

# Bitcoin: The Early Market

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## ABSTRACT

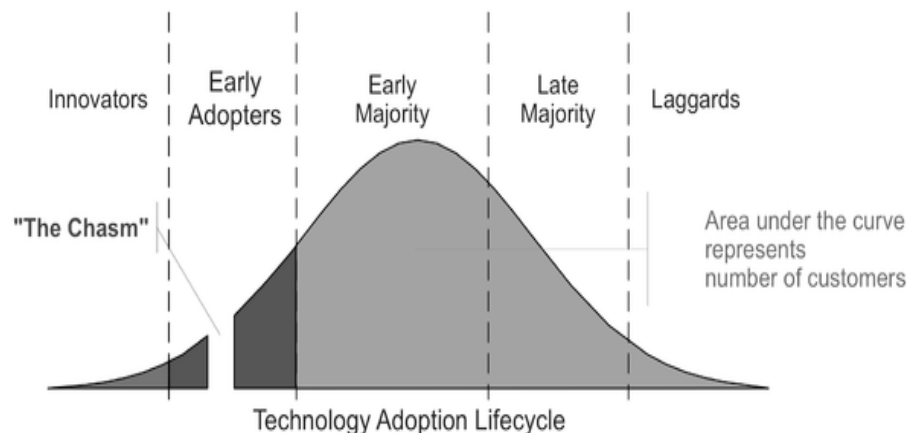
*Bitcoin is a decentralized virtual crypto currency that has attracted attention from technologists, economists, consumers, regulators, black marketeers, venture capitalists and Wall Street commentators to name a few. While many debate issues such as whether or not bitcoin is money, how might it ultimately be regulated and whether or not it represents a truly disruptive innovation, this paper examines the current landscape of bitcoin and identifies some of the early adopters and significant events that have contributed to this unfolding phenomenon.*

**Keywords:** Bitcoin; Cryptocurrency; Regulation; Money; Venture Capital

## INTRODUCTION

The year 2013 proved to be eventful for bitcoin. Prices of bitcoin were volatile, digital wallets were hacked, hearings were held, regulatory guidance was given, a Tesla was purchased and wall street analysts published research opinions. As events continue to unfold academics, governments, consumers, venture capitalists and regulators are waiting to see whether we are witnessing the emergence of a disruptive innovation on par with the internet itself or another speculative bubble akin to tulip mania and beanie babies. Moore (2014) offers an adaptation to the technology adoption cycle coming out of the diffusion of innovations literature (Rogers, 1962) for high tech marketing that identifies five stages of technology adoption and their participants summarized in Figure 1: (1) Innovators (2) Early Adopters (3) Early Majority (4) Late majority and (5) Laggards. While the process of technology adoption may be modeled as a continuous process unfolding along a normal distribution as innovations move through time and communications channels, Moore posits that for disruptive technologies defined as those that require behavioral change on the part of users that there is a discontinuity between the early market comprised of innovators and early adopters and the larger most profitable mainstream market. This discontinuity is referred to as the chasm. Although bitcoin is an open source technological protocol, there are plenty of private for profit start ups seeking to capitalize on what they clearly believe to be a disruptive technology. This paper characterizes the early bitcoin market and delineates significant events that occurred during 2013 and the first quarter of 2014.

**Figure 1.** Moore's Technology Adoption Life Cycle, Craig Chelius (2009) Wikimedia Commons



## **BACKGROUND**

### **The Ecosystem**

The Bitcoin protocol was espoused under the pseudonym Satoshi Nakamoto (2008) by an unknown author in a seminal paper describing a system in which digital currency is created within a peer to peer network. The Bitcoin ecosystem relies upon a decentralized network to verify transactions and a public ledger known as the block chain in order to prevent double spending. Network participants are referred to as miners and are responsible for confirming transactions and are rewarded by receiving new Bitcoin. The first Bitcoins were mined by using computing power to solve mathematical problems that must still be solved as part of the confirmation process. Growth in the monetary base is fixed and governed by the rate at which network participants can add transactions to the block chain. According to the parameters built into the system the last Bitcoin will be created in 2140. For an introductory primer from the Federal Reserve Bank see Velde (2013). For a narrated overview on how the system works see khanacademy.com. Although the system was proposed as a form of digital cash Bitcoin has been referred to as a fiduciary currency, synthetic commodity money, and as a speculative investment.

### **Purported Benefits**

Proponents of the system tout many of its attributes<sup>1</sup>. Compared to the current methods employed for international money transfers and traditional payment systems the bitcoin protocol offers faster and less expensive means to accomplish similar ends. Transactions fees are paid directly to the network as part of the incentive for miners to confirm transactions. Transactions fees are lower than the fees associated with traditional payments systems and there are no chargeback risks for merchants. International transfers can be completed in minutes or hours compared to days. Fees for international remittances which may run as high as 15% via traditional methods are drastically reduced. From a consumer's point of view creating a digital wallet is far less time consuming than opening a traditional bank account and requires no personally identifying information. Therefore there is no personal identification stored with merchants who receive bitcoin payments. The system has been analogized with email. Parties to a transaction have a public address visible on the block chain, but payment may only be made by combining a private key with the public address. Additional perceived benefits include sheltering currency from seizure, the fixed rate of money supply growth and the benefits of a transparent public ledger system.

