

Evaluating The Short Term Effects of Major News on the Bitcoin-United States Dollar Exchange Rate*

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Abstract

Investors and traders, in any financial market, use major news as one of many tools to attempt to predict price changes of a given asset, and using sentiment analysis on major Bitcoin events, as well geopolitical and economic ones, we see that the these major articles that are published do not affect Bitcoin price in a statistically significant way, most likely due to the fact that news in such technologically capable communities will integrate into the market faster than a news article can be published.

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1 Introduction

Bitcoin is a decentralized, peer-to-peer electronic currency system, first devised in a 2008 white paper by Satoshi Nakamoto, an alias for a lone programmer or group of programmers. The crux of the digital currency is a proof-of-work blockchain to record transactions completely anonymously, yet each transaction is public, identifiable only by a public address ([Nakamoto \(2008\)](#)). Originally envisioned primarily as a transactional currency that circumvents the need for a trusted third party or central bank to regulate exchanges, many investors and traders now trade Bitcoin as a more speculative currency or a commodity. Owners of Bitcoin, since Bitcoin inherently provides no service to the owner other than its value itself, only demand it if they seek to hold it as an asset or commodity, or hold that currency as a medium of exchange to be used in a consumer transaction ([Luther and White \(2014\)](#)). Investors and traders perform trades in online exchanges that determine Bitcoin exchange rates independent of other exchanges. Since there is no central bank, these exchanges are guided and prices are determined exclusively by supply and demand of Bitcoin in each exchange, which inherently introduces large amounts of volatility and variance in Bitcoin price in a given exchange. Since the exchange rates change depending on supply and demand, many factors have an effect on the price movements of Bitcoin since individual investors and traders collectively determine price, but perhaps the least explored and a potentially quite important price determinant is

the effect of news on short term price fluctuations. Most recently, we have seen that the news announcing China's effort to shut down exchanges and prevent Initial Coin Offerings (ICO's) had a significant negative impact on Bitcoin price movements. Using sentiment analysis on 64 major news articles from mid-2010 until the present, we can explore how the tone of each article, a representative proxy for the tone of the event as a whole on a particular day, affects the short term change in price of Bitcoin or not. In addition, we will be able to examine whether different types of news events, in particular geopolitical, economic and blockchain or exchange specific, can give us any insight into how Bitcoin owners view it in terms a commodity or a currency. This type of advanced technical analysis using natural language processing seeks to add further insight into the risk-heavy price fluctuations that promise great profit for speculative investors and traders.

Examining Bitcoin in its current state relative to the three functions of money, medium of exchange, store of value and unit of account, will provide context for the state of Bitcoin in terms of its integration into markets as a transactional currency or a commodity/asset and create a lens to more purposefully examine the results of the subsequent analysis. First, as a medium of exchange, Bitcoin perhaps fits most easily into this function of money. While envisioned as the future of transactional currency without the need of a central bank, Bitcoin does not currently have the market integration as a transactional currency to suggest that this goal

is completely met so far. While it's accepted by many major companies like Microsoft, Apple and Subway, the majority of the businesses and companies that do accept it as a transactional currency are online merchants, not everyday, non-online retailers, limiting the practicality of Bitcoin as a transactional currency in the traditional sense. While trading volume is high across the many virtual exchanges, consumer transactions are extremely low, indicating that while Bitcoin does serve the function of a medium of exchange, but not currently in the traditional, retail sense like the US Dollar. This is mostly consistent with findings that of the different types of owners of Bitcoin, the types correlated with Bitcoin interest were computer programmers, technology enthusiasts, and individuals interested in its uses in illegal activity (Yelowitz and Wilson (2015)). The technology that Bitcoin employs has from its inception drawn a more technologically oriented clientele than a purposefully investment oriented one. The creation of the now numerous online currency exchanges like GDAX, Bitfinex, Kraken and Poloniex have certainly allowed Bitcoin to become more of a medium of exchange, with users able to exchange currencies with Bitcoin instantaneously with other cryptocurrencies as well as state currencies, depending on the exchange. Therefore, Bitcoin only partially functions as a medium of exchange, since while it has the ability to function as a medium of exchange in terms of its accessibility and online retailers accepting it as payment, it also fails as normal consumers to not demand Bitcoin in order to make many consumer transactions that currencies

typically exhibit.

