoin premiums and various metrics of economic freedoms. For example, a 10 point improvement in the Investment Freedoms Index lowers premiums by 5.1 percent (Viglione 2015: 15).

Viglione's attempts to quantify bitcoin interest by country offer several useful theories. However, he is misguided in using local bitcoin price to do so. He does not account for off-chain and off-exchange transactions. Where markets are illiquid, many bitcoin

[7] See, in particular, Beach and Pederson (2013: 12) on case-centric process tracing: "instead of attempting what is perceived to be the mission impossible of building and testing law-like generalizations, we should instead adopt a form of instrumentalism aimed at accounting for outcomes in particular cases."

exchanges take place in person, meaning that the traded price will not be documented. Furthermore, price versus a given currency does not necessarily mean that the transaction took place locally. Because many of the countries he examines do not have mature bitcoin infrastructure that could enable such trades, the trades he studies likely have been executed by speculators outside of the country (Papageorgiou 2016).

Viglione (2015: 17) mentions that "the most extreme data comes from Argentina." He ends up omitting this outlier data from parts of his analysis. He mentions in his robustness analysis that he did not account for the parallel exchange rate that exists in Argentina. While capital controls were in place there, the dollar traded locally at a premium to the official exchange rate.[8] This is a common phenomenon in countries with these kinds of controls. If Viglione failed to account for this, then the premiums he found may simply be comparable to those versus the US dollar or other hard currency.[9] It is necessary to examine bitcoin usage and adoption from other angles beside price.

Substantial speculation exists about the uses of bitcoin, yet little satisfactory analysis has yet been undertaken to explore this area. Hileman and Viglione both offer pioneering proposals for this study. I intend to build upon and answer their arguments. I intend for my research to serve as a foundational framework for how deductive research in this slippery area might be undertaken.

[8] In practice this is still the case. See page 36.
[9] In fact, anecdotally, locals allege that bitcoin traded cheap to the blue dollar, or unofficial, rate (Amati, interview, 4 April 2016).

III.

METHODS

In analyzing possible trends and relationships between bitcoin adoption and capital controls, I take a deductive, qualitative approach based on interview with market players. While I initially embarked on a quantitative analysis attempting to model this relationship, I discovered that attempting rigorous quantitative analysis on such a nascent area of research was premature. There is still work to be done in developing thoughts and theories about bitcoin use cases and adoption before empirical testing should be done. Furthermore, there are many data-related challenges that arise in quantitatively examining cryptocurrency, which by definition masks information about the user. Therefore, I adopt a qualitative approach, focusing on the case study of Argentina. This choice is appropriate given Argentina's economic history, the attention it has received for its adoption of cryptocurrency, and its unique current political dynamics. I base my conclusions on expert interviews, in the spirit of the literature on capital control circumvention.[10]

CRITIQUE OF QUANTITATIVE METHODOLOGY

Here, I confront the data issues that the quantitative methodology presents. I do so to provide a foundation for future research on the subject and also to serve as a justification for my case study approach. The Bitcoin protocol was built to hide the identity and accompanying metadata of the user. As such, it is by design infeasible to accurately trace the

[10] See Forbes (2012) and Carvalho and Garcia (2006).

geographic location of transactions.[11] In order to trace bitcoin penetration, therefore, it is necessary to utilize proxies. Proxies could include social media mentions (Twitter, Facebook groups), attendance at bitcoin meet-ups, number of local merchants accepting bitcoin, venture capital funding towards cryptocurrency-related businesses, number of regional nodes, count of software downloads, and data from Google trends.

Social media mentions and RSVPs to meet-ups might provide good barometers of on-the-ground sentiment surrounding cryptocurrency. However, these present the practical hurdle of needing a web scraper to glean accurate data derived from a given jurisdiction. Furthermore, this is problematic in areas that have more limited personal freedoms or are intolerant of cryptocurrency. In some of the areas where bitcoin might have the most significant use cases, authorities may be the least tolerant of social media freedoms. Thus interest in or demand for the technology would not be captured through this sort of metric.

Measuring bitcoin adoption based on the number of local vendors using the technology is problematic insofar as it makes assumptions about how bitcoin is being used. Given the wide range of use cases that are still emerging, it is reductive to assume that retail use in brick-and-mortar shops is necessarily a relevant metric of adoption, let alone interest.

Using venture capital funding towards local cryptocurrency start ups as a proxy poses several issues. Many start ups, once they have gained sufficient traction and funding, relocate from their home countries to areas with better resources or more friendly regulation. For example, the largest bitcoin start up to grow out of Argentina, Xapo, is based in Silicon Valley and Switzerland. Additionally, innovation and its accompanying funding demand much more than local interest in order to succeed. Thus, examining the numbers behind a

[11] See Meiklejohn et al. (2016) for attempts at this sort of analysis of other bitcoin metadata. Her work may eventually offer accurate geographical data.

local start up scene is not necessarily illustrative when looking for use cases of the technology.

The location of nodes, or the servers that mine bitcoin and keep the network functioning, is available thanks to the work of Addy Yeow and the Bitnodes site, supported by 21.co. However, given that the average bitcoin user will not be engaged in mining, this does little to illuminate where and why cryptocurrency adoption is taking place. Node count is also problematic because this is often linked to other drivers. For example, Venezuela is thought to have a significant number of nodes because of the cheap availability of energy, and therefore electricity, there (Amati, interview, 4 April 2016). Similarly, software downloads by geographic location, while accurately available, do not reflect mainstream use of the technology, given the proliferation of web- or mobile-based exchange and wallet services that do not necessitate use of the software.[12] If a relationship could be established between software downloads and overall adoption, then this metric would be useful, but this cannot be achieved without proprietary data.

