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Master's Thesis of Global Management of
Public Administration

An Investigation into Premium Price
in Korean Bitcoin Market

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March 2018

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Abstract

This study aims to explore a background for a so-called Kimchi premium on Korean Bitcoin market. Korea has garnered considerable attention around the globe because the level of the Bitcoin price was set far higher than in other countries. This paper tries to find a reason for the Korean Bitcoin premium in relation to government policies. Following previous studies that suggest a premium price that one country pays more than other countries reflects a higher speculative demand in the cryptocurrency market, this paper focuses on the environment that allowed higher speculative demand could grow in Korean Bitcoin market. Compared to other countries, Korea is found out to be late in making their first move in cryptocurrency markets. While other major countries such as the US, Japan and China recognized the need for a regulatory system and started to take measures to deal with relevant issues as early as 2013, it was not until 2017 that Korean government issued their first official announcement toward cryptocurrency markets. In other words, Korea had to face a frenzy cryptocurrency craze peaked on December 2017 basically with no regulatory frame. This paper regards that the absence of a regulatory framework in Korea provided a favorable soil for speculative demands to grow. So this paper traces a trend of Bitcoin Kimchi premium, analyzing changes made between ex-ante and ex-post a series of intensive government policies targeting the cryptocurrency

market. The fact that Kimchi premium is found out to have vanished after a strong government intervention implies higher speculative demand reflected in high Bitcoin premium was due to a lack of appropriate regulatory framework. The most important contribution of this paper is that it offers a different view toward premium price in cryptocurrency from precedent studies. Previous studies tend to argue that countries with high premiums have a larger incentive to invest in alternative means, such as cryptocurrency because their financial system is poorly functioning. Apart from this dominant view, this paper thinks existence and non-existence of an appropriate regulatory framework are important in the creation and extinction of speculative demands that lead to premium price.

Keyword: Bitcoin, Cryptocurrency, Speculation, Premium price
Student Number: 2017 – 24288

국문초록

최근 몇 년간 세계는 가상화폐라는 새로운 매체의 탄생과 관련 시장의 폭풍적인 변동을 경험하였다. 정부나 중앙의 통제를 받지 않으며 실물이 존재하지 않는 가상화폐의 개념과 운영원리의 신기성(novelty)이 초창기 학계의 주된 관심사였다면, 최근 학계는 가상화폐 가격의 폭등과 높은 변동성 및 그 투기적인 속성을 연구하는 데 주력하고 있다. 본 논문 역시 가상화폐가 학계에 던진 수많은 연구주제 중 하나에 기여함을 목표로 하고 있다. 특히 본 논문은 한국의 비트코인 시장을 주제로 다른 외국의 시장에 비해 한국에서 비트코인이 크게 높은 가격에서 거래되는 양상을 보였던 소위 ‘김치 프리미엄’ 현상을 탐구한다.

본 연구는 한국 비트코인 시장의 프리미엄이 시간에 따라 어떻게 변화하는지 살펴본다. 특히, 유보적인 입장을 취했던 한국 정부가 2017년 12월부터 강도 높은 시장개입 노선으로 입장을 변경한 후 두 달에 걸쳐 쏟아낸 일련의 규제정책들을 중심으로 규제 전(2017년 12월 이전), 본격적인 규제정책 도입기 (2017년 12월~2018년 1월), 제도 정착 (2018년 2월 이후) 이후에 비트코인 프리미엄이 어떻게 변화하였는지 조망한다. 이러한 분석은 가상화폐 프리미엄에 대한 기존 선행연구가 연구가 정부의 정책이나 시장 개입에 대한 고려 없이 이루어져왔던 것과 차이를 보인다.

조사 결과 한국 정부의 일련의 규제정책 이후에 김치 프리미엄은 대부분 소멸한 것으로 밝혀졌다. 가격 프리미엄은 기본적으로 다른 시장보다 투기적인 수요가 높을 때 나타난다는 선행연구의 가정에 따르면 정부정책 이후 상대적으로 한국시장에서 강도 높게 나타났던 투기적인 수요가 적어도 다른 외국의 시장 수준으로 감소한 것으로 해석된다.

이에, 본 연구는 정부의 정책이 투기적 수요 진작에 긍정적인 영향을 미친 것으로 판단하고 정부 정책이 어떠한 내용과 방식으로 집행되었는지 살펴보았다. 본 논문에서는 정부가 거래 자체를 규율하기 위한 정책들을 집행하는 한편, 투기적인 수요 진작을 위한 대국민 홍보라는 두 가지 방식으로 시장 진화에 나선 것으로 분석하였다.

본 연구는 기존의 선행연구들에서 가격 프리미엄이 높게 나타나는 국가들의 경우 시금융기관의 후진적 운영으로 수익이 낮기 때문에 가상화폐 보유의 유인이 높고 자본이동의 장벽이 높아 차익거래가 이루어지기 힘들다는 주장을 주로 펼쳐왔던 것의 반론이 될 수 있다는 데 그 의의가 있다. 새로운 매체나 기술에 대한 정부의 정책이 신속하게 도입되지 못한 경우 규제의 공백으로 인한 투기적인 시장이 형성될 수 있고, 적절한 규제를 통해서 시장의 비이성적 과열을 진화할 수 있다는 것을 비트코인 시장을 통해 확인하였다. 다만 트렌드 분석과 정부 정책의 대강을 살펴봄으로써 이러한 가능성을 제시하는 데에 머물러 각국 시장의 규제수준을 수치화하여 통계적으로 가설을 검증하는 데까지 나아가지는 못한 바, 이러한 한계를 보완하기 위한 후속 연구가 요청된다고 하겠다.

주요어: 비트코인, 가상화폐, 투기적 수요, 가격 프리미엄

학번: 2017-24288

Chapter 1. Introduction

1.1. Concept of cryptocurrency and Bitcoin market

The original concept of Bitcoin is invented in 2008 by an unknown figure named Satoshi Nakamoto. It is an online, digital currency, operating on a peer-to-peer network (Buchholz et al., 2012). Compared to a standard fiat currency, such as dollars or euros, the key distinguishing feature of Bitcoin is that the quantity of units in circulation is not controlled by a person, group, company, central authority, or government, but a software algorithm controls the amount of Bitcoins issued (Ciaian et al., 2014). It means Bitcoin operates in a decentralized way. A Bitcoin is an entry in an electronic, publicly available ledger or blockchain (Linda & Herald, 2018). Bitcoins can be created or issued in a "mining" process, in which users solve complex mathematical problems and record solutions into the blockchain. Bitcoins can be transferred from one owner to others through the blockchain mechanism. The idea of a Bitcoin system is innovative since it implies the whole process of money production and circulation can be done without any interference from central governments or intermediaries. Since the way Bitcoin is gathered resembles solving a cryptogram, people coined the term 'cryptocurrency' to name those new currencies. A term 'virtual currency' is also used, reflecting its feature that does not have a substantial form. Since both terms are widely used, this paper also adopts both terms.