Secondly, as a store of value, Bitcoin does not function very well due to security concerns, the natural volatility of the Bitcoin exchange rate and the inherent inflationary pressure of the limited bitcoin supply on the exchange rate. Bitcoin users store their currency in virtual "wallets", often designed and secured by third party companies that are notoriously insecure. Users must look themselves for specific wallets that they feel are the most secure, but wallets are a very popular target for hackers. Due to the decentralized nature of Bitcoin, once a hack takes place, there is no central bank allowing users to recoup stolen funds, meaning that security issues negatively affect Bitcoin's ability to actually store the funds themselves. Another significant issue for Bitcoin owners is the inherent volatility in the exchange rate of the currency. Volatility of Bitcoin prices is significantly higher than traditional commodities and currencies, where in 2013 had a volatility of 142%, whereas other traditional state currencies exhibited volatilities between 7-12% and gold exhibited 22% volatility ([Yermack \(2013\)](#)). This incredible volatility exhibited by Bitcoin exchange rates creates great difficulty for the currency to actually store its value over a long period of time. The volatility is created by the push and pull of supply and demand of the currency, and while other commodities and currencies respond to the same market forces, for Bitcoin this constant attempt to equilibrate its exchange rate is the *sole* determinant of Bitcoin price at any given time. A more long term concern of

how Bitcoin will store its value regards the limit of 21 million Bitcoin able to be mined. While the number of Bitcoins currently in circulation is almost 17 million, the limited long term supply of Bitcoin will drastically change the profit structure for miners, an essential element of the Bitcoin blockchain framework. Not only will this fixed total number of Bitcoin cause great inflationary pressure since supply will remain fixed and demand will remain high, if not increase, but once miners cannot be rewarded with Bitcoin for each block mined, transaction fees will be their only incentive to actually mine the blocks, or validate the transactions in the blockchain. This change in structure for miners could potentially cause many to leave the market, leading to increased concentration of miners in larger groups instead of more decentralized, potentially leading to security concerns. Bitcoin does not store its value well, and for the foreseeable future will not either, due to many concerns about some of the inherent features of Bitcoin and its blockchain technology.

Lastly, as a unit of account, the primary challenge to Bitcoin exhibiting this function of money is the inherent volatility in its price as mentioned earlier and the practical problems of quoting items in terms of Bitcoin. The volatility that Bitcoin exhibits creates challenges for retailers who want to charge a single price while quoting it in Bitcoin when Bitcoin's volatility is so great even minute to minute. This is a significant obstacle for physical retailers for accepting Bitcoin as a form of payment and is most likely the primary reason that most of

the businesses that accept Bitcoin as payment are online retailers. Bitcoin is quoted in units as small as one hundredth of a millionth of a Bitcoin, or one "Satoshi", named after Bitcoin's creator, and for businesses to accept Bitcoin as payment they would need to quote these prices to such a depth that is most likely to cause more confusion to consumers and businesses than benefits that accepting Bitcoin would provide ([Yermack \(2013\)](#)). Bitcoin does not currently have enough widespread exposure to the general population to make such integration feasible or beneficial to most physical retailers, but it remains an attractive option for online retailers who have the ability to be flexible in how they accept payments.

This discussion of the legitimacy of Bitcoin as money in the traditional sense provides insight into what the subsequent model suggests. The results suggest that these major news events do not have an effect on the short term, daily price movements of Bitcoin. However, there appears strong evidence that financial factors in the traditional financial markets, specifically the S&P 500, 3 Month T-Bill and the 10-Year Bond, do exhibit statistically significant effects on Bitcoin price.

2 Literature review

Extensive work exists on price determinants for Bitcoin price, however much of that work attempts to look at the effect of public perception on the price of Bitcoin, evident in such

works as [Kristoufek \(2013\)](#) & [Georgoula et al. \(2015\)](#). These works look at the effect of Google Trends data and adoption of Bitcoin and determines that these factors do have an effect on Bitcoin price. The article, [Li and Wang \(2017\)](#) talks very specifically about the different factors that determine the Bitcoin exchange rate, but categorize them in two distinct categories: technological factors and economic factors. Of these categories, it seems that public opinion is included in terms of twitter data, however, since Bitcoin is so susceptible to price swings due to news, it is surprising that type of study is not readily available in a manner that I am hoping to explore.