PROPOSALS FOR QUANTITATIVE METHODOLOGY

The best publicly available option for representing bitcoin interest is Google trends. This is the method often adopted by the media in demonstrating a rise in interest in bitcoin coming out of a certain country, particularly if it has experienced a recent change in financial regulation or undergone an economic shock. Caution must still be used in this approach, however. Following imposition of capital controls, for example, an uptick in media mentions of bitcoin may follow given the popularity of the theory linking the two. There may then be a

[12] For use of this metric in the media, see Wells (2013) in the Wall Street Journal.

correlation between imposition of capital controls and Google searches for bitcoin, when in reality the causal mechanism lies in media mentions of the technology as opposed to adoption of it.

Volume of bitcoin traded against various local currency crosses would be a good metric to use. However, many trades are either done on exchanges that hold those volumes as proprietary information or in person, off exchange. The media and academia have both proposed that there may be a relationship between both local and global bitcoin price and capital controls.[13] For my purposes of examining interest in bitcoin, price is not an appropriate indicator. While the local bitcoin exchange rate may reveal something about the supply and demand dynamics of the cryptocurrency, the asset is so illiquid and, generally, adoption has been so thin, that it is problematic to try to use this to demonstrate anything about local interest.[14] Many of the areas that ought to be researched do not have the necessary infrastructure to grant material access to bitcoin purchases (Papageorgiou 2016). As such, it is unlikely that substantial local volumes would drive price action. Indeed, if there is any correlation between global bitcoin price and capital controls, it is more likely to be driven by speculators and increased media attention rather than local demand for the cryptocurrency.

Making a robust quantitative assessment of a correlation between bitcoin use and capital controls would involve dealing with the aforementioned issues surrounding accurate proxies. Furthermore, it would demand an in-depth analysis of any endogeneity issues, controlling for everything from GDP to Internet penetration. With appropriate data and

[13] For discussion of local BTC price, see Viglione (2015). For global BTC price fluctuations, see media example from Kelly 2015; Perez 2015a; Farrell 2013; Christensen 2013; Cox 2013.
[14] See my critique of Viglione (2015) on page 20.

resources, such an analysis could be successfully executed by conducting a principal component analysis for bitcoin penetration, looking for anomalous activity. This analysis would use a combination of appropriate proxies for bitcoin interest, including those detailed above, clustered by country. These would represent the principal components, the proxies having been transformed into a dataset of linearly uncorrelated variables that highlight the variation along one axis (Wright 2015). Wright (2015) uses this approach to deductively explore drivers of Tor usage (another identity-masking software), seeking anomalies in use patterns in a time series analysis segmented by country. I believe that this can and should be researched with regard to bitcoin. I intend for this level of rigorous empirical study to follow on from the preliminary research I present here.

CASE STUDY APPROACH

At this early stage of theory-development a qualitative approach is desirable. My research relies on interviews and observation from my fieldwork in Buenos Aires, Argentina to glean how bitcoin can be and has been used. I use this data to test the theory that the technology has been employed to circumvent capital controls and to propose new theories about adoption.

Argentina provides a good combination of factors in examining whether capital controls and bitcoin penetration can be linked. Since Argentina's default and crisis in 2001, and its ensuing freeze on bank accounts, nicknamed the *corralito*, the country has pursued isolationist economic policies (Dominguez and Tesar 2009: 317). Measures including controls on capital outflows and a pegged exchange rate were hallmarks of the economic policy of Nestor Kirchner, and then his wife Cristina, from 2003 until 2015. In December of

2015, however, Mauricio Macri assumed the presidency and moved swiftly to lift these restrictive policies. He allowed the currency to float and began alleviating limitations on buying and selling foreign currency (Stevenson 2016).

Argentina has one of the most active bitcoin ecosystems in the emerging world. The country has gained much attention for being an outlier on this front. Hileman (2014) ranked Argentina at the top of his Bitcoin Market Potential Index. In his assessment of bitcoin's relationship to financial freedoms, Viglione (2015) related bitcoin's outperformance in Argentina to the country's restrictive policies. Downer (2014) analyzed the number of bitcoin-accepting sites in Buenos Aires and found it came out ahead of regional comparisons, as well as the likes of New York City.

I focus on Argentina not only because I wish to engage in this debate, but also due to the timing of this research. It was during the course of this study that President Macri took office and moved to liberalize the economy, providing a good natural experiment to test whether presence of capital controls has an impact on interest in bitcoin.

In order to study this phenomenon, I conducted open-ended interviews with market players. These included Argentine entrepreneurs operating both locally and globally, currency brokers, and public and private sector economic analysts. Given the niche nature of the topic, and the relatively small number of players in the space, I used snowball sampling, identifying and speaking with several Argentine cryptocurrency experts who then put me in touch with others. This approach may have resulted in a biased sample, a problem that I have tried to mitigate by seeking and including a diversity of actors who might represent varying viewpoints. Finding an expert on cryptocurrency, who is not also an enthusiast, did prove a major challenge to this approach. It is important to acknowledge that, by virtue of the fact

that the interview subjects are involved in or knowledgeable about cryptocurrency, they are more likely to be proponents of it or to portray a positive picture.

In the course of these interviews, I explore whether trends in bitcoin interest or adoption have shifted since the election of Macri. I investigate user trends on local wallet and exchange platforms. This data is largely proprietary, but through the course of interviews with the CEOs of these companies, I gained information about the growth of their businesses and client base, as well as insights on the sentiment surrounding the technology locally. I use their thoughts on their company's experiences, their observations of cryptocurrency use cases, and their interactions with Argentina's economic policies to conduct both theory-testing and theory-building process tracing analyses (Beach and Pederson 2013; Tansey 2007). I test whether the removal of capital controls is associated with a decline in use of bitcoin and I develop new theories for why bitcoin has experienced acceptance in Argentina.