### **Known Risks**

There are many risks associated with bitcoin that must be overcome if the technology is ever to cross Moore's chasm. To name a few there are global uncertainties surrounding regulation, exchange failures and outright thefts from digital wallets, reluctance from traditional banks to provide support for entrepreneurs and users, technological issues and competing alternative virtual currencies<sup>2</sup>. Additionally, price volatility contributes to speculative trading and hoarding.

## **THE EARLY MARKET**

### **Core Metrics**

There is little debate over the fact that Bitcoin is in its infancy. However there has been some phenomenal growth. Wallace (2011) reports the first 50 Bitcoin were mined in 2009 and the first transaction was an exchange involving 10,000 bitcoins, an intermediary and two pizzas. The first bitcoin exchange, Mt.Gox opened in 2010 and 20 bitcoin were exchanged for less than \$1. Table 1 reports the US Dollar market capitalization of bitcoin, estimated dollar transaction volume over time, total bitcoin in circulation and mining revenue per day. Market cap is reported as of August 17, 2010. Bitcoin reached its highest reported market cap in December 2013 at \$13.9B. As of May 2014 the compound annual growth rates in market cap, estimated dollar transactions and mining revenue were 370%,

<sup>1</sup> Coindesk.com.

<sup>2</sup> Mt. Gox had USD accounts at Wells Fargo seized in the U.S. on May 16, 2013 and ultimately filed for bankruptcy in Japan on February 28, 2013. Because there are low barriers to entry there are competing digital currencies such as Ripple, Litecoin and Dogecoin. bitcoin remains in the forefront as a result of its first mover advantage.

392% and 828% respectively. All values are reported as of August 17 of the reported year with the exception of 2014 where values are reported as of May 14, 2014.

**Table 1.** Market Capitalization, Estimated Dollar Transaction Volume And Bitcoin In Circulation

	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Market Capitalization (\$)	287,933	79,868,400	149,657,200	1,138,079,589	5,670,834,348
Estimated Dollar (\$) Transaction Volume/Day	3712	712,430	3,341,881	10,907,886	50,863,294
Total Bitcoins in Circulation	3,744,250	7,068,000	9,718,000	11,567,025	12,768,100
Mining Revenue/Day (\$)	503.65	72,964	110,572	462,826	1,782,107

Source: Blockchain.info

### **Innovators and Early Adopters**

The early market is comprised of innovators and early adopters. Innovators pursue new technologies aggressively and are usually alpha and beta testers. They are technologists who help debug innovations and their approval influences early adopters. Innovators include bitcoin core developers and entrepreneurs building technology businesses around bitcoin. These include bitcoin financial services, exchanges, investment vehicles, payment processing, digital wallet hosting, mining hardware manufacturing, mining pools, mobile application development and many more. A listing of bitcoin core developers and contributors can be found at <https://bitcoin.org/en/development>.

Bitcoins were initially mined without any transactions to confirm, so miners received bitcoin by solving mathematical problems and adding zero transaction blocks to the block chain. As a result, early miners were able to obtain bitcoin with comparatively low computing power. As more and more computing power is used to mine for bitcoin the difficulty associated with adding blocks to the block chain increases so the rate of bitcoin creation occurs on average every 10 minutes. In this case early miners/innovators have incentives to promote the ecosystem as the value of their initial holdings increase as more and more users adopt the system. The resulting bitcoin wealth inequality is well documented. Of the approximately 12 million bitcoins in circulation 47 individuals hold 28.9%; 880 individuals hold 21.5%; 1,000 individuals holds 21.48%; 1 million individuals hold 20.7% and 7.42% have been lost. Some early adopters are so fervent they have been labeled “bitcoin evangelists”.

Early adopters are less technologists and more enthusiasts that envision applying new technology to their businesses. They arrive at the decision to do so on their own as opposed to relying on established references to do so. In order to illustrate the rate of adoption in the early market, select proxy measures of adoption are reported in Table 2. The measures reported include the growth in the monthly number of members subscribed to the online discussion board Reddit's subreddit dedicated to bitcoin, the number of listings added to the bitcoin directory coinmap.org, the number of client downloads necessary to run the full bitcoin software, the number of daily tweets that mention bitcoin and the growth in the number of merchants using the bitcoin merchant processing firm Coinbase.