The next logical step, since it has been concluded that using public sentiment to anticipate price movements has sizeable merit, is to perform sentiment analysis on the news, since that could have a significant impact on price movements, not just tweets which is more of a metric of public perception, not impactful news. Studies from [Bouoiyour and Selmi \(2017\)](#) & [Polasik et al. \(2015\)](#) begin to investigate the sentiment analysis of English language articles mentioning the keyword 'Bitcoin', but these works take this approach from a very high level perspective, determining if on a monthly basis news affects price. However, an analysis into whether the price volatility on a daily basis can be partially explained by major news relating to Bitcoin has yet to be investigated, a task I hope to address in this paper.

Many of the studies involving time series analysis on Bitcoin price include models that are

not limited to different forms of regressions. While [Georgoula et al. \(2015\)](#), [Bouoiyour and Selmi \(2017\)](#), [Polasik et al. \(2015\)](#), use various forms of regressions, other studies like [Li and Wang \(2017\)](#) and [Ciaian et al. \(2016\)](#) use different models like ARDL. Both ways of addressing time series analysis is sound depending on the context of the problem, but given the scope of my analysis here a regression model that accounts for the various challenges time series analysis on a financial asset presents, like serial correlation and heteroskedasticity, will suffice.

3 Dataset

The data used in this study encompasses many of the fundamental and technological factors of the Bitcoin market, as well as other financial markets in general. The Bitcoin price, presented in this paper in terms of USD/BTC exchange rate, will allow us to see the short term price fluctuations in the Bitcoin market and provide the basis for the subsequent analysis. The main included fundamental factor that affects Bitcoin price formation is Bitcoin trading volume. Bitcoin Market Capitalization is another major fundamental factor but is not included in this regression because it is itself a function of Bitcoin price and Bitcoins in circulation. Trading volume gives us a gauge of the level of participation in exchange specific behavior of Bitcoin owners, as the vast majority of users in exchanges are trading Bitcoin as a speculative commodity, rather than holding their Bitcoin for typical transactions, of which there is not even

a sufficient metric to gauge traditional transactional use of Bitcoin. The technological factors accounted for are the number of unique Bitcoin addresses and mining difficulty. The number of unique Bitcoin addresses, a proxy for general Bitcoin popularity as each wallet generally represents a different Bitcoin user, provides a sufficient estimate for the general popularity of Bitcoin. Mining difficulty is another indicator used to estimate the general popularity of Bitcoin, albeit one that gauges the primarily technological community more than the general public, since it's a reflection of the participation of Bitcoin miners, meaning the more miners that enter the market, the faster the difficulty rises.

To determine how the Bitcoin market interacts with the traditional financial markets and since many owners regard Bitcoin as a trading commodity, not just a digital currency, we include trading volume and closing index price of the S&P 500 in order to account for these investors using Bitcoin as a potential alternative investment to the stock market and other commodities. Also included are the Three-Month Treasury Bill and Ten-Year Treasury Bond yield rates as two general indicators of traditional financial market sentiment.

The final set of variables included into the model are those that relate most directly to my hypothesis. I collected 64 articles from various Bitcoin news outlets like CoinDesk, as well as major news outlets like CNN, Fox News, Bloomberg, etc, regarding not only Bitcoin specific events about exchange activity, blockchain updates & various legal news regarding

its standing in the eyes of world governments, but also major geopolitical and economic or financial news. By specifying the context of each event, we can gain insight on how the specific type of news affects Bitcoin price, and what that particular type of news having an effect on price means for how Bitcoin is viewed by its owners. Each news article, after being run through a sentiment analysis algorithm from the Python library TextBlob, was attributed a polarity on a scale of -1 to 1 based on the sum of the sentiments of the key words and phrases that the algorithm identifies as having a specific polarity, -1 being the most negative and 1 the most positive. This sentiment is the polarity of the specific article passed into the algorithm, therefore similar articles written on the same event will result in slightly different polarities, but the assumption made is that the major news articles collected will reflect the relative sentiment of the event, rather than the exact sentiment of the particular article. Also included are variables that specify the context of the news article, namely, global (general geopolitical news), economic or financial news, blockchain news specifically discussing the blockchain technology and exchange specific news that highlights news that refers to specific exchanges and their respective activities.