IV.

CASE STUDY: ARGENTINA

Argentina's thriving bitcoin ecosystem and its history of capital controls are often linked. Anecdotal evidence points to use of cryptocurrency in Argentina in circumventing capital controls. The presence of these policies has been credited with creating the right conditions for Argentina's adoption of the technology (Hileman 2014; Popper 2015; Matonis 2013; Wells 2013; Brito and Castillo 2013: 17). In order to explore whether these relationships hold, I first give an overview of Argentina's recent economic history. Then, I explain how bitcoin has been linked to evasion of capital controls. Finally, I provide an overview of the current situation there and conclude that the connection between bitcoin and capital controls has been accorded excessive focus.

ECONOMIC BACKGROUND

As any economist will agree, a full overview of Argentina's economic woes is (far) beyond the scope of this paper. However, some degree of context is necessary to understand the unique relationship that Argentine individuals and businesses have with money and with their government.

In the early 1990's, Argentina stabilized its economy under the administration of Carlos Menem, guided by minister of economy Domingo Cavallo. They crafted the Convertibility Plan, which pegged the peso to the US dollar in order to curb the rampant inflation plaguing the economy (Dominguez and Tesar 2009: 300). They started to bring down the high tariffs and trade barriers that had insulated the country for decades

(Dominguez and Tesar 2009: 301). Finally, they privatized and deregulated many industries that had fallen under the interventionist policies of the previous administrations (Dominguez and Tesar 2009: 301). These measures encouraged foreign investment and helped reboot economic activity (Dominguez and Tesar 2009: 301).

However, in the decade that followed, one emerging market after another fell prey to a variety of economic shocks, from Mexico, to Asia, to Russia. Each of these had a spillover effect on the newly open Argentine economy (Dominguez and Tesar 2009: 305). Brazil's devaluation in 1999 was the death knell for Argentina as the country's trading position weakened and it was all but shut out of international capital markets (Dominguez and Tesar 2009: 310). As Argentina suffered these external shocks, its domestic fiscal and monetary situation exacerbated the issue (Dominguez and Tesar 2009: 314).

Given the dollar peg, Argentina had very little leeway to adjust monetary policy in the face of crisis. Volatility ensued and, in 2001, Argentine banks started to see large outflows (Dominguez and Tesar 2009: 317). In December of that year, the government imposed the *corralito,* a set of capital controls that dramatically limited withdrawals and halted transfers abroad (Dominguez and Tesar 2009: 317). A month later, the peso was devalued and all private funds held in dollars were pesofied (Dominguez and Tesar 2009: 317). Dominguez and Tesar (2009: 318-319) point out that the one area of the economy that did not collapse in the wake of this crisis was the stock market, and attribute this to the use of ADRs in capital control evasion. As Auguste, et al. (2005: 10) detail, Argentines could still use their funds to buy Argentine stocks, which could then be converted to ADRs and liquidated in the US for dollar proceeds. This represents one of many forms of financial innovation that has occurred in this country in the face of repressive policies.

While the *corralito* ended in 2002, economic challenges persisted for over a decade, resulting in increasingly desperate responses by the government. Nestor Kirchner, a populist who was elected in 2003, and his successor and wife Cristina, both pursued interventionist policies, isolating the country from the IMF and the capital markets. Both administrations were characterized by high import barriers and export tariffs, limits on dollar purchases, manipulated inflation statistics, frozen debt markets, and multiple exchange rates (Stevenson 2016). They maintained an official, pegged peso-dollar rate, leading to the development of the "blue dollar" or black market exchange rate. The blue dollar was the rate that one would receive in exchange for US dollars through unofficial channels, as on the famed Calle Florida in Buenos Aires, where unregulated exchange agents operate illegally, offering much better terms than any local bank.

Between high inflation, stringent cross-border controls, and the history of pesofication, the origins of Argentine *dolarmanía* are obvious (Martinez-Carter 2012). As one Argentine bitcoin entrepreneur told me: "You cannot hold the peso. That is like holding an ice cream cone in this heat. It's melting. You need to do something" (Bari, interview, 6 April 2016).

BITCOIN IN ARGENTINA

Alternatives to the peso come in many forms in Argentina. Hard currency, ADRs, financial derivatives, dollar denominated bonds, and property all serve as methods of diversification away from the local currency. While it still only enjoys relatively scarce adoption, bitcoin has increasingly been explored as an additional alternative.

As of 2015, Argentina was one of ten emerging markets to boast venture capital-backed bitcoin start ups and was ranked number ten globally in terms of funding (Hileman 2015). The country has also fielded one of the most successful and vocal proponents of the cryptocurrency, Wences Casares. Casares became an outspoken advocate of bitcoin within the country, initiating the first "bitcoin meet-up" there in 2012 and going on to found Xapo, one of the major global bitcoin wallet start up companies (Popper 2015). In the three years since the first meet-ups occurred, a host of companies running bitcoin exchanges, wallets, and related services have developed a strong presence in the country.

Inflation and barriers to international exchange feed the desire of Argentina's economic actors to look for alternative currencies. Both of these have been widely cited as reasons for bitcoin's relative popularity in Argentina. Both, however, deserve more scrutiny.

Bitcoin and Inflation

With regard to inflation, there is little evidence—empirical, anecdotal, or otherwise—that indicates this is a direct driver of bitcoin interest. Among the industry players I spoke to, all denied witnessing substantial use of cryptocurrency as an inflation hedge, saying that people were more likely to pay up for US dollars instead. Given the historically high volatility of bitcoin, it is not intuitively a good replacement even for a peso suffering 25% annual inflation. That having been said, high inflation and an overall sense of distrust in the government and central bank likely fuel the underlying national psychology that is conducive to the adoption of an alternative currency.