Table 2. Selected Adoption Metrics

Selected Adoption Metrics					
Month/Year	Reddit Subscribers	Coinmap	Client Downloads	Daily Tweets	Coinbase Merchants
<b>2013</b>					
January			1,880,228	626,763	
February			1,991,601	652,931	
March	18,162		2,105,171	705,460	
April	35,716		2,597,435	1,022,314	
May	41,047		2,917,673	1,268,824	
June	43,861		3,220,961	1,445,994	
July	45,935	125	3,396,141	1,583,185	
August	47,575	*	3,480,890	1,751,614	
September	50,238	326	3,612,907	1,930,019	
October	53,364	441	3,705,037	2,126,145	
November	66,763	655	3,875,514	2,346,446	12,000
December	87,936	1,827	4,557,801	3,043,710	16,000
<b>2014</b>					
January	97,630	2,700	4,782,969	3,955,063	20,000
February	106,862	3,181	4,971,950	4,709,674	23,000
March	114,780	3,642	5,007,717	5,683,826	26,000
April	118,113	4,125	5,024,926	6,693,162	28,000
May	120,227	4,342	5,032,661	7,309,646	30,000
<b>Compound Annual Growth</b>	353%	4,695%	100%	466%	381%

\* data not available

Source: Bitcoinpulse.com

### A CHRONOLOGY OF EVENTS: 2013-1Q THROUGH 2014

From September 18, 2011 to January 6, 2013 bitcoin increased in dollar value from \$4.81 to \$13.63. Although this represents a significant return for innovators, price volatility increased in 2013 as prices rose as high as \$1216 on November 30, 2013. There were a number of events associated with price swings and they fall into different types of categories. Events can be categorized broadly as (1) regulatory, (2) early adoption, (3) venture funding and (4) risk events. A search was performed on Lexis Nexis Academic on the term “Bitcoin” from January 1, 2013 through May 14, 2014. A total of 6,325 results were found.

#### January Through June 2013

During the six months from January 8, 2013 bitcoin prices fluctuated from a low of \$13.60 on January 8 to a high of \$217 on April 10. Table 3 summarizes meaningful events while Figure 2 provides a timeline. Over this period Bitcoin prices peaked during the banking crisis and subsequent bank account seizures that took place in Cyprus. Popular press accounts relate the spike in prices to Cypriots Russians trying to move money out of the country. However, the high trading volume and frenetic activity heavily stressed the infrastructure of Mt. Gox and there was a subsequent price crash that followed. Bitcoin prices settled around \$110 at the end of June. Table 3 lists selected events over this time period and categorizes their impacts. In venture funding the year began with Bitcoin payments processor Bitpay announcing it had received \$510,000 in initial funding with a second announcement on June 24 that it had received another \$2M. Coinbase, a competing service announced it had received \$5M in funding from seasoned venture capitalists on May 8. On March 18 FINCEN announced that it would regulate Bitcoin exchanges like money transmitters implying that exchanges would be required to conform to Know Your Customer (KYC) and Anti Money Laundering (AML) laws. On June 24 the California Department of Financial Institutions send a letter to The Bitcoin Foundation requesting that it cease money transmission in the state. It is interesting to note The Bitcoin Foundation does not engage in any exchange activity. There were numerous websites announcing that they would accept Bitcoin including Reddit.com and Mega.com. Cameron and Tyler Winklevoss, whom had settled a claim against Facebook founder Mark Zuckerberg disclosed they held around \$11M in Bitcoin. During this

<sup>3</sup> Bitcoin prices were widely reported from Mt. Gox as it was the initial online exchange for Bitcoin. Mt. Gox recently filed for bankruptcy, for consistency historical prices are quoted from the Bitstamp exchange via bitcoinity.org.

time period there were threats and risks to Bitcoin adoption. Mt. Gox had its US based accounts seized at Wells Fargo and was fighting a denial of service attack. On June 22 Mt. Gox suspended USD withdrawals. Bitfloor, a competing exchange, had its accounts closed by Capital One Bank and stories surfaced regarding Bitcoin's role on the black market website Silk Road. Figure 3 shows Bitcoin price fluctuations during the period.

**Table 3.** Selected Events January 8, 2013 Through June 24, 2013

<b>Date</b>	<b>Event</b>
January 8	Payment Processor Bitpay receives \$510,000 in funding (venture funding)
January 27	Article entitled 'Drugs, Guns, Credit Cards-Everything is for sale' published (risk)
February 15	Social news and entertainment site Reddit.com accepts bitcoin (adoption)
February 19	Website Mega to accept bitcoin (adoption)
February 27	Article titled 'Underweb anger as Silk Road Seller Does A Runner' published (risk)
March 18	FINCEN Announces Bitcoin exchanges will be regulated like money transmitters (regulatory)
March 26	Cyprus gets world's first Bitcoin ATM (adoption)
April 3	Online wallet service Instawallet discloses theft and shuts down (risk)
April 4	Mt. Gox reports a ddos attack (risk)
April 11	Mt. Gox halts trading after bitcoin prices plummet (risk)
April 11	Dealbook Reports Tyler and Cameron Winklevoss own \$11m in Bitcoin (adoption)
April 19	Bitcoin Exchange Bitfloor shuts down after Capital One closes accounts (risk)
May 7	Bitcoin payment processor Coinbase receives \$5M in funding (venture funding)
May 16	Mt. Gox accounts at Wells Fargo are seized by the department of Homeland Security (risk)
May 16	Payment Processor Bitpay receives \$2M in funding (venture funding)
June 20	Mt. Gox suspends withdrawals in USD (risk)
June 23	California Department of Financial Institutions warns The Bitcoin Foundation to cease money transmission operations in the state (risk)

