

Anonymity or Speculation?

Risks and sources of legitimacy for virtual currencies

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Abstract. Is Bitcoin mainly a speculative instrument or a tool for protecting the anonymity? This paper investigates virtual currencies with a double aim: first to identify and analyze the individual and organizational risks associated with their increasing diffusion; second to understand if they can be interpreted as instruments for anonymity or instruments for speculation.

The research follows a mixed method approach: qualitative and anecdotal evidences are analyzed to identify the risks in the diffusion of virtual currencies, whereas a quantitative analysis is performed to investigate if Bitcoin is mainly an instrument to support anonymity or to foster speculation by measuring risk-adjusted performance and volatility.

The empirical findings will show that in a first phase Bitcoin's risk-adjusted performance, and especially volatility, are much higher than for any other financial instrument (even the more speculative ones), thus suggesting the prevalence of anonymity as a driver of their diffusion. In a second phase, Bitcoin's risk-adjusted performance becomes similar to the one of speculative investments (hedge funds and private equity) rather than traditional currencies thus suggesting the prevalence of speculation as a driver of their diffusion. Interpreting these findings we are also able to draw organizational conclusions about the evolution of Bitcoin and its (distributed) source of legitimacy.

Keywords: virtual currency, e-currency, Bitcoin, risks, volatility, risk-adjusted performance, organizational impact

WOA Topic: PROCESSES: Information Systems & Innovation

1. Purpose of the Paper

The main aim of the paper is to investigate the sources of legitimacy for virtual currencies, and particularly whether Bitcoin can be interpreted as an instrument for anonymity or as an instrument for speculation. Relatedly, we explore the main risks associated with a wide diffusion of virtual currencies among organizations and people.

Based on qualitative examples, we investigate the risks associated to the diffusion of decentralized virtual currencies. The three episodes concern the use of Bitcoins for illegal activities (Episode 1: Silk Road and Silk Road 2.0), the risks associated to the virtual currency intermediaries (Episode 2: the crack of MtGox, one of the main virtual currency platform exchange), and the role of public perception over the solidity of the virtual currencies related business (Episode 3: the premature interruption of Bitcoin St. Petersburg Bowl sponsorship and its consequences).

From these qualitative evidences, the two main drivers for the diffusion of Bitcoin appear to be substantially different from traditional currencies. Specifically anonymity and speculation seem to play a main role (Landau, 2014). Therefore, our econometrical analysis aims to investigate such two dominants drivers. In short we aim to answer the following research question: is Bitcoin an instrument for anonymity or for speculation?

2. Theoretical Background: Virtual Currency Definition

The European Central Bank defined virtual currency as "a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community" (ECB 2012). The European Bank Authority refined its explanation as "a digital representation of value that is neither issued by a central bank or a public authority, nor necessarily attached to a fiat currency, but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically" (EBA 2014). US Department of Treasury adopted a broader definition: "a medium of exchange that operates like a currency in some environments, but does not have all the attributes of real currency" (USDT 2013).

The use of virtual currency has become so pervasive that major financial institutions as FED and ECB have raised their attention on the phenomenon trying to identify its characteristics, limits and risks. The diffusion and the potential impact of virtual currencies call for a deeper understanding of their nature, value and models both from an organizational and an information system perspective. While money can support a virtually unlimited number of purposes, its use can be defined according to three main functions: a trade facilitator (medium of exchange); a measure of value (unit of account); and a saving mean (store of value) (ECB 2012). Virtual currency and the traditional currencies present several risks, and some of them overlap (as showed in Table 1 below).

Market Risk	Adverse movements in market prices (CPSS 2001)
Credit Risk	A borrower default on debts by failing to make required payments (BIS 2000)
Liquidity Risk	Liquidity is associated with the flows among central bank, commercial banks, and market. The liquidity risk refers to the inability of a financial agent to complete these flows (Nikolaou, 2009)
Operational Risk	The risk of a change in value caused by the fact that actual losses differ from the expected losses (BIS 2000)
Technological Risk	A technological failure that causes unexpected losses (can also be a specific case of operational risk)
Systemic Risk	Risk of collapse of an entire financial system or entire market (Kaufman 2000)

Table 1. Risks associated with traditional and virtual currencies (Nikolaou 2009, Kaufman 2000, Chong et al. 2012)

Other risks, specific for virtual currencies, can be added to the previous list:

NEWNESS - Virtual currency is a new instrument. People and organizations cannot rely on their past experiences to deal and use it, but they need learning skills and a set of trials and errors to understand its nature and characteristics.