BITCOIN AND CAPITAL CONTROLS

If not as a store of value, then is bitcoin being used as a means of cross-border transaction in Argentina?

Notable among the local Argentine start ups is BitPagos, a financial services company that enables local businesses to accept international payments via bitcoin. The company is geared towards businesses that wish to transact with international clients, offering an online solution amidst the financial and bureaucratic frictions of accepting cross-border transfers (Serrano, interview, 5 April 2016). As Popper (2015) describes it, this mechanism "circumvents the onerous government restrictions on receiving money from abroad."

A business operating in Argentina seeking to receive money from abroad can have the client purchase bitcoin with their local currency and transfer the value in the form of bitcoin to the business' wallet. From there, the business operator can liquidate the bitcoin using an exchange or broker and receive the local currency. BitPagos offers a payment processor that facilitates this by allowing customers to transact using credit cards and providing an exchange on which businesses can liquidate the bitcoin (Serrano, interview, 5 April 2016). BitBookings (the company's payment gateway) clips a small fee for each transaction—about 1.5%—but eliminates the taxes, the paperwork, and the discount between the official and true exchange rates that would normally accompany such a transaction (Serrano, interview, 5 April 2016). This method appeals in particular to hotels and tourist agencies, freelancers located in Argentina, and small businesses exporting goods. The reverse of this could also be adopted by businesses relying on imports or by Argentine individuals making purchases from foreign companies or freelancers.

Argentine bitcoin exchanges have kept their transaction sizes relatively small, both incidentally and by design. Most of the clients of start ups like BitPagos were only looking to execute small size transactions, as in the case of hotels. Businesses or individuals looking to move larger amounts efficiently were more likely to turn to more conventional, more liquid mechanisms, such as financial derivatives (Serrano, interview, 5 April 2016).

While most transactions were retail in nature, larger players did explore the technology for performing more sizable cross-border transactions. Another of the major bitcoin start ups in Argentina, Satoshitango, was approached by a large, mainstream, multinational corporation with the intention of transferring 10 million US dollars from Argentina to another Latin American subsidiary (Bari, interview, 6 April 2016). Satoshitango researched the possibility, but ultimately declined to execute the transaction. This was in part due to the illiquidity of bitcoin: such a large operation would flood the market (Bari, interview, 6 April 2016). Additionally, however, the exchange did not want to push the limits of tolerance of the government and central bank (Bari, interview, 6 April 2016). This suggests that bitcoin use in capital control evasion has not been executed in substantial size. However, the possibility is there, and this does raise issues of global economic governance for policymakers to consider.

Argentina, like most countries, has not yet adopted a clear legal stance on virtual currency. In 2013, the Argentine Central Bank issued a statement making it clear that neither they nor any other international institution issues or guarantees any virtual currency (Banco Central de la República Argentina 2016). They included in this statement a warning about the volatility of these types of assets (Banco Central de la República Argentina 2016). Finally, the Central Bank stated their awareness of the potential for virtual currency to be used in

fraud and money-laundering (Banco Central de la República Argentina 2016). These kinds of statements have become *de rigeur* for Central Banks around the world. While these warnings do nothing to cast bitcoin and its peers in a positive light, they can actually benefit the local bitcoin ecosystem by virtue of the fact that a governmental authority is acknowledging, but not banning, the use of the technology (Serrano, interview, 5 April 2016; Amati, interview 4 April 2016).

The Argentine government under the Kirchners was known for its demonstrations of enforcement of economic regulations. Dollar-sniffing dogs roamed the ports to Uruguay seeking smugglers attempting to bring cash out of the country (Martinez-Carter 2012). Authorities periodically shut down unofficial currency exchange houses and brokers (Mander 2015). In this context, it is clear why bitcoin exchanges would be incentivized to keep transaction sizes small despite the technology being perfectly legal, lest they become victims of their own success.

MACRI ADMINISTRATION AND ECONOMIC LIBERALIZATION

Mauricio Macri, the conservative mayor of Buenos Aires, was elected president over the Kirchner-backed candidate in October of 2015. In the weeks after he was inducted into office, he moved swiftly to lift many of the financial restrictions that had been the hallmark of previous administrations (Stevenson 2016). He unified the exchange rate with a managed float, bringing the rate in line with the blue dollar, amounting to an effective devaluation of the official rate by 30% (Stevenson 2016). He also eliminated export duties, lifted restrictions on cross-border capital movements, and granted companies and individuals the ability to purchase up to 2 million US dollars per month (KPMG 2015). All of this has led

commentators on and actors in the Argentine economy to laud Macri as heralding a new era of economic liberalization.

Some of the sentiment among the people, however, remains cynical. A walk down Calle Florida reveals that an unofficial dollar exchange rate continues to exist. For example, in April 2016, the official rate was 14.30 pesos per dollar, but an unofficial rate of 16 to 17 pesos per dollar was still on offer. This represents a much smaller spread than was common under the Kirchners (which at times traded at over 50%), but serves to demonstrate a persisting degree of skepticism among the general population.

Testing the Relationship: Bitcoin and Capital Controls

Still, Macri's reforms are significant. Capital control regimes very rarely change (Eichengreen and Rose 2014). As such, the shift in policy in Argentina creates a unique opportunity to conduct a natural experiment examining the impacts of the policy change on the use of bitcoin.

The relevant data to explore these changes from a quantitative perspective is all either proprietary, owned and protected by the exchanges and companies operating in the space, or is obfuscated by the pseudonymous nature of bitcoin. As such, insights on changes in bitcoin interest and use can only be accurately derived from qualitative exploration of the ecosystem.