Figure 2. Timeline of Selected Events From January 2013 Through June 2013

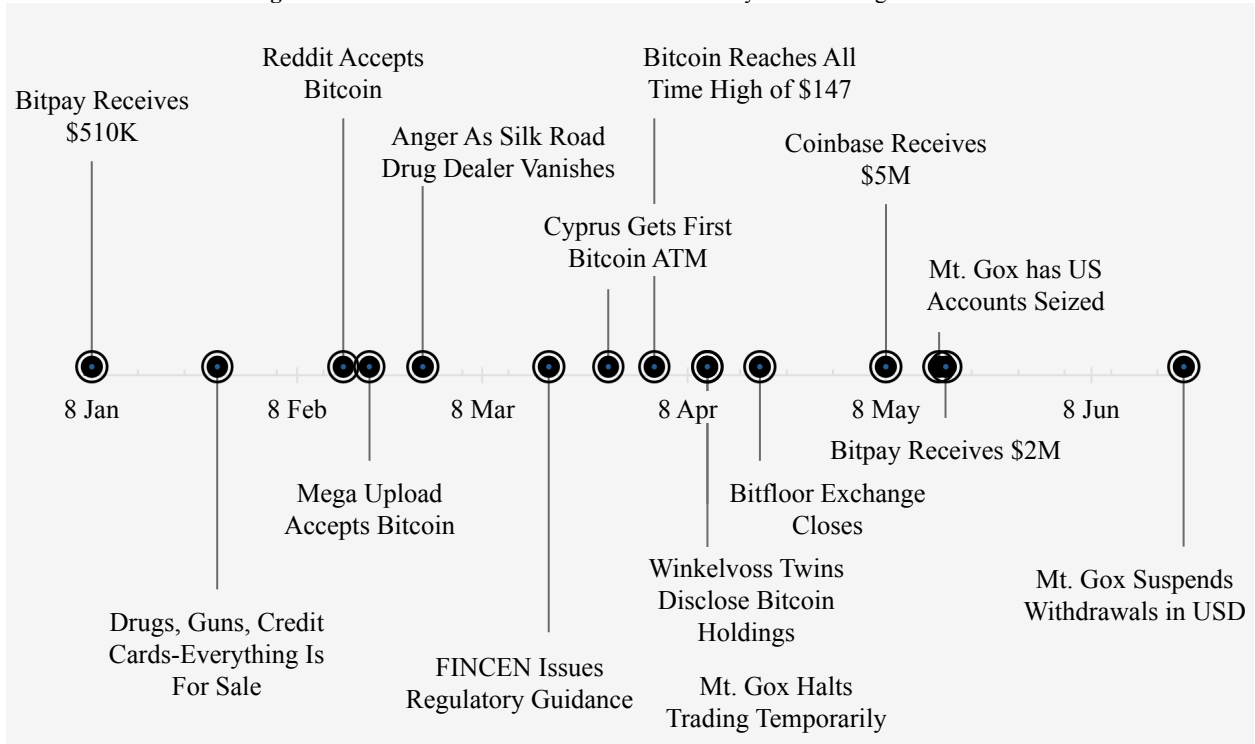
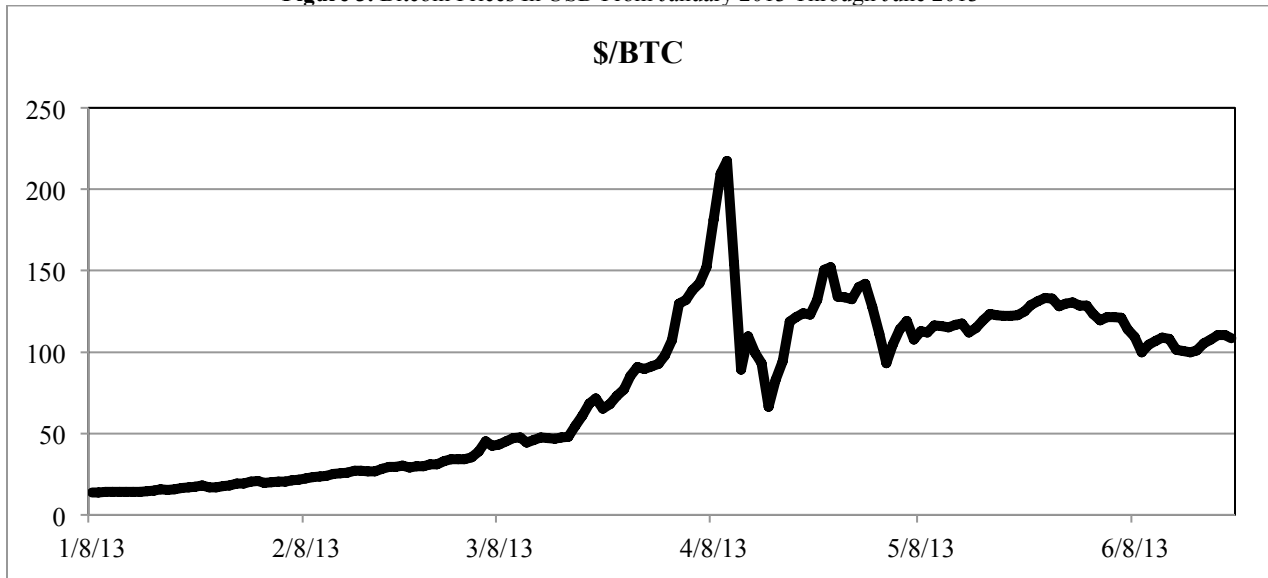