TRUST – The diffusion of a this new form of payment and financial instrument requires a huge amount of trust because virtual currencies are built as distributed instruments, without having any institution or government to support or guarantee them. Thus, the virtual currency owner assumes herself the risk that tomorrow the virtual currency will simply disappear or that nobody will accept her digital money.

ANONIMITY – Most of the virtual currency are designed in order to guarantee (or at least increase) the anonymity during the transactions. While this is often seen as an answer to the control of governments over internet, anonymity also creates a system in which criminal use of virtual currency is more than just a theoretical potentiality (see in our analysis Episode 2). Thus, customers are exposed to higher risks (respect to traditional currencies) maybe compensate with other advantages, like higher level of anonymity and lower costs of transaction (Nakamoto, 2008). Among the virtual currencies, since has been developed in 2009 Bitcoin is the market leader with a 71% of market share (see Table 2 below).

<i>Virtual Currency</i>	<i>Volume of Transactions (\$)</i>	<i>Market Share</i>
Bitcoin	10.167.800,00	71,8%
Litecoin	1.216.550,00	8,6%
Dogecoin	231.297,00	1,6%
BitcoinDark	228.665,00	1,6%
Monero	228.089,00	1,6%
OTHER 95 v.c.	2.080.773,00	14,8%

Table 2. Source: <https://coinmarketcap.com/> (12pm July 21st, 2014 to 12pm July 22nd 2014), see Bolici e Della Rosa 2014.

Bitcoin is a decentralized (no third parties are involved in the process of creation, exchange and supervision of any transaction) private digital currency traded online via a peer-to-peer network. It is based on a proof-of-work, a principle to artificially impose transaction costs in the absence of a payment system. To prevent double spending there is a consensus on a temporal ordering of transactions. This way, the current owner of a Bitcoin can always be determined. This temporal order is established by what is called a *blockchain*. Bitcoin, as most of the virtual currencies, showed an extreme volatility but also an astonishing rise in its exchange price in the long term: in 2010 its value was USD 0,0041 while in July 2014 its price was over USD 610 (the highest value ever reached was USD 1124.76 on 29 November 2013). Considering the ECB classification of virtual currencies schemes on the base of their interactions with traditional money and economies, Bitcoin belongs to the type 3 “virtual currency schemes with bidirectional flow”. In order to trade in Bitcoins, a user can buy and sell the virtual currency, exchanging traditional currencies (USD, Euro, etc.), through a virtual currency exchange platform.

3. Research Gap

The research on Bitcoin is still very dispersed and often focused more on the technical issues (blockchain, security, etc.) rather than on the impact of such instruments over organizations and the financial system (Barber et al. 2012, Mier et al. 2013). We are aiming to first clarify the role and characteristics of Bitcoin among the financial instruments, and then to investigate the main risks associated to its organizational model and diffusion.

As Landau (2014) states: “The currency is at present attractive for two reasons. One is anonymity, which makes it suitable for tax evasion and money laundering. This will not last; authorities are already wising up. The other is pure speculation. Bitcoins are the tulips of modern times. The mania is not yet over. But the longer it lasts, the more investors are likely to be burnt.”

Surprisingly, however, there is no empirical evidence on whether anonymity or speculation is the driver of the diffusion of Bitcoin. Our paper aims to fill such a gap.

4. Research Approach and Methods

Given the complexity and multidisciplinary of the investigated topic (the diffusion of an innovative *financial* instrument following a distributed and multi-level *organizational* model based on a new *technological* environment and system), involving both technical and soft areas, we decided to follow a mixed-method approach (Creswell and Plano Clark 2007, Teddlie and Tashakkori 2009). “Mixed methods research is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumption and theoretical frameworks” (Creswell 2013 p.4).

We had two main research aims: to (i.) qualitatively identify the main risks associated to virtual currencies and their behavior as financial instruments in order to (ii.) econometrically investigate the two main risks associated to their diffusion.

The first aim is addressed through the support of anecdotal episodes. We identify three episodes that can highlight the main risks associated to the diffusion of Bitcoin into the system.

The second aim is addressed by investigating Bitcoin’s risk-adjusted-performance (Sharpe ratio and Jensen alfa) and volatility (estimated through GARCH and TGARCH models), and by comparing them with other currencies and financial investments (from traditional to speculative). In the analysis we use daily observations from the period 1 August 2010 and 1 August 2014. Specifically, we employ for the financial instruments: the indexes for the stock market (S&P 500), bond market (W1G7 and JGAGGUSD), commodity (SPGSCI), hedge fund and private equity (HFRXLG); for the currencies: the exchange rate XBT-USD. For all time series non-trading days are excluded. Data are taken from Bloomberg.