Table 1: Variables & Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BTCprice	2,631	438.7657	731.7926	0	4911.74
BTCtradevol	2631	1.06e+08	2.01e+08	0	1.77e+09
addresses	2631	181034.4	181317	284	691480
miningdiff	2631	1.03e+11	2.02e+11	181.5433	1.10e+12
sp500	1815	1762.378	398.512	1047.22	2519.36
sptradevol	1815	3.66e+09	7.49e+08	0	7.60e+09
TextSentiment	2,631	0.0008766	0.0142342	-0.118817	0.2231407
globalnews	2,631	0.0041809	0.064537	0	1
econnews	2,631	0.0064614	0.0801381	0	1
blockchainnews	2,631	0.0133029	0.1145904	0	1
exchangenews	2,631	0.0060813	0.0777602	0	1
tbill3y	2,631	0.180973	0.258601	0	1.18
yryield10	2,631	2.285678	0.4844025	1.37	3.75

4 Model

In order to determine the type of model to use for the analysis, determining if autocorrelation or heteroskedasticity exists in a regular OLS regression using the variables listed above, with price as the independent variable, is the first task. As we can see in Figure 1, the residuals of the preliminary regression model do appear to graphically display heteroskedasticity, a violation of our OLS model assumptions.

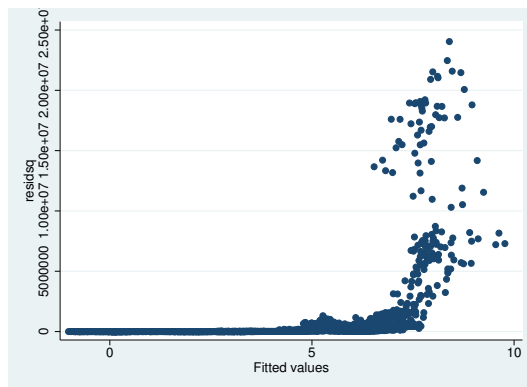


Figure 1: Heteroskedasticity in the initial OLS regression model

More formally, we can test if these conditions exist in our initial model using various tests that detect serial correlation and autocorrelation, shown in Table 2 below.

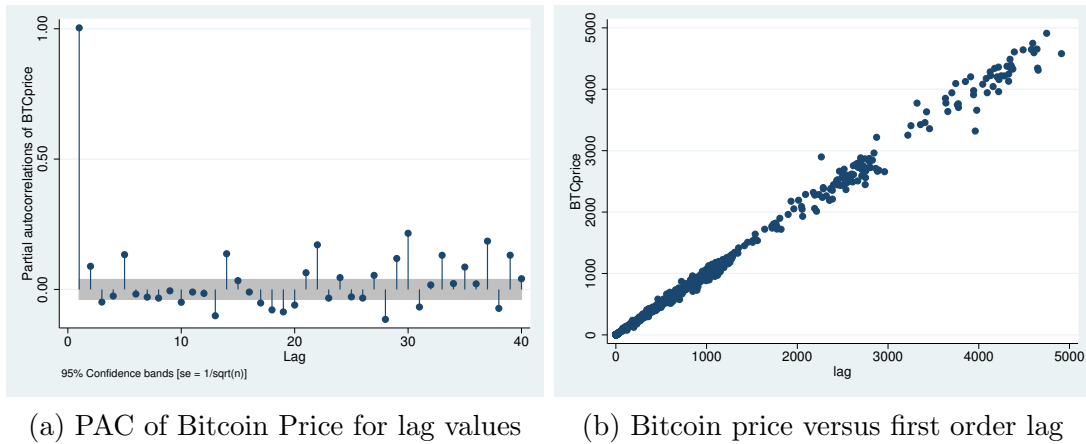
Table 2: Formal Tests for OLS assumptions

Test	Assumption	Null Hypothesis	Pr(Type 1 Error)	Reject H_0 ?
Breusch-Pagan	Heteroskedasticity	Constant Variance	0.0000	Yes
Durbin Alternative	Autocorrelation	No Serial Correlation	0.0000	Yes
Breusch-Godfrey	Autocorrelation	No Serial Correlation	0.0000	Yes