Figure 3. Bitcoin Prices In USD From January 2013 Through June 2013



**July 1 through November 21**

Over this five month period the price of Bitcoin Spiked from \$89 to \$1216 before ending at \$1171 on November 31s. Events are enumerated in Table 4 and Figure 4. In July, early adopters Cameron and Tyler Winklevoss filed documents with the SEC in order to create a Bitcoin ETF, Coinbase began offering customers instant purchases when they comply with KYC and AML protocols, the SEC accused a Texas man of a Ponzi scheme involving Bitcoin investments and Thailand banned the use of Bitcoin entirely. In August members of the Bitcoin Foundation met with congressional legislators behind closed doors in an attempt to educate lawmakers and New York's Department of Financial Services began an inquiry into Bitcoin by sending subpoenas to 22 companies operating in the Bitcoin space that lead to public hearings a few months later. Counterbalancing the negative stance taken by Thailand, Germany recognized Bitcoin as a unit of account. In October Silk Road proprietor Ross Ulbricht was arrested and the website closed down. Silk Road was like an eBay for illicit activity and all transactions were conducted in Bitcoin. Ultimately, federal agents seized 177,991 Bitcoin which were worth around \$200M at the historically high prices of Bitcoin towards the end of November. In November, Bitcoin prices soared after US Senate hearings on digital currencies. Regulators, entrepreneurs and the Bitcoin Foundation testified in front of congress in what was widely received as positive news. In a letter from Ben Bernanke to the committee, the Federal Reserve acknowledged some of the potential benefits of digital currencies. This news helped propel bitcoin prices through the end of the year. Figure 3 outlines the relevant timeline. Figure 5 displays the rise in bitcoin prices from July 1, 2013 through December 1, 2013.

**Table 4.** Selected Events July 1, 2013 Through November 21, 2013

<b>Date</b>	<b>Event</b>
July 1	Cameron and Tyler Winklevoss file documents with SEC regarding Bitcoin ETF (adoption)
July 12	Coinbase offers customers instant purchases if they comply with KYC and AML protocols (adoption)
July 24	SEC accuses a Texas man of a Ponzi scheme involving Bitcoin investments (risk)
July 31	Thailand bans the use of Bitcoin (risk)
August 5	Wall Street Journal reports currency trader Joe Lewis plans \$200M investment in private equity for bitcoin mining hardware but story is falsified (adoption)
August 12	New York Department of Financial Services subpoenas 22 digital currency related companies (regulatory)
August 19	Bitcoin classified as a unit of account in Germany for tax purposes (regulatory)
August 27	Members of The Bitcoin Foundation meet with US Lawmakers behind closed doors (regulatory)
September 6	Online wallet service Instawallet discloses theft and shuts down (risk)
September 23	Second Market launches the Bitcoin Investment Trust that lets accredited investors indirectly purchase Bitcoin (adoption)
October 3	Federal Agents arrest Ross Ulbricht proprietor of the black market Silk Road website and seize \$3.6M in Bitcoin (risk)
October 25	Michael Novogartz of Fortress Investments (\$55b under management) discloses a personal investment in Bitcoin (adoption)
October 28	Additional Silk Road Bitcoins seized bringing the total to 177,991 (risk)
October 31	Bitcoin ATM debuts in Vancouver (adoption)
November 8	Hackers steal 4,100 bitcoins from inputs.io (risk)
November 9	Vancouver ATM exchanges \$100,000 cdn in first week (adoption)
November 12	Bitcoin online exchange Bitcash.cz hacked (risk)
November 12	Chinese Bitcoin platform Global Limited shut down and \$3.3M in bitcoin disappear (risk)
November 18	Homeland Security senate hearings on digital currencies and Bitcoin begin
November 19	Ben Bernanke, Chairman of the US Federal Reserve Bank, comments in a letter read during US Senate hearings, "[T]hat there are also areas where they may hold long term promise." (regulatory)
November 20	Retailer PC Game Supply accepts bitcoin (adoption)
November 21	Cyprus University will accept bitcoin for tuition (adoption)