Since the birth of a Bitcoin in 2009, over 1,800 cryptocurrencies have been created (Badkar, 2018). However, according to data from a virtual currency analysis company Bitcoin's position in terms of trading percentage, price, and market capitalization in virtual currency markets is overwhelming (see figure below).

<Figure> Top 20 cryptocurrency (12/05/2018)

#	Name	Symbol	Market Cap	Price	Volume (24h)
1	Bitcoin	BTC	\$146,825,783,340	\$8,622.78	\$8,874,330,000
2	Ethereum	ETH	\$67,784,043,087	\$682.14	\$3,433,710,000
3	Ripple	XRP	\$27,093,529,444	\$0.69	\$990,798,000
4	Bitcoin Cash	BCH	\$24,063,140,282	\$1,405.39	\$1,594,630,000
5	Litecoin	LTC	\$7,935,385,677	\$140.49	\$547,397,000
6	Cardano	ADA	\$6,870,232,932	\$0.26	\$347,817,000
7	Stellar	XLM	\$5,863,702,512	\$0.32	\$83,642,100
8	IOTA	MIOTA	\$5,276,938,242	\$1.90	\$141,164,000
9	NEO	NEO	\$4,240,515,500	\$65.24	\$188,816,000
10	Monero	XMR	\$3,259,604,888	\$203.47	\$54,896,700
11	Dash	DASH	\$3,204,369,154	\$397.32	\$117,037,000
12	NEM	XEM	\$2,839,167,000	\$0.32	\$31,447,500
13	Bytecoin	BCN	\$1,827,436,092	\$0.01	\$88,826,100
14	Ethereum Classic	ETC	\$1,821,977,786	\$17.93	\$376,677,000
15	Qtum	QTUM	\$1,468,300,190	\$16.57	\$210,117,000
16	Lisk	LSK	\$1,080,881,998	\$10.22	\$28,419,300
17	Bitcoin Gold	BTG	\$981,508,424	\$57.74	\$36,324,800
18	Zcash	ZEC	\$941,788,628	\$241.90	\$59,873,000
19	Verge	XVG	\$892,809,477	\$0.06	\$82,517,900
20	Nano	NANO	\$834,913,793	\$6.27	\$20,337,700

* Data source: coinmarketcap.com

Bitcoin is the top currency in market capitalization of 2202 virtual currencies registered in Coinmarketcap.com as of May 23rd, 2019, accounting for almost 60% of total cryptocurrency transactions (see the figure below). The orange area in the graph shows the percentage share of the Bitcoin. As new cryptocurrencies are developed and traded over time, the relative proportion of the Bitcoin tends to be decreasing but still takes the biggest share in the virtual currency market. Based on its dominance, Bitcoin has been regarded as representative virtual currency.

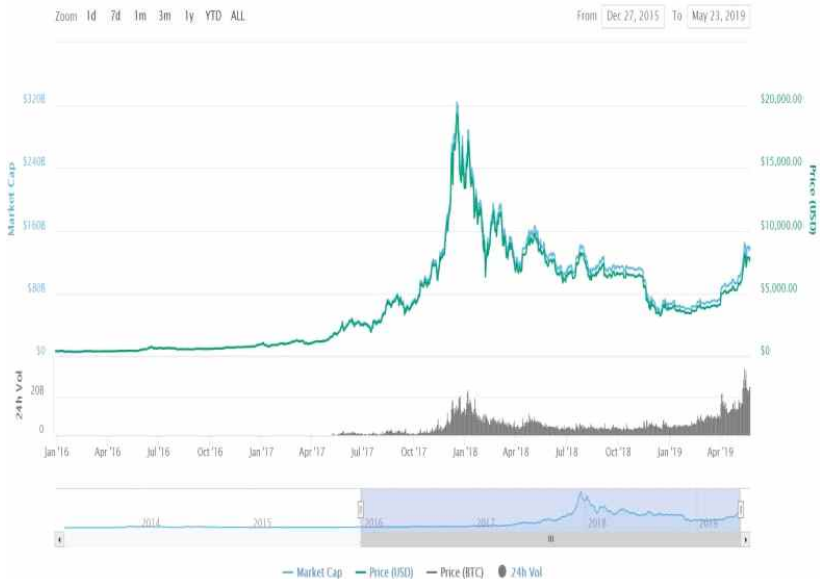
<Figure> Percentage of total market capitalization (dominance)



* Data source: Coinmarketcap, accessed May 23rd, 2019
<http://coinmarketcap.com/charts/#dominance-percentage>

In addition to its innovative concept of cryptocurrency and blockchain technology, Bitcoin's rapid appreciation and price hikes play an important role in dragging its popularity. Its price increased from zero value at the time of its inception in 2009 to around \$13 per Bitcoin in January 2013 and subsequently shot up by more than 8000% to around \$1100 at the end of 2013 (Ciaian et al., 2014). Late 2017 and early 2018 became auspicious time for Bitcoin, setting its monumental new high of \$ 20,089 per unit (see Figure below).

<Figure> Bitcoin close price and market cap in USD
(Jan. 1st, 2016 - May. 12nd, 2018)



*Data Source: coinmarketcap.com

Green line represents price while the blue line means market cap.

After the peak of early 2018, the price of Bitcoin collapsed and is failing to retrieve its highest price. Nguyen & Thaver (2018) explains tightened regulations, a wide introduction of other cryptocurrencies, shut down of some well-known exchanges, a prohibition of cryptocurrency in China are among attributable reasons for Bitcoin price fall.