Each of these tests very clearly show that serial correlation and heteroskedasticity exist in the data. In order to account for this, we cannot use our traditional OLS model, because the homoskedastic and no serial correlation assumptions are violated. Since both of these assumptions are not satisfied in the preliminary OLS model, we can instead use the Newey-West regression model, a model that has an error structure that is assumed to be heteroskedastic

and potentially autocorrelated up to a specific lag. In order to determine this specific lag, we can observe the partial autocorrelations for different levels of lag to identify the level that has the greatest autocorrelation. In Figure 2, we can see that the greatest spike in autocorrelation occurred at a lag level of one, suggesting that AR(1) serial correlation is the lag we should implement into the Newey-West model. In order to confirm this, Figure 2 also shows the linear relationship between Bitcoin price and the first order lag values, confirming that level one lag is the optimal level for our Newey-West regression.

Figure 2: Determining the Type of Autocorrelation



Therefore, equation 1 is our equation for the Newey-West multivariate regression model.

$$\begin{aligned}
y = & \beta_0 + \beta_1 BTCprice + \beta_2 BTCtradevol + \beta_3 addresses + \beta_4 miningdiff + \beta_5 sp500 \\
& + \beta_6 sptradevol + \beta_7 TextSentiment + \beta_8 globalnews + \beta_9 econnews + \beta_{10} blockchainnews \\
& + \beta_{11} exchangenews + \beta_{12} tbill3y + \beta_{13} yyield10 + u
\end{aligned}
\tag{1}$$

5 Results

The results of this Newey-West regression is given in Table 3. While text sentiment and the four categories of news did not show statistical significance as anticipated, the underlying factors of Bitcoin, namely the number of unique addresses, the total daily trading volume and mining difficulty did show statistical significance, as expected. In addition, the factors of the traditional financial markets, S&P closing price, the 3-Year T-Bill yield rate and the 10-Year Bond yield rate are statistically significant, except for S&P trading volume, which did not produce a statistically significant result.

The Mt. Gox hack in early February, 2014 was the first major event to occur in the Bitcoin market, and the effects are evident in how Bitcoin owners vehemently necessitate security as one of their primary concerns. Table 4 displays two separate regression models, one on the

time period before the hack on February 7, 2014 and after the hack, in an effort to see if news has an effect in a particular time period but not across the entire dataset. The variables that demonstrate statistical significance are mostly the same across both time periods, however the standard errors for all variables are significantly higher in the second time period, most likely due to the drastic increases in price exhibited in the Bitcoin market in the time period after the hack. In the time before the hack, economic news displayed some statistical significance, while in the time period after the hack through the present it did not, perhaps suggesting that economic news was more influential when the market was in its very early and uncertain stages, rather than presently where the market has a quite solid foundation, but it should be noted there were only 15 news examples before the hack, while there were 49 after the hack.

Another critical event and particularly so for this study, was when the United States government officially classified Bitcoin as a commodity on September 18, 2015. Table 5 shows two separate regressions before and after the commodity classification. Perhaps the most interesting result in this comparison of time periods is how investor sentiment in traditional financial markets affects Bitcoin price, exemplified in the 3 Month T-Bill and the 10 Year Bond yield rates. The 3 Month T-Bill displays an extremely positive relationship with Bitcoin price before the governmental classification, suggesting that investors and owners very much viewed Bitcoin as a portfolio expanding asset when investor confidence was high, however shows no

statistical significance at all after this classification. Conversely, the 10 Year Bond exhibits no statistical significance before the classification, but shows a negative relationship after the classification at all levels of significance, suggesting that investors after the classification viewed Bitcoin through the same lens as the federal government, as a commodity used for alternative investment when traditional market sentiment is low.