Based on the theory that the closed economic system drove bitcoin adoption throughout the country, cryptocurrency start ups in Argentina steeled themselves for a downturn in growth following the election of Macri (Bari, interview, 6 April 2016). However, the three largest bitcoin exchanges in the country all reported stable or growing volumes since the handover of power (Bari, interview, 6 April 2016; Serrano, interview, 5

April 2016; Bruno, interview, 6 April 2016). Satoshitango said that volumes had grown 30% each month in the second half of 2015 and had stayed stable from December 2015 through April 2016 (Bari, interview, 6 April 2016). BitPagos and Bitex.LA also reported growth across the board, but did not disclose numbers (Serrano, interview, 5 April 2016; Bruno, interview, 6 April 2016).

Despite the company's assertion that they have seen continued growth, BitPagos acknowledged that the arbitrage opportunity that part of its business model was predicated on is gone (Serrano, interview, 5 April 2016). The company's growth may then indicate that the presence of capital controls was not the main driver behind the business. Alternatively, just as the parallel exchange rate persists six months after the change in policy, it may be that there is a time lag effect at play in adjustments to local bitcoin use.

It may also be the case that the change in administration has actually been a positive catalyst for bitcoin in Argentina. Macri has indicated a friendly stance toward the technology, which might encourage new users to try using it or might embolden start ups to expand or enter the space. The president posted on his Facebook page about a meeting he held with Richard Branson, in which they discussed the possibilities of bitcoin (Macri 2016). It was also during his tenure as mayor of Buenos Aires that the first bitcoin forum was held in one of his government buildings (Singh and Vega 2016). The change in government power, then, brings with it more shifts to the dynamics of the cryptocurrency landscape than solely those of economic policy.

The situation is complicated by several competing factors influencing the cryptocurrency dynamics in Argentina. It is challenging to draw concrete conclusions without much reliable data. However, based on this exploratory review, removal of capital

controls has not, in the short term, had the expected accompanied decline in bitcoin use. This could be because, once infrastructure and awareness of the technology has taken hold, interest is sticky. It could also be because the association between bitcoin and capital controls has been overestimated.

ALTERNATIVE THEORIES AND CONCLUSIONS

It is necessary, then, to explore alternative use cases for the technology and devise new theories about the factors that catalyze bitcoin adoption. In Argentina, inflation and capital controls may have played a role in constructing the bitcoin ecosystem, but the emphasis on these factors both oversimplifies the causal mechanisms at play and overlooks other relevant considerations. Some of the other factors involved in Argentina are levels of taxation, degree of government corruption, and a history of multiple currency regimes.

Regulatory conversations surrounding bitcoin have touched lightly upon tax evasion, but generally this issue has not received the same degree of attention as know-your-customer, anti-money laundering, or capital control concerns (He et al. 2016: 30). Dwyer (2014: 90-91) posits that bitcoin is "likely to undermine government's ability to generate revenue," but does not make this case in relation to tax levies. Rather, he points to the use of bitcoin in evading other forms of financial repression: the conventionally cited phenomena of high inflation and capital controls. Viglione (2015: 13) considers bitcoin use in relation to tax burden, but tests this based on local bitcoin premiums. He finds that "investors in countries with higher resource confiscation via taxation are willing to pay more for bitcoin than investors in lower tax countries" (Viglione 2015: 13). While his methodology is problematic, this does give due recognition to the possible use of bitcoin as a means of tax evasion.

This theory would certainly be applicable in Argentina, where the total corporate tax rate is 137% of profits, by far the highest among the 140 countries studied by the World Economic Forum and the only instance of a country's tax rate coming in over 100% (Schwab 2016). The personal income tax rate is graduated, but because the bands have not been changed in line with inflation, nearly all individuals fall under the highest level at 35% (Devereux 2016). Evasion of taxes, then, could be a critical part of the story behind bitcoin's popularity.

It is not only the high tax rate that would serve as an incentive to turn to methods of evasion. Another factor involved is disillusionment with the government and institutions. For a country that is highly developed in many respects, Argentina generally ranks poorly in global corruption indices.[15] The Kirchner administration has been publicly accused of tax evasion and embezzlement (Mander 2016). Such scandals have bred an attitude of distrust of institutions and a psychology of irreverence in Argentina. Cynicism, as much as opportunities for arbitrage, may contribute to the relative prevalence of bitcoin interest in Argentina.

Another element of context that may render Argentines predisposed to acceptance of cryptocurrency is the historical presence of multiple currency regimes. This may seem obvious, but is worth stating as it has not been mentioned in any other works assessing popularity of bitcoin. In the 1990's, Argentines could hold both US dollars and pesos in their bank accounts and could use either interchangeably in personal and business transactions. While this convention ended in the early 2000's, Argentines have remained accustomed to thinking in terms of both US dollars and pesos, given the high levels of inflation and the

[15] Most recently ranked 107 out of 168 countries by Transparency International (2016).

existence of the blue dollar rate (Bruno, interview, 6 April 2016). Use and adoption of money is largely based on trust. Given Argentina's history, the psychological step to trusting a new form of currency is relatively smaller than it is elsewhere.

The story of Argentina's relationship with cryptocurrency is much broader than inflation and capital controls. To reduce it to those two factors, or to apply undue focus and research in those areas, is to miss some of the critical use cases of cryptocurrency and causes for bitcoin adoption in the country.

V.