Another interesting phenomenon observed with respect to Bitcoin price is that price gaps between an exchange to other exchanges. Since Bitcoin has a homogeneous nature where there is no difference between coins, it can be expected that there will be no price difference beyond transaction cost between exchanges. Nevertheless, in reality, there is a significant price difference between exchanges and so-called price premium has been observed. Especially, a Bitcoin market price in Korea tended to be formed at a far higher level than that of international prices. CNN reported that the price of Bitcoin remained much higher in the Korean market, using the term "Kimchi premium". In the same article, CNN mentioned it is in such high demand on Korean exchanges that South Koreans often end up paying a premium of between 15% and 25% over global prices¹⁾. To review this phenomenon contradicting to a Law-of-One-Price (LOOP), a number of researchers have devoted their works. This paper also aims to contribute to this field.

1) CNN, 2017.12.12. Retrieved from
<http://money.cnn.com/video/news/2017/12/12/Bitcoin-south-korea-kimchi-premium.cnnmoney/index.html>

1.2. Bitcoin market and government policies

Since the emergence of virtual currency cast both new challenges and possibilities to our society, major governments in the world have issued related policies to bring virtual currency into an institutional framework. While many developed countries had recognized a need for preemptive actions and started to prepare initiatives in the early stage of Bitcoin history, Korea failed to gear up themselves in advance and faced the market boom basically without any proper system. This section is allocated to introduce preliminary activities taken by major countries, which made a huge difference in market situations between Korea and others.

The United States

The United States is one of the countries who took their initial response as early as 2013. On March 2013, the Financial Crimes Enforcement Network (FinCEN), a bureau of the United States Department of the Treasury that collects and analyzes information about financial transactions in order to combat domestic and international money laundering, terrorist financing, and other financial crimes, defined virtual currency dealer as a "Money Service Provider (MSP)" in Anti-Money Laundering (AML) law and introduced guidelines to apply regulations on virtual currency market. Moreover, in October 2013, the FBI shut down the Silk Road, a website that traded drugs and

firearms with Bitcoin, which means the crackdown and monitoring were conducted on criminal acts using Bitcoin.

Furthermore, in March 2014, the Internal Revenue Service (IRS) issued a Notice 2014-21, which describes how existing tax principles can be applied to transactions using virtual currency²). This public pronouncement provided a basis for taxation by classifying Bitcoin as a property for tax purposes. The notice delivering IRS position on matters of a virtual currency served as a primer on the key tax issues raised by Bitcoin use and how those issues should be analyzed under existing tax laws.

Moreover, government institutions in the US have started to release public alerts from the early stage of a Bitcoin market. The U.S. Securities and Exchange Commission (SEC), for example, issued an investor alert in July 2013 to warn individual investors about fraudulent investment schemes that may involve Bitcoin and other virtual currencies³). Even after, SEC posted several alerts on an official website alarming heightened risk of frauds related to virtual currency⁴). Not only SEC but also The Financial Industry Regulatory Authority (FINRA)⁵), the North

2) IRS, (March 25, 2014) Notice 2014-21, Retrieved from <https://www.irs.gov/pub/irs-drop/n-14-21.pdf>

3) Retrieved from https://www.sec.gov/investor/alerts/ia_virtualcurrencies.pdf

4) SEC, (May 7th, 2014) Investor alert: Bitcoin and other virtual currency-related investments. Retrieved from https://www.sec.gov/oiea/investor-alerts-bulletins/investoralertsia_Bitcoin.html

5) FINRA, (May 7th, 2014) Bitcoin: More than a Bit Risky <http://www.finra.org/investors/alerts/Bitcoin-more-bit-risky>

American Securities Administrators Association (NASAA) and the Consumer Financial Protection Bureau (CFPB) joined warning campaign to protect investors from jumping in scams or speculative investments. As for NASAA, they included digital currency on its list of the top 10 threats to investors for 2013. CFPB advised consumers to be aware of potential issues such as unclear costs, volatile exchange rates, the threat of hacking and scams, and that companies may not offer help or refunds for lost or stolen funds⁶).

A number of government hearings were held on virtual currencies to improve public understanding about virtual currency (Nov. 18th 2013; Nov. 19th 2013; Feb. 18th 2014; Apr. 11th 2014)⁷). From the benefits and risks of virtual currency to the potential need for federal government intervention to regulate the increasing demand for digital currency was discussed and questioned by committee members and penalist.

6) CFPB (Aug. 11th, 2014) Risks to consumers posed by virtual currencies, https://files.consumerfinance.gov/f/201408_cfpb_consumer-advisory_virtual-currencies.pdf

7) A video clip for each government hearing can be retrieved from the link in the following order
<https://www.c-span.org/video/?316289-1/digital-currencies-challenges-promises>
<https://www.c-span.org/video/?316346-1/senate-banking-virtual-currencies>
<https://www.c-span.org/video/?317779-5/washington-journal-future-Bitcoin>
<https://www.c-span.org/video/?316289-1/digital-currencies-challenges-promises>

Japan

The Japanese government recognized the need for proper regulation of virtual currency after the bankruptcy of Mt. Gox, the world's largest Bitcoin exchange at that time in February 2014 (Kawai & Nagase 2018). As the amount of legal and virtual currency held by the company was revealed to be far below the amount to be paid to investors, a voice calling for a regulatory framework for consumer protection enlarged. In light of these circumstances, Japanese lawmakers amended the Payment Services Act (PSA) and the Act on Prevention of Transfer of Criminal Proceeds (APTCP) on 25 May 2016 to regulate business handling virtual currencies (VC Exchanges) who provide exchange services between virtual currencies and traditional real money (Ohashii et al. 2017). The laws were designed to impose obligations on VC Exchanges to protect consumers and to prevent the virtual currency from being used in money laundering and entered into effect on 1 April 2017. Namely, Japanese policies regarding virtual currency were set to directly regulate VC exchangers. With the amendments, VC exchanges were institutionalized and monitored under government supervision.

China

While Japan chose to take an approach to target VC exchanges, China decided to limit a virtual currency transaction itself. The root of the current regulatory landscape can be traced back as early as 2013. Chinese authorities issued the Notice on Precautions against the Risks of Bitcoins (2013 Notice) on 3 December 2013, which shows their initial approach on virtual currency (Fu, 2018). Starting with reviewing features of virtual currency, China clarified their position by stating “the virtual currencies are not a currency in the strict legal sense despite their name because they are not issued by the monetary authorities and thus lack the legal status of legal tender (Fu, 2018).” Interestingly, the 2013 Notice allowed virtual currency trading on a restricted basis. Even though it was banned for financial institutions to trade virtual currencies, online transactions using web platforms were permitted.