5. Main findings and Contributions

The virtual currency system is attracting more and more interest, both in business and academia. While the idea of developing non-traditional money is not innovative, nowadays the environment seems to be ready to embrace the challenge of a new currency system, from a business, social and technological point of view. The risks of the diffusion of such financial instruments have to be carefully addressed in order to avoid negative impact on organizations and individuals. In this exploratory paper we aimed to provide a more accurate look into the phenomenon, focusing on some of the characteristics and potential failures of the system. We identified some of the risks linked to the use of the most common virtual currency in the market: Bitcoin.

First, we will investigate three anecdotal episodes that will support our identification of different risks associated with the diffusion of virtual currencies. The three episodes concern the use of Bitcoins for illegal activities (Episode 1: Silk Road and Silk Road 2.0), the risks associated to the virtual currency intermediaries (Episode 2: the crack of MtGox, one of the main virtual currency platform exchange), and the role of public perception over

the solidity of the virtual currencies related business (Episode 3: the premature interruption of Bitcoin St. Petersburg Bowl sponsorship and its consequences).

Following on, an econometrical analysis will investigate the two main risks (anonymity vs. speculation). Interestingly, the empirical findings will show that in a first phase Bitcoin's risk-adjusted performance, and especially volatility, are much higher than for any other financial instrument (even the more speculative ones), thus suggesting the prevalence of anonymity as a driver of their diffusion. In a second phase, Bitcoin risk-adjusted performance becomes similar to the one of speculative investments (hedge funds and private equity) rather than traditional currencies (see Fig1 – Fig4), thus suggesting the prevalence of speculation as a driver of their diffusion. Such a second phase only occurs since when central banks (ECB, FED, etc.) started to show a clear interest in these financial instruments.