Figure 4. Timeline of Selected Events July 21, 2013 Through November 21, 2013

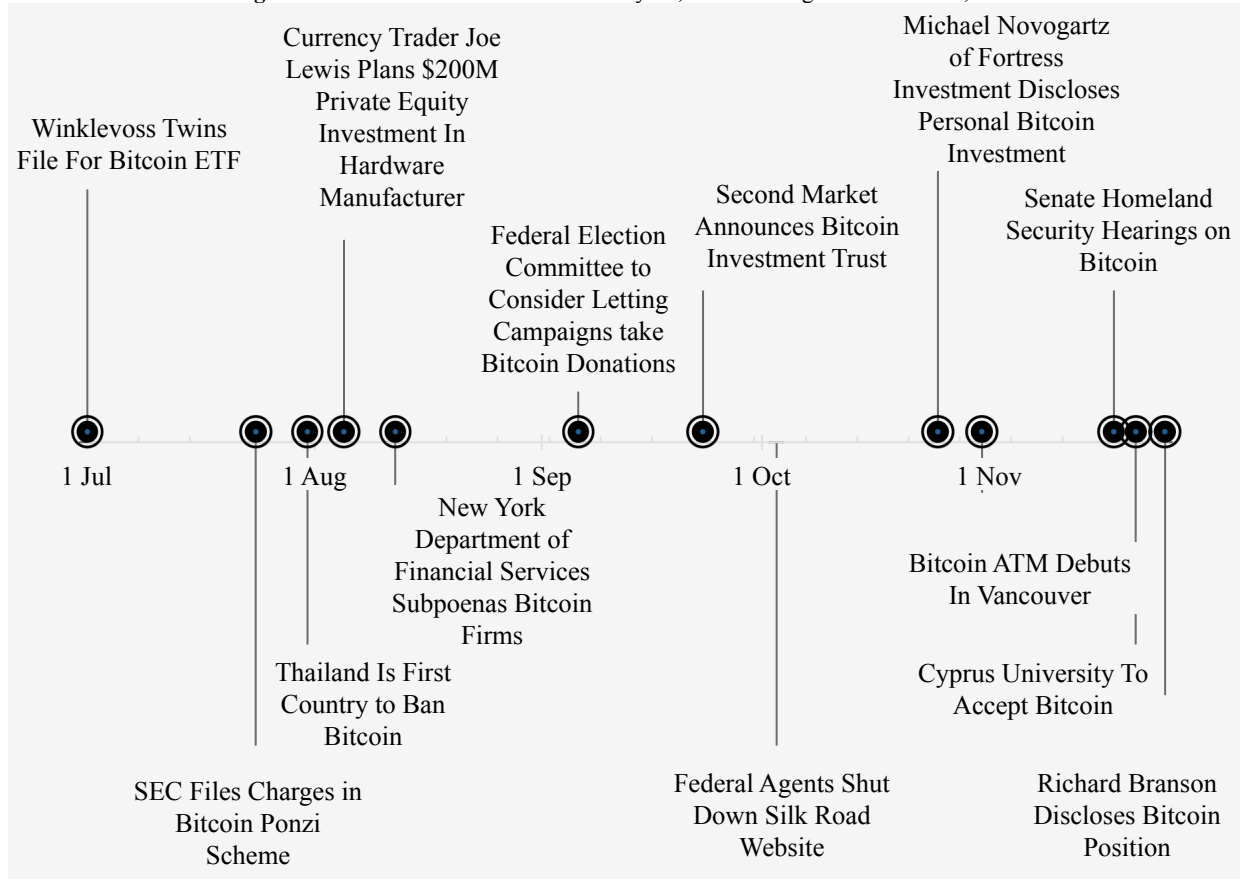
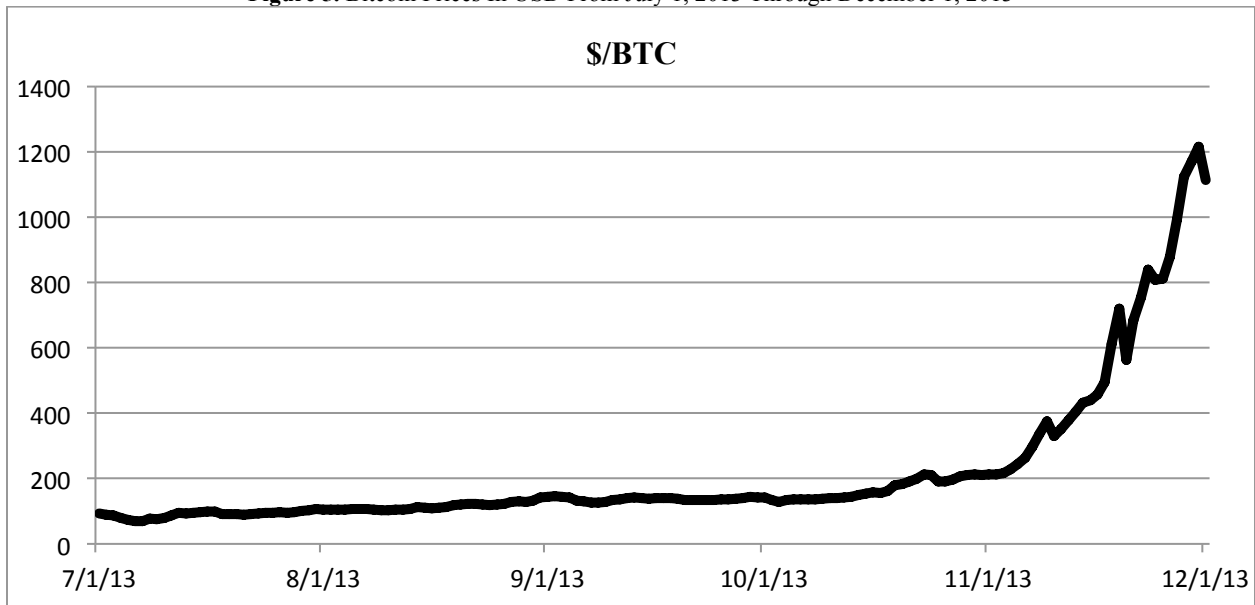