However, virtual currency trading was completely banned as Chinese government pronounced the Announcement on Preventing Token Fundraising Risks on 4 September 2017 (2017 Announcement) (Fu, 2018). The 2017 Announcement declared that fundraising activities involved in virtual currency were unauthorized by a monetary authority, therefore illegal. Moving further, the announcement demanded complete closure of virtual currency business platforms, requiring VC exchangers to make refunds to investors who deposited their money. The

announcement also involved a statement that the Chinese authority has a right to shut down websites and businesses who do not comply with the government decisions. Ten days after the announcement was made, there was a pronouncement from Bitcoin China, the biggest virtual currency exchange of the time, that they decided to exit the market. Following their suit, most of the virtual currency exchanges in the country left the market, which led to a complete vanishment of transactions made in Chinese Yuan in the cryptocurrency market.

South Korea

As briefly noted above, foreign governments have made their strides to deal with urgent issues raised by birth and rise of virtual currency markets. Though there were differences in their approaches, the countries started to take initiative as early as 2013. On the other hand, it was not until September 2017 that Korea took its first step to respond to the virtual currency market. What made worse was that Korean government showed wait-and-see approach as they stated “it is necessary to analyze and assess the feature and utility of virtual currencies from a balanced perspective and carefully examine whether regulatory oversight is necessary (Joint Authorities Report, Sep. 2017, p.1)⁸⁾ While other countries were building up a system to

8) The paper can be retrieved from

https://www.fsc.go.kr/info/ntc_news_view.jsp?bbsid=BBS0030&page=1&schl=s&subject&sword=%EA%B0%80%EC%83%81%ED%86%B5%ED%99%94&r_url=&menu=7210100&no=32027

provide a framework for the cryptocurrency market, Korean government took a reserved position, saying that there was no shared consensus made among countries on the virtual currency issue and further policies should be reviewed on the careful manner (Joint Authorities Report, Sep. 2017).

This paper regards it was inevitable for Korea to face red-hot markets in December 2017 virtually in devoid of any appropriate regulatory framework because Korea chose to have a reservation and did not make active preemptive steps to intervene in a virtual currency market. It is deemed that the absence of a regulatory framework in Korean cryptocurrency market provided favorable conditions for speculative demands to grow, which led to Bitcoin premium in the market. To examine this claim, this paper firstly looks into precedent studies committed to this field. Then, the Bitcoin premium trend until the present time is reviewed and a linkage between government policies and Bitcoin premium price is discussed.

Chapter 2. Literature Review

Since the birth of the first cryptocurrency Bitcoin in 2009, cryptocurrencies have had phenomenal rise over the past ten years. The novelty of the concept and dramatic evolution of the market have dragged full attention from various experts groups including finance, economics, academia and the government. In this paper, the preceding study related to Bitcoin was divided into four main flows, and major domestic and foreign studies were reviewed.

2.1. Early researches on cryptocurrency

The very early approaches in the field of mainly devote their works on discovering the concept of cryptocurrencies while comparing their characteristics with fiat money and other assets. They aim to introduce background knowledge needed to understand the notion and technological foundation of cryptocurrencies, unfamiliar concept, to the public and the related academic community. This includes discussions about how to understand what is different from the traditional currency, how it works and how it can be traded and how it can be used.

Brito & Castillo (2013) provides an early primer on Bitcoin. It introduces a Bitcoin network, including its properties, operations, and pseudonymous character. The paper also describes a regulatory landscape and proposes brief policy recommendations for policymakers. In a similar view, Böhme et

al(2015) explains economics, technology and governance of the Bitcoin system. Meanwhile, Chohan (2017) examines the historical evolution of Bitcoin through is literature "A History of Bitcoin".

There is also a journal that publishes only the articles of cryptocurrencies and blockchains. It is called *Ledger* and according to a description in its official homepage⁹⁾, it is a peer-reviewed scholarly journal that publishes full-length original research articles on the subjects of cryptocurrency and blockchain technology, as well as any relevant intersections with mathematics, computer science, engineering, law, and economics. It is published online by the University Library System, University of Pittsburgh.

In case of South Korea, a number of researchers have conducted research to introduce related concepts and current situations surrounding the Bitcoin since 2013 when the concept of the Bitcoin began to be known(Kim, T. H., 2013; 양희성·권영미¹⁰⁾, 2015; 전주용, 2013; Jun & Yeo, 2014). The above studies show the characteristics, technical properties, types and price trends of exchanges, and the regulatory and operation of countries as virtual currencies distinct from conventional currencies.

9) <http://ledgerjournal.org/ojs/index.php/ledger>

10) Literatures are quoted in Korean since they do not provide official names in English

The revolutionary concept of cryptocurrencies built on a blockchain technology which allows transactions in the absence of a centralized custodian not only provides positive expectations with technological breakthrough but also raises concerns of misuse in the vacuum of appropriate regulatory frameworks. Critics widely pointed out that virtual currencies, including Bitcoin, can be traded without the government or banks, which can be used for hiding criminal profits, money laundering or tax evasion. Accordingly, preliminary scholarly efforts were made to deal with these issues. Papers related to this area can be divided into studies involving each of the problem areas (taxation or crime) related to virtual currencies and studies dealing with the overall government management system.

First of all, as the Marian (2013) shows the possibility of a tax avoidance using virtual currency, the issue of Bitcoin taxation is one of the most detailed explorations have been made in this field. dealt researches and focused areas in this field. Governments and international organizations such as The United States (Internal Revenue Service), OECD (2014), European Banking Authority (2014) have come up with tax plans appropriate to their respective regions and countries.

As the government taxation guidelines on Bitcoin and virtual currency were announced significantly later in Korea than in other countries, domestic academic studies were relatively abundant. Hong, D. H. and Kim, B. I. (2015) reviews the taxation issue on the virtual currency in terms of income tax,

corporate tax, value-added tax and inheritance tax, pointing out that Bitcoin had the nature of being a tax haven. Jeong, S. Y. (2015) suggests that virtual currency can not fall under legal currency when it is classified by tax law and can be classified as a new type of intangible asset. Shin, S. H & Kang, S. H (2015) consider the legal characteristics of Bitcoin as an asset and assert that income tax, corporate tax, and inheritance tax should be taxed for the profit, an inheritance and gift of Bitcoin. However, they think only VAT should not be levied on Bitcoin transactions because it should be regarded as a payment method in applying VAT. In addition, they propose governments should obtain transaction information from exchanges and mandate users to register their Bitcoin public keys so that Bitcoin can be prevented from being used as a tax haven.