Table 3: Newey-West Regression results accounting for Heteroskedasticity & AR(1) Serial Correlation

	(1) BTCprice
BTCtradevol	1.55e-06*** (2.08e-07)
addresses	-0.00175*** (1.612e-4)
miningdiff	1.77e-09*** (1.80e-10)
sp500	0.663*** (0.036)
sptradevol	1.63e-09 (5.74e-09)
TextSentiment	-794.9 (601.225)
globalnews	34.11 (58.892)
econnews	71.47 (91.026)
blockchainnews	-27.74 (45.698)
exchangenews	28.60 (44.417)
tbill3y	457.5*** (76.457)
yryield10	-50.72*** (5.768)
_cons	-734.0*** (58.041)
<i>N</i>	2631

Standard Errors statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Newey-West Regression results for the time periods before and after the Mt. Gox Hack

	(1)	(2)
	Before Mt. Gox Hack	After Mt. Gox Hack
BTCtradevol	0.000*** (0.00)	0.000*** (0.00)
addresses	0.001*** (0.00)	-0.002*** (0.00)
miningdiff	0.000*** (0.00)	0.000*** (0.00)
sp500	0.110*** (0.02)	-0.995*** (0.11)
sptradevol	-0.000 (0.00)	-0.000*** (0.00)
TextSentiment	-323.508 (218.49)	-861.363 (632.34)
globalnews	10.262 (55.91)	32.141 (67.36)
econnews	-31.784* (12.41)	156.972 (92.55)
blockchainnews	-66.806* (30.03)	-51.525 (48.59)
exchangenews	-52.437 (32.41)	6.434 (45.11)
tbill3y	454.831*** (62.37)	234.122** (71.98)
yryield10	9.125*** (2.68)	-84.911*** (15.08)
_cons	-210.251*** (30.15)	2843.617*** (210.38)
<i>N</i>	1300	1331

Standard Errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Before and after the United States Government officially classified Bitcoin as a commodity

	(1) Before US Commodity Class	(2) After
BTCtradevol	0.000000692*** (4.88)	0.00000109*** (5.25)
addresses	0.00127*** (8.34)	-0.000563 (-1.29)
miningdiff	-6.18e-09*** (-14.65)	4.08e-09*** (15.11)
sp500	0.430*** (20.63)	-1.576*** (-6.46)
sptradevol	5.04e-09 (1.73)	-5.49e-08** (-3.12)
TextSentiment	307.9 (1.85)	-2245.6* (-1.98)
globalnews	-20.41 (-1.01)	67.84 (0.65)
econnews	-7.332 (-0.43)	360.7* (2.14)
blockchainnews	-30.15 (-1.53)	-210.4 (-1.87)
exchangenews	-33.65 (-1.34)	10.00 (0.08)
tbill3y	917.3*** (27.05)	-7.518 (-0.06)
yryield10	-1.856 (-0.44)	-158.4*** (-5.19)
_cons	-666.0*** (-21.31)	3616.2*** (7.55)
<i>N</i>	1971	660

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

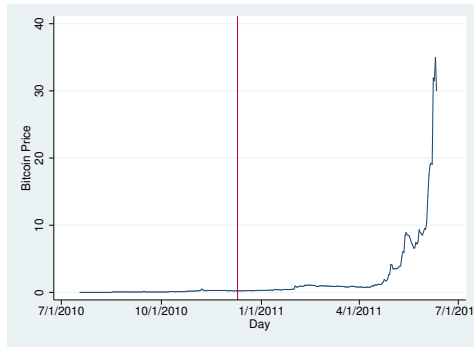
6 Discussion

Evident in Table 3, the sentiment of news events does not have a statistically significant effect on the price of Bitcoin, and nor do the different categories of news examined in this study.

While this result is unexpected given the purely supply and demand nature of the Bitcoin market, upon further inspection of when these events occur, how long it takes these events to cause price swings and the news events chosen, understanding these results becomes much more clear. Figure 3 provides a more in depth view of each news event included in the model and when each of these events occurs with respect to the behavior of Bitcoin price. This view is important to see because due to the highly technical nature of the Bitcoin community, even more so towards the beginning of its inception, information likely leaked into the market before these news articles were written. Therefore, for many of the news events included, there is a lag between when the news actually occurred and when the article was written, which is the date included in this model, not necessarily the date of the actual event. In Table 6, we can see that approximately 50.0% of the articles included in this model did in fact occur on a day that was after the beginning of the most recent price swing, meaning on days where this occurred, the daily price change the model captured was price movement after the movement caused by the event occurred that has already occurred, typically manifesting in either a retrace of the actual price swing from the event or the price movement from an unrelated event. Table 6 also