CONCLUSION

Cryptocurrency has witnessed a new wave of interest in 2015 and 2016. Bitcoin was the world's top performing currency in 2016 (Hileman 2016). Venture capital investment in the space doubled in 2015 (Hileman 2016). Every major investment bank is formally exploring its underlying technology and its possible impact on the financial industry (Hileman 2016). Whether this technology goes mainstream or remains on the periphery, its existence has the potential to compromise the enforcement, and therefore the efficacy, of economic regulation.

Based on my analysis of Argentina, I conclude that the media and academia have overstated the relationship between cryptocurrency and capital controls. While cryptocurrency was used in retail-sized transactions to evade some of the country's economic regulations, it is unlikely that this amounted to any substantial circumvention of the controls. As such, the presence of capital controls should not be viewed the chief driver behind Argentina's interest in bitcoin. Rather, economic policy may be one component of a larger collection of factors, including tax rate, perceptions of corruption, and a history of multiple currencies and exchange rates.

I intend for my work on Argentina to serve as a model for conducting country-based analysis of cryptocurrency use. This model can be applied to other jurisdictions that have received attention for bitcoin adoption or that demonstrate interesting use cases of the technology. This kind of deductive analysis will yield the development of further theories surrounding where and why the technology has become relevant or prevalent. Case studies of other countries can serve as points of comparison, to test if theories hold up across cultures

and contexts. Further research in this vein will offer a better understanding of the combinations of factors that either galvanize or impede acceptance of cryptocurrency. Only with this insight can use cases of cryptocurrency be accurately identified and can related regulatory concerns be addressed.

One example of a possible comparative case study is Brazil. Brazil has much in common with Argentina in terms of geographic location and its recent history of financial repression, leftist governments, economic turbulence, and issues of institutional corruption. While Brazil's cryptocurrency landscape has not seen the sort of development or press that has characterized Argentina's, this appears to be changing. In 2015, Coinbase, a major international bitcoin wallet provider and exchange, saw a 400% rise in usership out of the country (Hileman 2016). This coincided with increasingly public allegations of corruption against high-ranking politicians in the Brazilian government. A study of uses and perceptions of bitcoin in Brazil may corroborate the hypothesis that adoption and corruption are linked. This exploration may also lead to new theories about cryptocurrency use and interest.

The hypotheses deduced from case study based research eventually ought to be tested quantitatively. Ideally, some of the closely guarded proprietary information held by wallet and exchange companies will be made available for this kind of empirical analysis. In the meantime, using an appropriate combination of proxies, a principal component analysis grouped by country could both test existing theories and help to generate insights on more opaque use cases and factors surrounding adoption.

Use of and interest in cryptocurrency remains little understood. What is clear is that this technology promises both the possibilities and the perils of true global financial integration. Whether taken as a means of economic empowerment or an enabler of illicit

operations, cryptocurrency's potential applications will have important implications for global economic governance. In order to prepare for these, it is necessary to begin by exploring the present drivers of adoption and interest from the ground up.

Word Count: 10,610

BIBLIOGRAPHY

ADRIANOVA, A. (2016) "Bitcoin Users Would Face Jail Under Russian Cryptocurrencies Law," *Bloomberg*, 28 April. Available at: <http://www.bloomberg.com/news/articles/2016-04-28/russian-law-would-send-bitcoin-users-to-jail-as-cybercriminals> (accessed 24 May 2016).

AMATI, F. (2016) Interview, 4 April 2016, Buenos Aires, Argentina.

AUGUSTE, S., DOMINGUEZ, K., KAMIL, H., and **TESAR, L.** (2005) "Cross-Border Trading Mechanism for Implicit Capital Flight: ADRs and the Argentine Crisis," Gerald R. Ford School of Public Policy Discussion Paper 533, Ann Arbor, Michigan.

BANCO CENTRAL DE LA REPÚBLICA ARGENTINA (2016) *Comunicación al public en general: Monedas Virtuales* [online]. Available at: <http://www.clientebancario.gov.ar/> (accessed 24 May 2016).

BARI, M. (2016) Interview, 6 April 2016, Buenos Aires, Argentina.

BARNATO, K. (2015) "Greece could soon get 1,000 bitcoin ATMs," *CNBC,* 19 August. Available at: < http://www.cnbc.com/2015/08/19/greece-could-soon-get-1000-bitcoin-atms.html> (accessed 24 May 2016).

BEACH, D. and **PEDERSON, R. B.** (2013) *Process-Tracing Methods: Foundations and Guidelines*, Ann Arbor, Michigan: University of Michigan Press.

BLOOMBERG (2013) "China Bans Financial Companies From Bitcoin Transactions," 5 December. Available at: <http://www.bloomberg.com/news/articles/2013-12-05/china-s-pboc-bans-financial-companies-from-bitcoin-transactions> (accessed 24 May 2016).

BRITO, J. and **CASTILLO, A.** (2013) *Bitcoin: A Primer for Policymakers*, Arlington, Virginia: Mercatus Center, George Mason University.

BRUNO, C. (2016) Interview, 6 April 2016, Buenos Aires, Argentina.

CARVALHO, B. and **GARCIA, M.** (2006) "Ineffective Controls on Capital Inflows Under Sophisticated Financial Markets: Brazil in the Nineties," National Bureau of Economic Research Working Paper 12283, Cambridge, Massachusetts.

CHRISTENSEN, N. (2013) "2013: Year Of The Bitcoin," *Forbes*, 10 December. Available at: < http://www.forbes.com/sites/kitconews/2013/12/10/2013-year-of-the-bitcoin/#258818c12295> (accessed 24 May 2016).

COX, J. (2013) "Bitcoin Bonanza: Cyprus Crisis Boosts Digital Dollars," *CNBC*, 27 March. Available at: < http://www.cnbc.com/id/100597242> (accessed 24 May 2016).