Next, there is a trend of research on crimes outside the tax evasion problem using Bitcoin. Dion (2013) writes about Bitcoin fraud regulation. He argued that regulators must seek a balance between oversight and cooperation from the major institutions, namely the exchanges. This paper highlighted the use of the Money Laundering Act and the Exchange Act as the way for the government to achieve that balance.

There are several domestic literatures regarding Bitcoin-related crimes. They categorize four types of crimes related to Bitcoin: those that use Bitcoin as compensation, those that use Bitcoin, and those that hack Bitcoin. Then their paper examines Bitcoin regulation measures made by major foreign

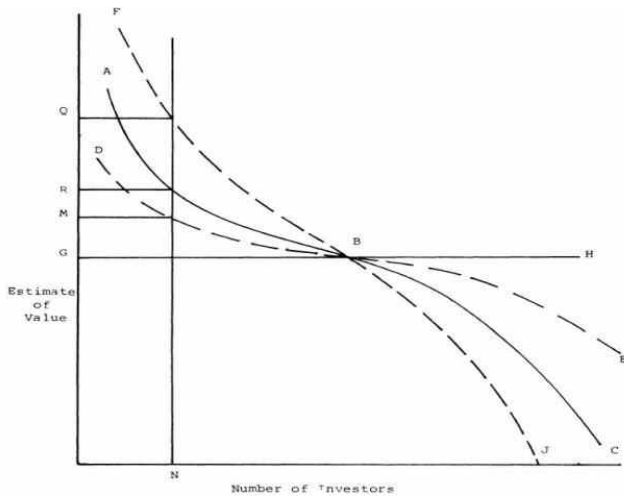
countries such as the United States, Britain, Japan and China and explores countermeasures appropriate for Korean case. In the similar vein, Jeong, J. W. (2016) divides the cases of Bitcoin crime into four types, which are used for illegal trading, the type used for money laundering, the type of tax evasion, and the type aimed at acquiring Bitcoin. The countermeasures were divided into technical and institutional countermeasures. On the other hand, from a criminal legal standpoint, Lee, J. H. & Kim D. W. (2017) talk about the possibility of using Bitcoin for online fraud, gambling, hacking, embezzlement, terrorism, drug crime and tax evasion.

2.2. Speculative demand and Bitcoin

2.2.1. Traditional bubble literature

Kindleberger (1978), Miller (1977) and Shiller (2015) are some of the most famous studies on the bubble and irrationality of the asset market. To be specific, Kindleberger (1978) provides a bubble theory based on the human tendency of herding behavior. When the first shock initiates the bubble, which is often an exogenous shock such as technological innovation or birth of a new financial instrument, herding behaviors attract immature investors to take part in buying spree and forms overly optimistic expectations in the market during the phase of bubble expansion. However, because expectations are not stable, the bubble bursts into nothing as the expectations reaches its peak and reverse to pessimism.

Miller (1977) explains the price of an asset can be driven by the demand of participants with the highest or the most optimistic expectations among all individuals by focusing on the bounded rationality in the market. Since it is beyond one's ability to know every information, people may have heterogeneous beliefs in the market. In this case, under a short-sale constraint, the author argues the market price may be set higher than the average expectations, which implies bubble, as the graph below indicates. Curve ABC in the graph is a cumulative distribution of the number of investors who wish to buy the assets at the given price, reflecting the assumptions that investors make different estimates of expected returns of investments due to the uncertainty. When there are only N shares available, the selling price of the stock will be R , above average evaluation G .



* Source: Miller (1977, p.1152, Figure 1)

Shiller (2015) provides a ground for autocorrelation or serial–correlation of bubble prices. Autocorrelation means price movements at some point tend to trigger price movements at the next point in time (Hong, 2018). Shiller (2015) argues that after the price rises in the market for the first time, people might feedback that cause a larger price increase due to psychological bias. He explains the price changes affect people' expectation and it can lead to further price hikes, which forms a basis for a bubble.

To sum up, the works of Kindleberger (1978), Miller (1977) and Shiller (2015) show how a bubble is formed and increased by irrational behavior, bounded rationality or peoples' expectations. These traditional theories provide a ground for future bubble theory in Bitcoin markets as this paper reiterates in the later part.

Bubble Markets and governmental policy

A number of previous studies have devoted their efforts to point out the importance and impact of government policy in traditional asset markets. For example, credit policy can either suppress or amplify housing price because it directly affects people' s expectation and credit constraint. Rajan (2010) and Mian & Sufi (2015) who study the US housing market point out the US government policy has been focused on lifting financial institutions' restrictions and loosening household credit restrictions which promoted housing boom. Researchers who devoted their works in examining investment demand in domestic

housing markets also tend to conclude that speculative or investment housing demand is highly affected by government policy (Choi & Seo, 2017; Park, 2019; Hong 2018).

Especially, Hong (2018)' s remark about the need for appropriate government policy in housing market especially in the time of bubble is notable. She asserts that when real estate prices are overheated or caught in frenzy speculative demand a government can stabilize it through policy measures. On the other hand, improper policy measures may amplify existing overheating expectations or overcooled horror, which will exacerbate market volatility. The author speculative motives and market volatility can be weakened significantly with appropriate government interventions.

While the role and effect of government policy have been dealt with significance in conventional bubble literature, governmental interventions in speculative markets for the cryptocurrency is hard to be found in Bitcoin literature. Though researches claiming for appropriate tax and regulating system for cryptocurrency have been conducted in the early era of cryptocurrency, they are not related to bubble markets because the market was still in its infancy. To this paper' s knowledge, Delikanli & Vogiazas (2018) is the only paper that asserts the present financial system devoid of an effective regulatory framework has palpated the gigantic growth in Bitcoin price. According to them, to evade the instability and economic costs with the expansion of cryptocurrency markets, appropriate policy delivering effective regulatory frame is highly needed.

2.2.2. Bitcoin, different from traditional currency and assets

With a dramatic growth of the cryptocurrency market, scholars have worked to examine whether it should be viewed as a form of currencies or a sort of traditional assets or another form of assets. Their works seem to converge into a shared opinion that cryptocurrency can not be viewed as a currency nor traditional assets and rather, it should be categorized into another form of assets that has high speculative nature.