explains that in the second half of the timeline, or after the Mt. Gox hack, which occurred at the cutoff between sections four and five, these news events were more efficient in their timing relative to the Bitcoin price movements, as about 84.38% of the news events that preceded a price movement included in this model occurred after the Mt. Gox hack. Interestingly though, Table 4 illustrates that even though the timing of the news was more efficient to precede a price movement as just mentioned, there still was no statistical significance in *TextSentiment*. Therefore, the difference timing of when the model captures the price change attributed to when an article is published relative to when the event actually occurred and the market reacted to that information, is most likely a significant factor, but not the only explanation.

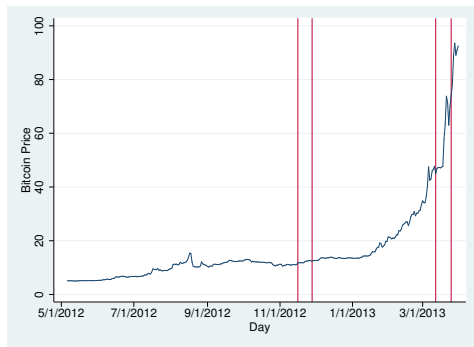
Figure 3: Noted news events in the context of when they occurred in the Bitcoin timeline



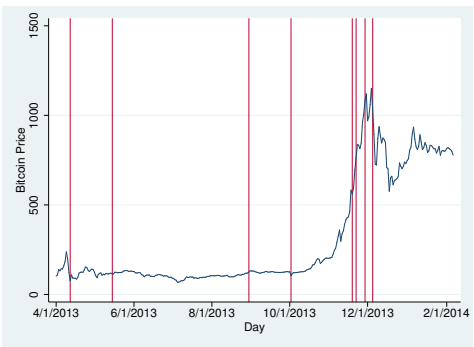
(a) Jul 18, 2010 - Jun 11, 2011



(b) Jun 12, 2011 - May 5, 2012



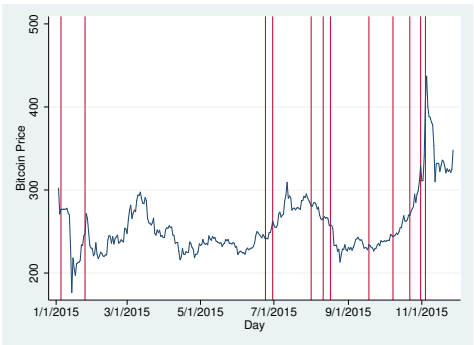
(c) May 6, 2012 - Mar 31, 2013



(d) Apr 1, 2013 - Feb 6, 2014



(e) Feb 7, 2014 - Jan 2, 2015



(f) Jan 3, 2015 - Nov 27, 2015



(g) Nov 28, 2015 - Oct 22, 2016



(h) Oct 23, 2016 - Sep 29, 2017

Table 6: Approximate Coincidence of News and Bitcoin Price Swings

Section	# Events	# After Most Recent Price Swing	# Precedes Price Swing
1	1	1	0
2	2	1	1
3	4	2	2
4	8	6	2
5	13	8	5
6	12	5	7
7	12	5	7
8	12	4	8
Total	64	32	32

In addition to the timing of the news articles themselves, the timing of how the Bitcoin market actually ingests information and reacts based upon it can differ depending on a multitude of factors. The underlying assumption that as soon as a major news event is reported on, the market will react accordingly, immediately, but the behavior of so many individual Bitcoin owners is so different given that the market is worldwide and much of the trading takes place in Asia. Owner risk preferences and trading are so different, particularly between countries, that news about a major United States political event may not have as much impact on Asian trader behavior as American traders. The way Bitcoin owners evaluate whether or not to buy or sell their holdings is largely not in a way that mirrors technical analysis on a large scale like other financial assets. While there are traders and investors who use this type of analysis, it is not as widespread in use as it is for traditional financial markets for equities and the like. This makes the supply and demand functionality of the Bitcoin market random in the sense

that most traders are not always beholden to the type of analysis most currencies and assets are bought and sold with. Some news may factor into long term investments rather than cause short term swings, particularly with financial crises, like in Greece and Venezuela, since those situations are longer term, individual articles about them are unlikely to cause price swings that are directly attributable to them. The way Bitcoin owners react varies greatly, which can lead to the actual reaction to news to be very different from situation to situation, making it challenging to capture the true effect of it and separate it from other market forces.