Figure 5. Bitcoin Prices In USD From July 1, 2013 Through December 1, 2013





**December 5, 2013 through May 13, 2014**

Bitcoin prices steadily declined over this time period from a high of \$1044 to \$448. Events and timelines are summarized in Table 5 and Figure 6 respectively. In early December the Peoples Bank of China declared Bitcoin was not legal tender and stated that financial institutions may not transact in Bitcoin, however investors could hold and trade bitcoin as an investment. Additionally, Bank of America's currency expert issued a report on Bitcoin with a fundamental valuation of \$1300. In January Coinbase raised \$25M in venture funding while companies including Overstock.com, Zynga, Tigerdirect.com, the NBA Sacramento Kings and two Las Vegas Casino properties initiated Bitcoin payments. However, there was also continued trouble associated with Bitcoin exchanges. In February Mt. Gox halted withdrawals and abruptly went offline on February 25, exchange Bitstamp suffered a denial of service attack and a Bitcoin entrepreneur and founder of an exchange in Singapore committed suicide in her apartment. In March regulatory clarity came as the IRS announced Bitcoin transactions would be treated like property for tax purposes and Goldman Sachs issued a research report on Bitcoin. In May venture funding continued and Bitpay raised \$30M. Figure 7 displays the downward trend of bitcoin prices from December 5, 2013 to May 13, 2014.

**Table 5.** Selected Event December 5, 2013 To May 13, 2014

<b>Date</b>	<b>Event</b>
December 5	Peoples Bank of China states bitcoin is not legal tender and cannot be accepted by financial institutions, but investors may hold bitcoin as an investment.
December 5	David Woo of Bank of American Merrill Lynch issues research on Bitcoin and states its viability in the money transfer market.
December 13	Coinbase raises an additional \$25M from Andreessen Horowitz (venture funding)
December 19	BTC China's largest exchange stops taking Yuan denominated deposits amid uncertainty (regulatory)
January 6	Zynga announces they will accept bitcoin for online gaming payments (adoption)
January 10	Overstock.com announces it will accept bitcoin as a form of payment. (adoption)
January 16	National Basketball Association team the Sacramento Kings announces it will accept bitcoin for merchandise and tickets . (adoption)
January 22	The Golden Gate Hotel and Casino and the D Las Vegas Casino Hotel announce they will accept bitcoin for hotel rooms and related purchases. (adoption)
January 24	Tigerdirect.com will accept bitcoin (adoption)
January 28	Charlie Shrem a board member of The Bitcoin Foundation is arrested for money laundering via Silk Road (risk).
February 8	Mt. Gox Halts all withdrawals (risk)
February 13	Bitstamp halts withdrawals as a result of a ddos attack (risk)
February 25	Mt. Gox goes offline without explanation. 850,000 bitcoins apparently stolen. (risk)
February 27	Janet Yellen testifies that the Federal Reserve Bank has no authority to regulate Bitcoin (regulatory)
March 6	Bitcoin exchange, First Meta, founder commits suicide in Singapore. (risk)
March 6	Tyler and Cameron Winklevoss buy Virgin Galactic tickets with bitcoin (adoption)
March 6	Newsweek claims to have discovered the identity of Satoshi Nakamoto (adoption)
March 11	Wikipedia co-founder sets up Bitcoin address and is flooded with donations (adoption)
March 13	FINRA issues investor alert over speculative Bitcoin investments and companies offering Bitcoin investments (risk)
March 14	Goldman Sachs issues report on Bitcoin noting its benefits including less costly transactions and less vulnerable to cyber crime (adoption)
March 26	IRS announces it will treat bitcoin as property and not currency (regulatory)
March 28	GoCoin secures \$1.5M in funding (venture funding)
April 1	OkCoin Chinese Bitcoin Exchange raises \$10M (venture funding)
April 2	Square Market an e-commerce payments processor will take bitcoin (adoption)
May 7	Vaurum receives \$4M in funding (venture funding)
May 9	Federal Election Commission will allow non-anonymous bitcoin donations (regulation)
May 13	Bitpay raises \$30M (venture funding)