A limit of Bitcoin as a form of currency

A remark from Delikanli & Vogiazas (2018) successfully summarizes the fallacy of the belief that Bitcoin can be served as another form of currency. "Bitcoin is disjointed from any institutional control or tied to the performance of the economy. Being devoid of an economic anchor, its value is left to the whims of speculative investors. It is, therefore, a currency permeated with insurmountable contradictions. The whole rationale behind adopting Bitcoin as a currency is a pressing need to build a system that runs smoothly without being centralised. This is fundamentally fallacious as the economic system within which is trying to be established itself as a dominant currency cannot afford decentralized systems (Delikanli & Vogiazas, 2018, p.520)."

Empirical studies also show that Bitcoin is far from traditional currencies. According to Gangwal & Longin (2018), in order for Bitcoin to be regarded as a currency, it needs to satisfy three economic functions: ① intermediary of exchanges, ② a unit of account, ③ store of value. However, the authors consider Bitcoin does not cater to any of these functions. First and foremost, the authors point out the use of Bitcoin as an intermediary in the exchanges is quite limited. Secondly, they explain Bitcoin is not normally accepted as the official reference for prices. Lastly, owing to high volatility of Bitcoin price, the researchers conclude that it is hard to be used as a medium to store value. The chart below quoted from Gangwal & Longin (2018, p.13, Table 5) shows a much higher daily price volatility of Bitcoin compared to that of traditional currencies.

< Table: Basic risk indicators of Bitcoin and major currencies >

	BTC/USD	EUR/USD	JPY/USD	CNY/USD
Volatility	7.18%	0.60%	0.60%	0.14%
Long 95% Var.	-9.31%	-0.98%	-0.94%	-0.20%
Short 95% Var.	10.54%	0.98%	0.95%	0.20%

*Note: “This table gives the basic risk indicators of Bitcoin and major currencies in order to assess the stability of Bitcoin as a currency. Four major currencies are considered: US dollar, Euro, Japanese Yen and Chinese Yuan. Daily volatility and 95% VaR for both long and short positions are computed for each currency against the US Dollar. Daily volatility is computed as the standard deviation of log-returns. VaR is computed with the historical method. Data are obtained from Bloomberg for the period from October 10, 2010 to August 2, 2016 (Gangwal & Longin, 2018, p.13, Table 5).”

The remarks of Gangwal & Longin (2018) are consistent to what Baur and McDermott (2010) say in their researches pointing out that the fluctuations in the Bitcoin markets were more volatile than the volatility of the major currencies, the dollar, the euro, and the yen, and thus Bitcoin can not function as currency.

In a supplementary way, Yermack (2013) argues that Bitcoin behaves more like a speculative investment than a currency. He backs up his idea by showing Bitcoin's daily exchange rates exhibit virtually zero correlation with bona fide currencies. Further, from a monetary theory perspective, Horra, Fuente & Perote (2019) argues the demand for Bitcoin does not stem from its utility as a medium of exchange. On the ground that the demand for a widely-used currency depends essentially upon three variables: income, price level, and interest rates, they discover all three variables fail to account for the price for Bitcoin, which negates Bitcoin's suitability as a currency.

Difference between traditional assets and Bitcoin

Scholars consistently refer to the fact that the Bitcoin does not hold intrinsic value making it differed from traditional financial assets such as real estates, stocks and bonds (Fantazzini et al. 2016; Geuder et al., 2018; Gangwal & Longin 2018). Fantazzini et al. (2016) explain the main drivers of Bitcoin price dynamics are mainly of speculative nature in that

global macro-financial variables seem to play no role, which makes Bitcoin differentiated from other assets such as real estates and stocks or bonds.

Further, unlike conventional financial assets, the Bitcoin does not deliver financial cash flows to form its fundamental value. Since its value is detached from fundamentals, researchers show Bitcoin price has high volatility since its inception, unlike other traditional assets. Buchholz et al. (2012), for example, stress that Bitcoin price volatility has a statistically significant positive effect on a price before the peak of the bubble, implying the speculative nature of Bitcoin exchange rates. In a similar point of view, Gangwal & Longin (2018) show the Bitcoin has high price volatility when it is compared to other major equity indexes as shown in the chart below.

< Table: Basic statistics for Bitcoin and major equity indexes >

	BTC/USD	S&P 500	EuroStoxx	Nikkei 1225	SSE 180
Volatility	7.18%	0.97%	1.10%	1.44%	1.64%
Long 95% VaR	-9.31%	-1.57%	-1.77%	-2.25%	-2.67%
Short 95% VaR	10.54%	1.52%	1.77%	2.18%	2.43%

*Note: “This table gives the basic risk indicators of Bitcoin and major equity indexes. Four major equity indexes are considered: S&P500 index for the US, Eurostoxx for the European Union, Nikkei 1225 for Japan and SSE 180 index for China. Daily volatility and 95% VaR for both long and short positions are computed for each asset class. Data are obtained from Bloomberg for the period from October 10, 2010 to August 2, 2016 (Gangwal & Longin, 2018, p.14, Table 6).”

Bitcoin, speculative demand and price bubble

“Bubble is the existence of a systematic deviation of the market price from the fair price of that asset, corresponding to the net present value of the future cash flows from that asset (Chaim & Laurini, 2019, p. 2).” In the case of Bitcoin, since it does not carry fundamental value, fundamental price or fair price of Bitcoin can not be assessed, meaning that its value depends on investors’ expectations and sentiments (Gangwal & Longin, 2018). This sets the point where scholars locate the Bitcoin case in the stream of bubble literature. As introduced in the earlier part of this paper, traditional bubble literature note that speculative demands are essentially associated with investors’ expectations and sentiments toward the assets (Kindleberger, 1978; Miller 1977; Shiller, 2015)

A number of empirical studies have succeeded to attest the sign of a bubble in the cryptocurrency markets. For instance, in his paper, Kristoufek (2013) proves Bitcoin's attractiveness for investors has a direct impact on Bitcoin price. He points out that since there is no interest rate for digital currencies and accordingly profits can be made only from price hikes, the demand for Bitcoin is thought to be driven by investors' speculative motives. Ciaian et al. (2014) for another example, conclude the strongest and statistically most significant impact on Bitcoin price is attributable to Bitcoin's attractiveness for investors.

The work of Eom, et. al. (2019) also reaches the same conclusion. By utilizing Google trend index (GTI) by the keyword 'Bitcoin' as a proxy for investor sentiment regarding Bitcoin¹¹⁾, they argue that Bitcoin is found out to be an investment asset rather than a monetary asset because of its high dependence on investor sentiment. Results from Nguyen & Thaver (2018) shares a similar view. They suggest that demand for Bitcoin is driven mostly from speculative demand indicators such as media attention and price of another cryptocurrency.