A point that must be noted, also, is that all 64 events were not chosen randomly, rather they were chosen based on their level of importance to Bitcoin, the blockchain technology, world politics and major economic news. They were chosen specifically because they were reported on around the world, in an attempt to avoid strictly domestic or foreign news that may not integrate into the market on a worldwide scale. However, there is inherent bias in choosing these particular events, which could potentially lead to problems with coming to a conclusion statistically about the variable. The distribution of types of articles are noted in Table 7, which shows that the majority of news was Bitcoin related, but also included a fair amount of news that was non-Bitcoin in nature to gauge how the market reacted to such events not directly related to Bitcoin.

These findings give interesting insight into how Bitcoin is viewed in terms of a commodity

versus a currency. The fact that the S&P 500 closing price, 3 Month T-Bill yields and 10 Year Bond yields are all statistically significant speak volumes about how Bitcoin owners seem to view Bitcoin as more of a commodity and asset than a transactional currency. The 3 Month T-Bill has a very strong positive relationship with Bitcoin price, and as the 3 Month T-Bill is well known as a general indicator for traditional financial market sentiment, the strong positive relationship between the two commodities suggests that as the sentiment in financial markets increases, so does Bitcoin price. Investors and traders, when market confidence is high, will move to possibly expand portfolios and trade and invest in Bitcoin, indicative of a relationship that suggests these owners are viewing Bitcoin from a speculative point of view, once confidence is high. This same relationship applies to the S&P closing price, which has a positive relationship with Bitcoin price as well. The 10 Year Bond yields, also a general indicator for investor confidence, has an inverse relationship with Bitcoin prices, suggesting that when investor confidence is low, investors and traders move to Bitcoin as an alternative investment, akin to gold, oil and other currencies to diversify portfolios and hedge risk. Conversely, this also suggests in times of higher investor confidence, investors will sell Bitcoin positions to move into more traditional investment assets. All of these results for financial market variables suggest a strong sentiment that Bitcoin is currently view largely as a currency, more so than a transactional currency.

These results also can allow us to understand how Bitcoin functions as traditional money, as discussed earlier. The natural volatility of Bitcoin cause issues with reconciling how it functions as a store of value and a unit of account, and evidently owners, traders and investors recognize this and primarily view Bitcoin as a speculative commodity. Exchange Traded Funds are beginning to attempt to include Bitcoin and other cryptocurrencies, which could attract new investors as well as potentially mitigate some of the volatility evident in the market. As a commodity, how Bitcoin does not store its value is what attracts the investors, and keeps away owners from using it as a transactional currency. Therefore, the issue with Bitcoin not storing its value is only problematic for the currency if it ever hopes to transition into a more stable, transactional currency like a national and regional currency. As the results show, Bitcoin's volatility and inability to store its value is what primarily actually attracts investors and new Bitcoin owners currently, not owners looking to use it as a transactional currency.

7 Conclusion

Bitcoin markets are incredibly volatile due to the decentralization of the currency, and the pure supply and demand between Bitcoin owners is the only mechanism that determines price at a given moment. While based on this model news does not have an statistically significant effect on the price of Bitcoin price, we can see that traditional financial market confidence does have

an effect on Bitcoin price, demonstrating that the primary use for Bitcoin at least currently is a speculative commodity or asset, rather than a transactional currency, as was Bitcoin's original intent. Bitcoin will most likely never reach this goal until it solves its volatility problem, and until then it will remain primarily an asset for traders. The progression Bitcoin will need to follow before it becomes the transactional currency that it was envisioned as is moving from its current state as a commodity to a state where it can prove its store of value. Once its store of value is stable, then and only then can it transform into the transactional, decentralized currency that is free from all governmental and central bank intervention, that Satoshi Nakamoto imagined when he created the currency ten years ago.

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A Appendix

Table 7: Distribution of the types of news events included

News Subject	Number of News Articles
Global News	11
Economic/Financial News	17
Blockchain Technology News	35
Exchange Specific News	16