DARWISH, M. (2015) "Greece's Cash Crisis is Bitcoin's Boost," *Bloomberg*, 8 July. Available at: < http://www.bloomberg.com/news/articles/2015-07-08/greece-s-cash-crisis-is-bitcoin-s-boost-ibuhh68t> (accessed 24 May 2016).

DESAI, M., FOLEY, C., and **HINES, J.** (2005) "Capital Controls, Liberalizations, and Foreign Direct Investment," Harvard Business School Negotiations Organizations and Markets Working Paper 04 (24), Cambridge, Massachusetts.

DEVEREUX, C. (2016) "Argentina's Macri Gives Tax Breaks as Inflation Quickens," *Bloomberg*, 18 February. Available at: < http://www.bloomberg.com/news/articles/2016-02-18/argentina-s-macri-gives-income-tax-breaks-as-inflation-quickens> (accessed 24 May 2016).

DOMINGUEZ, K. and **TESAR, L.** (2009) "International Borrowing and Macroeconomic Performance in Argentina," 297-348 in Edwards, S., (ed.), *National Bureau of Economic Research Conference Report: Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences,* Chicago, Illinois, University of Chicago Press.

DOWNER, J. (2014) "How Bitcoin is Thriving in Argentina's Black Market Economy," *CoinDesk*, May 6. Available at: < http://www.coindesk.com/bitcoin-thriving-argentinas-black-market-economy/> (accessed 24 May 2016).

DWYER, G. (2014) "The economics of Bitcoin and similar private digital currencies," *Journal of Financial Stability* 17 (2015): 81-91.

ECONOMIST (2014) "Bitcoin in Argentina: If it can't make it there," 12 June. Available at: <http://www.economist.com/blogs/schumpeter/2014/06/bitcoin-argentina> (accessed 24 May 2016).

EICHENGREEN, B. and **ROSE, A.** (2014) "Capital Controls in the 21st Century," *Journal of International Money and Finance* 48 (2014): 1-16.

FARRELL, M. (2013) "Bitcoin prices surge post-Cyprus bailout," *CNN*, 28 March. Available at: < http://money.cnn.com/2013/03/28/investing/bitcoin-cyprus/> (accessed 24 May 2016).

FORBES, K. (2007) "One cost of the Chilean capital controls: Increased financial constraints for smaller traded firms," *Journal of International Economics* 71 (2007): 294-323.

FORBES, K., FRATZSCHER, M., KOSTKA, T., and **STRAUB, R.** (2012) "Bubble Thy Neighbor: Portfolio Effects and Externalities from Capital Controls," National Bureau of Economic Research Working Paper 18052, Cambridge, Massachusetts.

GARCIA, M. and **VALPASSOS, M.** (2000) "Capital Flows, Capital Controls, and Currency Crisis: The Case of Brazil in the Nineties," 143-191 in Larraín, F., (ed.), *Capital Flows, Capital Controls, and Currency Crises: Latin America in the 1990s*, Ann Arbor, Michigan, University of Michigan Press.

HE, D., HABERMEIER, K., LECKOW, R., HAKSAR, V., ALMEIDA, Y., KASHIMA, M., KYRIAKOS-SAAD, N., OURA, H., SEDIK, T. S., STETSENKO, N., and **VERDUGO-YEPES, C.** (2016) "Virtual Currencies and Beyond: Initial Considerations," International Monetary Fund Staff Discussion Note 16 (03).

HIGGINS, S. (2016) "California Bankruptcy Judge Says Bitcoin is Property, Not Currency," *CoinDesk*, 22 February. Available at: <http://www.coindesk.com/bankruptcy-judge-bitcoin-property-currency/> (accessed 24 May 2016).

HILEMAN, G. (2013) "Alternative Currencies: A Historical Survey and Taxonomy," Centre for Macroeconomics, London School of Economics.

_____ (2014) "The Bitcoin Market Potential Index," Centre for Macroeconomics, London School of Economics.

_____ (2015) "State of Bitcoin and Blockchain Q3 2015," *CoinDesk,* 15 October. Available at: < http://www.coindesk.com/research/state-of-bitcoin-q3-2015/> (accessed 24 May 2016).

_____ (2016) "State of Bitcoin and Blockchain 2016," *CoinDesk,* 27 January. Available at: < http://www.slideshare.net/CoinDesk/state-of-bitcoin-and-blockchain-2016-57577869> (accessed 24 May 2016).

INSOMNIA (2015) "Οδηγός αποφυγής capital control με το Bitcoin" [online forum]. Available at: < http://www.insomnia.gr/topic/575019-info-οδηγός-αποφυγής-capital-control-με-το-bitcoin> (accessed 24 May 2016).

KELLY, J. (2015) "Fearing return to drachma, some Greeks use bitcoin to dodge capital controls," *Reuters*, 3 July. Available at: < http://www.reuters.com/article/us-eurozone-greece-bitcoin-idUSKCN0PD1B420150703> (accessed 24 May 2016).

KPMG (2015) "Argentina: New government eliminates restrictions on cross-border transfers, export duties" [online]. Available at: < https://home.kpmg.com/xx/en/home/insights/2015/12/tnf-argentina-new-government-eliminates-restrictions-on-cross-border-transfers-export-duties.html> (accessed 24 May 2016).

KRUGMAN, P. (1999) "The Return of Depression Economics," *Foreign Affairs* 78 (1): 56-74.

MACRI, M. (2016) "Con Sir Richard Branson" [Facebook], 22 January. Available at: < https://www.facebook.com/mauriciomacri/posts/10153939507798478:0> (accessed 24 May 2016).

MANDER, B. (2015) "Argentine small businesses turning to bitcoin," *Financial Times* July 19. Available at: < http://www.ft.com/intl/cms/s/0/b2a8cca4-2c11-11e5-8613-e7aedbb7bdb7.html#axzz48SOIBkBi> (accessed 24 May 2016).