Not only the price volatility but also the evidence so far, represent that Bitcoin holds features deeply related to speculative bubbles that can be analysed by the mainstream explanations of irrational exuberance or mania (Delikanli & Vogiazas, 2018). Gangwol & Longin (2018) succinctly describes the boom and burst of Bitcoin price depending on investors' beliefs. "When the confidence builds up, the asset price exponentially increases; and then the confidence evaporates, the asset price crashes (Gangwol & Longin, 2018, p.7)."

11) The authors explain the ground for using GTI as follows: "Investors often use the Google search engine to gather information about their interests. ... the frequency of searches by keyword may indicate the strength of investors' interest (ibid., p.512)."

2.3. Price deviations and Bitcoin premium

Studies on high volatility in Bitcoin price lead to researches on different market prices across countries and exchanges because some market prices show distinctive patterns with higher volatility as well as higher price relative to other Bitcoin markets. Even though it has been widely seen that Bitcoin prices differ from markets to markets, the studies devoted to this issue are fairly limited. This paper finds that scholars use different terms to refer to price differences in Bitcoin markets. Price deviation and premium price are found to be the two most frequently used terms.

2.3.1. Existence of price difference in Bitcoin exchanges

As for preliminary work in this field, Pieters & Vivanco (2017) note a mismatch phenomenon in the price of the Bitcoins between virtual currency exchanges. The paper supposes that the markets sell Bitcoin should achieve the Law-Of-One-Price (LOOP), the theory that identical goods should be sold at identical prices when trade costs are taken into account. Since Bitcoin is a homogeneous good that completely same across every market and the Bitcoin markets operate 24 h a day, 7 days a week, with price data available immediately and free of charge, the authors argue Bitcoin price should be identical across all markets. However, they document significant differences in Bitcoin prices across 11 different markets representing 26% of

global Bitcoin trade volume. They try to explain this phenomenon with the difference in the exchanges' compliance with Anti-money laundering (AML) procedure. The authors put that the markets that do not require customer identification when they open accounts are more likely to deviate from representative market prices than those which do. Despite their limitation in the sophistication of their research, Pieters and Vivanco (2017)' s work has a scholarly value in that it pioneers the issue of price deviations in Bitcoin markets.

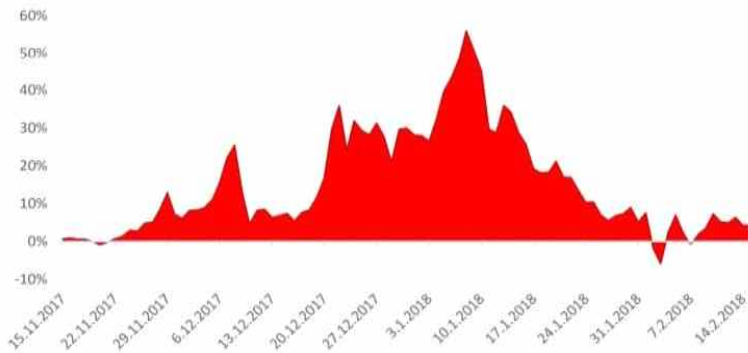
Though Bitcoin price difference between countries has been frequently observed, the notable overprice of cryptocurrencies in the Korean market attracted attention not only from investors but also from media and scholars. Even a new term called 'KimChi premium' was coined to indicate such phenomena and academic efforts have been made to examine this issue. (Nagy, 2018; Choi, Lehar & Staffer, 2019) Firstly, Nagy (2018) compares prices in Korean and European Bitcoin market using data from Korbit and Kraken respectively and he clarifies Kimchi premium exists as shown in the charts below. He notes that the price of Bitcoin stayed overvalued almost consistently all the way. Under his findings, there are occasions that the premium goes as high as more than 50%, which reveals a high incentive for arbitrage trading.

< Graph: Bitcoin Kimchi premium compared to Europe price >
17.01.01 - 17.07.15



* Data source: Nagy (2018, p.36, Graph 13)

< Graph: Bitcoin Kimchi premium compared to Europe price >
17.11.15 - 18.03.15



* Data source: Nagy (2018, p.36, Graph 14)

Choi, Lehar & Staffer (2019) also show the existence of KimChi premium in Korean markets. While Nagy (2018) compares markets in Korea and Europe, Choi, Lehar & Staffer compare three markets (Korea, Europe and the U. S.) by using data from Korbit, Kraken and Bitstamp respectively and find out Kimchi premium to be positive (Median 1.56%, Mean 3.237%, Min. -7.741%, Max 54.476%) while the average premium for the European market is near zero (see graph below).

< Graph: Bitcoin Kimchi premium compared to US price >



* Data source: Choi, Lehar & Staffer (2019, p.3 Figure 1)

Since the price deviations are commonly observed not only in Korea but basically in all over the world, researches trying to cover more countries and markets have also been conducted.

Choi, Lehar & Staffer (2019) provide summary statistics (median, mean, standard deviation) for an international sample of 12 countries including South Korea. They describe that Bitcoin premium is not a thing found only in South Korea but rather a worldwide phenomenon. According to the data they use, Countries such as Argentina, Nigeria, South Africa New Zealand, Mexico and Sweden are found to pay a higher premium than South Korea does.

<Table: Bitcoin premium compared to US price by countries >

Country	ISO	FX-Data	number of observations	Premium (in %)		
				median	mean	std.dev.
Argentina	ARS	OANDA	788	9.46	19.42	20.88
Australia	AUD	St. Louis Fed	788	0.96	1.37	2.38
Brazil	BRL	St. Louis Fed	788	4.41	5.54	5.53
Canada	CAD	St. Louis Fed	788	-0.02	-0.11	1.71
Chile	CLP	OANDA	683	2.56	3.50	5.81
Euro-Zone	EUR	St. Louis Fed	788	0.06	-0.02	0.86
Great Britain	GBP	St. Louis Fed	788	3.65	3.88	1.56
Hong Kong	HKD	St. Louis Fed	753	2.50	2.10	5.16
Israel	ILS	OANDA	787	0.57	0.80	3.34
India	INR	St. Louis Fed	788	2.63	3.80	6.20
Japan	JPY	St. Louis Fed	788	0.42	0.72	1.74
Korea	KRW	St. Louis Fed	788	1.39	2.97	6.42
Mexico	MXN	St. Louis Fed	788	5.58	6.29	3.61
Malaysia	MYR	OANDA	782	0.40	0.63	12.31
Nigeria	NGN	OANDA	543	20.45	26.35	24.69
Norway	NOK	St. Louis Fed	788	3.67	3.96	2.41
New Zealand	NZD	St. Louis Fed	788	6.75	6.95	3.66
Sweden	SEK	St. Louis Fed	788	5.38	5.51	2.26
Singapore	SGD	St. Louis Fed	747	-0.42	-0.49	1.26
Thailand	THB	St. Louis Fed	788	0.63	1.16	3.73
Venezuela	VND	OANDA	605	1.17	1.95	4.09
South Africa	ZAR	OANDA	613	6.84	7.74	4.48