Figure 6. Timeline Of Selected Events December 5, 2013 To May 13, 2014

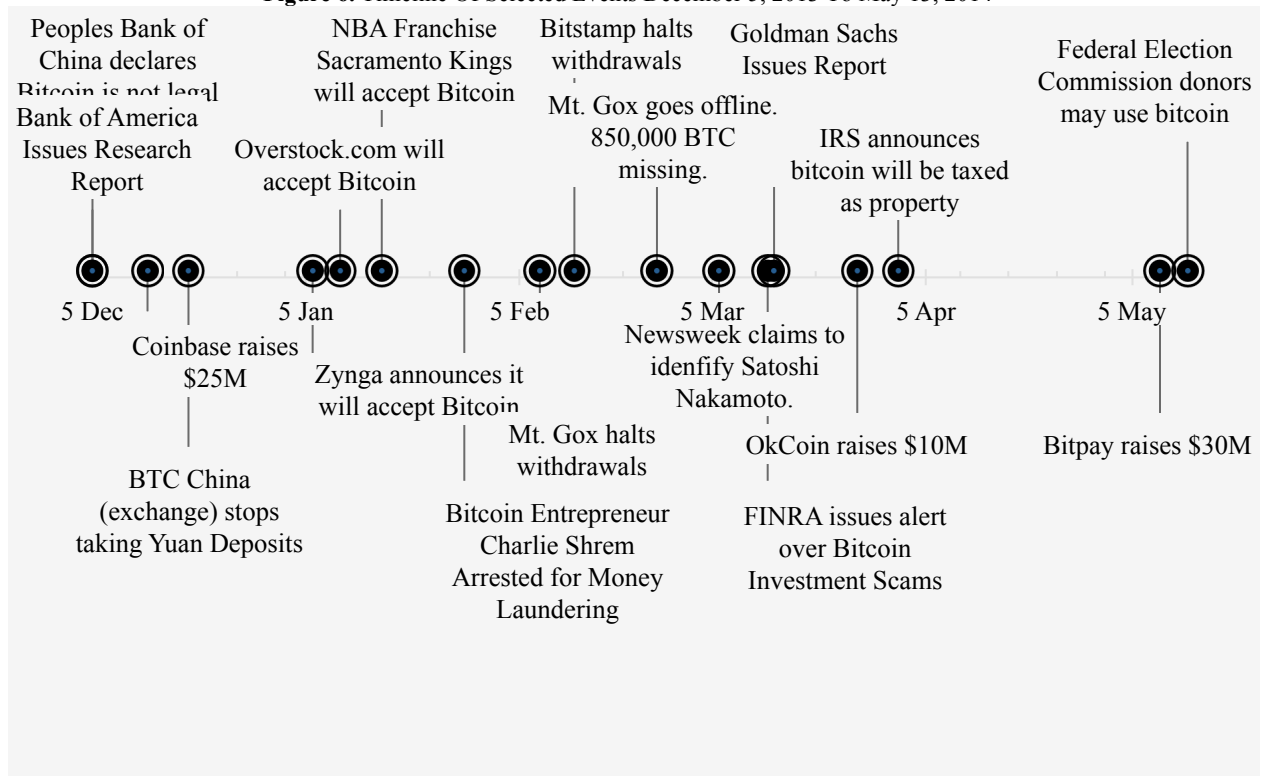
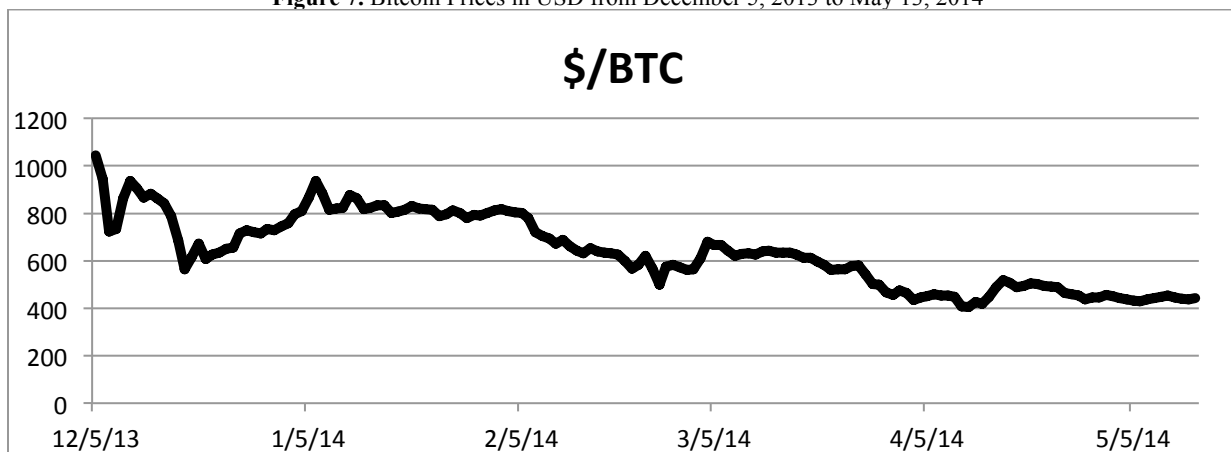


Figure 7. Bitcoin Prices in USD from December 5, 2013 to May 13, 2014



CONCLUSION

This paper attempts to catalogue events that both enhance adoption of the bitcoin protocol and those that pose risks to mainstream adoption. Although Bitcoin was first mined in 2009, 2013 and the beginning of 2014 mark the beginning of the technology and protocol moving through the innovation stage and entering the early adopter phase in Moore’s technology adoption life cycle. Over the brief time period considered the pace of both positive and negative events may be considered frenetic at a minimum. Whether or not the chasm will be crossed remains to be seen.

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