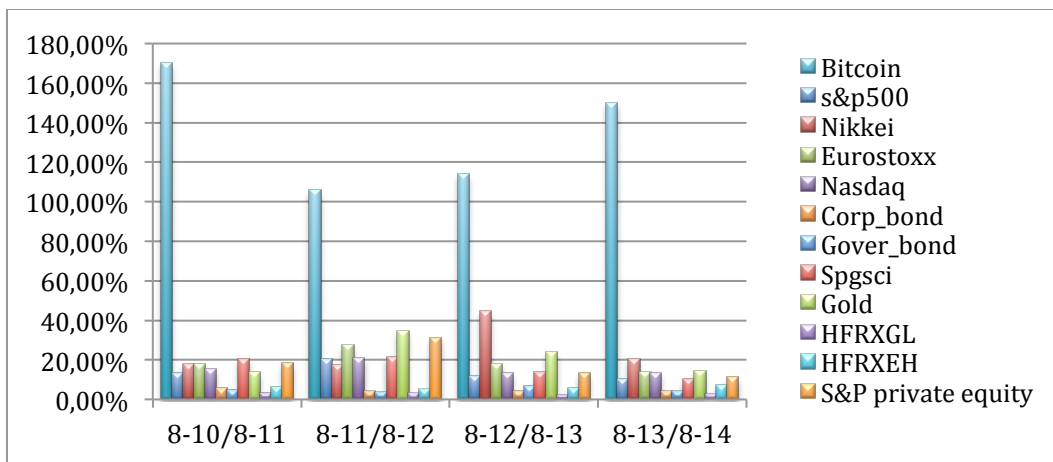


Fig. 1 Annual volatility for Bitcoin and financial investments over 2010-2014

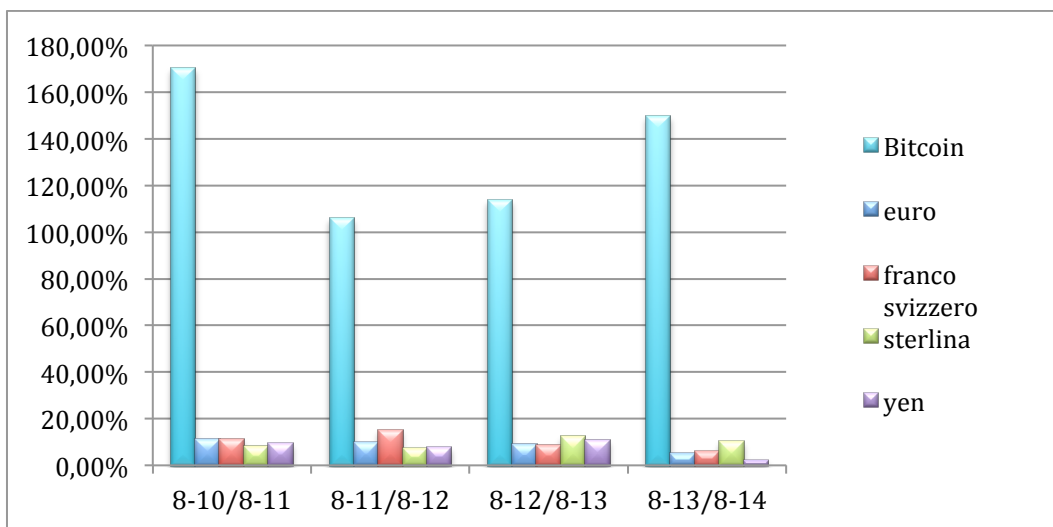


Fig. 2 Annual volatility for Bitcoin and currencies over 2010-2014

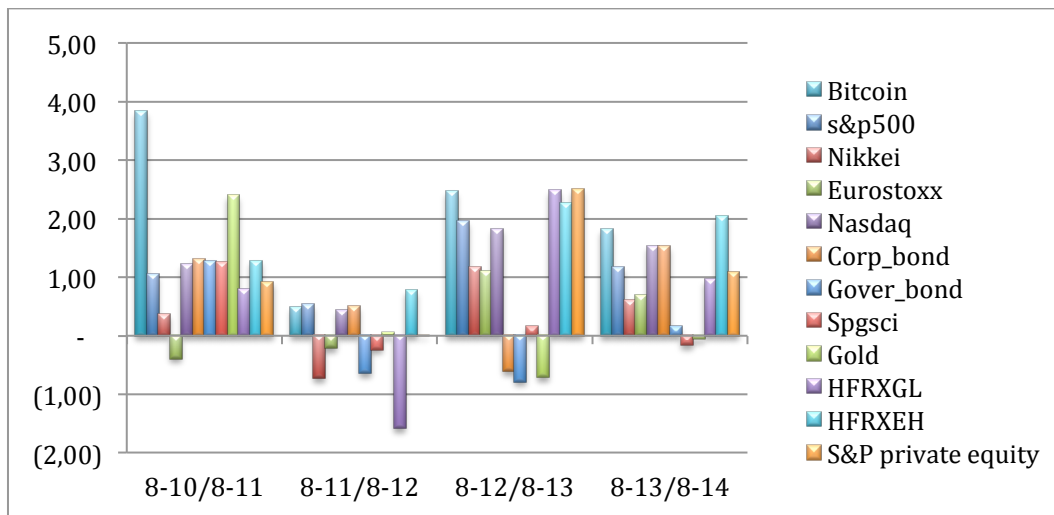


Fig. 3 Annual Sharpe ratio for Bitcoin and investment instruments over 2010-2014

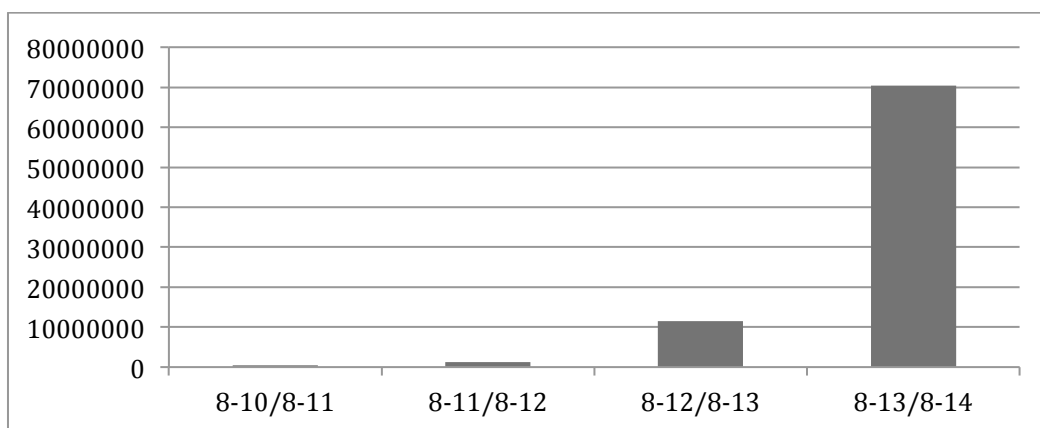


Fig. 4 Annual transaction volumes for Bitcoin over 2010-2014

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