_____ (2016) "Anti-corruption tide reaches Argentina," *Financial Times*, May 19. Available at: < http://www.ft.com/intl/cms/s/0/e0de4f00-1daf-11e6-b286-cddde55ca122.html#axzz49POiWRwW> (accessed 24 May 2016).

MARTINEZ-CARTER, K. (2012) "Argentina's dollar-sniffing dogs," *Bloomberg Business Week* January 12.

MATONIS, J. (2013) "Bitcoin's Promise in Argentina," *Forbes* April 27. Available at: < http://www.forbes.com/sites/jonmatonis/2013/04/27/bitcoins-promise-in-argentina/#1ac7ea3c2af5> (accessed 24 May 2016).

MEIKLEJOHN, S., POMAROLE, M., JORDAN, G., LEVCHENKO, K., MCCOY, D., VOELKER, G. M., SAVAGE, S. (2016) "A fistful of Bitcoins: characterizing payments among men with no names," *Communications of the ACM* 59 (4): 86-93.

NAKAMOTO, S. (2008) *Bitcoin: A Peer-to-Peer Electronic Cash System*. Available from: < https://bitcoin.org/bitcoin.pdf> [accessed 24 May 2016].

PAGLIERY, J. (2015) "Greeks are rushing to Bitcoin," *CNN*, 29 June. Available at: < http://money.cnn.com/2015/06/29/technology/greece-bitcoin/> (accessed 24 May 2016).

PAPAGEORGIOU, G. (2016) Personal communication via e-mail on bitcoin use in Greece and Cyprus, February 25.

PETRAKIS, M. and **ROOT, V.** (2015) "What are Greece's Capital Controls?" *Bloomberg*, June 29. Available at: < http://www.bloomberg.com/news/articles/2015-06-29/what-are-greece-s-capital-controls-> (accessed 24 May 2016).

PEREZ, Y. (2015a) "Bitcoin's Price Rise Explained By Industry Insiders," *CoinDesk*, 31 October. Available at: < http://www.coindesk.com/bitcoins-price-rise-explained-by-industry-insiders/> (accessed 24 May 2016).

_____ (2015b) "Interpol Creates Digital Currency to Study Crypto Crime," *CoinDesk*, 20 April. Available at: <http://www.coindesk.com/interpol-creates-digital-currency-study-crime/> (accessed 24 May 2016).

POPPER, N. (2015) "Can Bitcoin Conquer Argentina?" *New York Times*, April 29. Available at: < http://www.nytimes.com/2015/05/03/magazine/how-bitcoin-is-disrupting-argentinas-economy.html?_r=1> (accessed 24 May 2016).

REED, I. (2010) "Epistemology Contextualized: Social-Scientific Knowledge in a Postpositivist Era," *Sociological Theory* 28 (1): 20-39.

ROGOFF, K. (2014) "Costs and benefits to phasing out paper currency." Paper delivered at NBER Macroeconomics Annual Conference, 11 April 2014, Cambridge, Massachusetts.

SCHWAB, K. (ed.) (2015) "The Global Competitiveness Report: 2015-2016," *World Economic Forum*, Geneva, Switzerland.

SCOTT, B. (2016) "How Can Cryptocurrency and Blockchain Technology Play a Role in Building Social and Solidarity Finance?" United Nations Research Institute for Social Development Working Paper 2016 (1), Geneva, Switzerland.

SERRANO, S. (2016) Interview, 5 April 2016, Buenos Aires, Argentina.

SIMONE, F. and **SORSA, P.** (1999) "A Review of Capital Account Restrictions in Chile in the 1990s," International Monetary Fund Working Paper 99 (52).

SINGH, S. and **VEGA, A.** (2016) "Why Latin American economies are turning to bitcoin," *TechCrunch*, 16 March. Available at: < http://techcrunch.com/2016/03/16/why-latin-american-economies-are-turning-to-bitcoin/> (accessed 24 May 2016).

STEVENSON, J. (ed.) (2016) "Argentina: a good start for Macri," *Strategic Comments* 22 (1): iv-vi.

TANSEY, O. (2007) "Process Tracing and Elite Interviewing: A Case for Non-Probability Sampling," *PS: Political Science and Politics* 40 (4): 765-772.

TRANSPARENCY INTERNATIONAL (2016) "Corruption by Country/Territory" [online]. Available at: < https://www.transparency.org/country/#ARG_DataResearch> (accessed 24 May 2016).

VIGLIONE, R. (2015) "Does Governance Have a Role in Pricing: Cross-Country Evidence from Bitcoin Markets," Department of Finance, Darla Moore School of Business, University of South Carolina.

WELLS, G. (2013) "Bitcoin Downloads Surge in Argentina," *Wall Street Journal* July 17. Available at: < http://blogs.wsj.com/moneybeat/2013/07/17/bitcoin-downloads-surge-in-argentina/> (accessed 24 May 2016).

WOLLA, S. (2012) *Functions of Money: The Economic Lowdown.* [podcast] The Federal Reserve Bank of St. Louis. Available at: < https://www.stlouisfed.org/education/economic-lowdown-podcast-series/episode-9-functions-of-money> (accessed 24 May 2016).

WORLD ECONOMIC FORUM (2016) "Davos 2016—The Transformation of Finance" [online video], 20 January. Available at: <https://www.youtube.com/watch?v=JwkC8WaN5T4> (accessed 24 May 2016).

WRIGHT, J., DARER, A., and **FARNAN, O.** (2015) "Detecting Internet Filtering from Geographic Time Series," *Cornell University Library,* [under submission].