* Sample data (Jan. 2016 –Feb. 2018) are collected from Bitcoincharts.com. Column 3 shows the source of the foreign exchange data used to convert local currency Bitcoin prices to USD.

* Data: Choi, Lehar & Staffer (2019, p.21 Table 3)

The most extensive research is done by Makarov & Schoar (2018), covering 34 exchanges across 19 countries. They find out ① there are significant deviations in Bitcoin prices across exchanges. What is surprising to them is the large and recurring deviations exist even between countries with the most liquid exchanges such as the US, Japan, Korea and Europe. For example, they note that the daily average premium between the US and Korea from Dec. 2017 to early Feb. 2018 was over 15%. ② Plus, they discover Bitcoin price gap across countries is highly asymmetric. Bitcoin is found to be traded almost at a higher price and hardly at a lower price outside the US and Europe. ③ Most importantly, their analysis shows that price deviations happen during periods of a particular quick appreciation of Bitcoin prices. They interpret quick appreciation as a sensitivity of a country' s Bitcoin price to changes in world markets. They conclude countries like Korea have a higher price sensitivity and is willing to pay more for Bitcoin in response to the same positive market shock.

2.3.2. Reasons for a recurring gap of arbitrage chances

Papers dealing with Bitcoin price differences across exchanges often link their subject to the limit of arbitrage, which indicates that prices can deviate from Law-Of-One-Price (LOOP) in the presence of arbitragers. (Makarov & Schoar, 2018; Nagy 2018; Choi, Lehar & Staffer, 2019). They especially compare their works to precedent works of dual stock markets

or Siemens twins (Rosenthal & Young, 1990; Froot & Dabora, 1999). The scholars find there can be huge differences in the stock prices when the same stocks are traded in different countries. Similar to what these papers show, Bitcoin markets show dramatic price gaps across exchanges. Makarov & Schoar (2018) point out “the deviation from the law of one price is even more striking in the case of cryptocurrencies, since unlike shares which are traded within specific countries, Bitcoins can be transferred to any market. As a result, typical explanations such as tax-induced investor heterogeneity or index membership do not apply in this case (p. 6).”

To provide an explanation to sustaining price deviations, scholars try to offer answers to two important questions. Firstly, why investors in some countries have higher demand or wish to pay more on Bitcoin needs to be addressed. Researchers like Makarov & Schoar (2018) and Spade (2018) assume that investors in countries with failing or poorly functioning financial institutions might be willing to pay more on Bitcoin because Bitcoin may be a preferred alternative or investors can get more benefit from Bitcoin investments. Secondly, why such a gap persists and fails to close? Scholars acknowledge the price difference could only maintain if capital markets are segmented and arbitrage chances are small. Researchers assert a level of openness (or capital control) can explain the infilling gap of Bitcoin prices (Makarov & Schoar, 2018; Nagy 2018; Choi, Lehar & Staffer, 2019)

2.4. Contributions and Limitations of precedent studies

Precedent studies deliver significant facts about a speculative demand for cryptocurrency and premium prices. To summarize, three main factors are mentioned as important determinants of premium price in cryptocurrency. ① Firstly, direction of price movement is said to affect the size of Bitcoin premiums. As reviewed in the former part, Makarov & Schoar (2018) observes widening price deviation in times of quick appreciations of the Bitcoin price. ② Secondly, capital controls in the countries are thought to be one of the reasons of recurring gaps of Bitcoin premium. Nagy(2018) asserts the Korean regulation capping the amount of cash that Koreans can send abroad to \$ 50,000 per year is the reason for the Kimchi premium. ③ Lastly, government interventions that affect investors' sentiment or expectation toward market can affect the size of Bitcoin premium. Previous literature on bubble theories suggest government intervention is a core factor in determining speculative demand that leads to bubble price in traditional asset markets (Choi & Seo, 2017; Park, 2019; Hong 2018). This paper comes to think that this relation can also be applied to cryptocurrency market.

Three possible determinants of the Bitcoin premium are suggested from previous studies, however, the second possible factor, the capital controls seem to leave significant limitations. As Makarov & Schoar (2018) admit, the magnitude of the arbitrage spreads are still surprising even if they consider there

could be some regulations making cross border transfers difficult because many of industry reports suggest that large institutions should be able to avoid these constraints. Furthermore, the key reason that Nagy(2018) suggests as a reason for Kimchi premium, the regulation that caps the amount of cash transferable to \$ 50,000 per year does not hold the truth. Under the Foreign Exchange Trade Act, there is no limit on the amount of money transferred to a foreign country, and if the amount exceeds 50,000 dollars per day, it is only required to report to the designated foreign exchange bank and transfer money through the relevant bank. Therefore, this can not explain the large Bitcoin premium in Korea.

Interestingly, this paper finds no research has been conducted to examine Kimchi premium in relation with the government intervention in the cryptocurrency market. Precedent studies regarding Bitcoin premium fail to include the role of government in highly speculative markets even though it is deemed as an almost indispensable factor in traditional asset markets.

Chapter 3. Bitcoin Premium in Korea

3.1. Research Design and Data Description

This paper looks into the Kimchi premium in relation with government interventions. Especially, it examines how the Bitcoin market responded to government interventions in Korea. As described in the former part, government interventions can affect speculative demand in bubble markets. Since the premium price is thought to reflect the larger size of speculative demand (Makarov & Schoar, 2018), this paper assumes the Bitcoin premium would decrease with the government intervention.

Government intervention		Inspectors' sentiment	Speculative demand		Premium
X	→	positive	High	→	High
O	→	negative	Low	→	Low

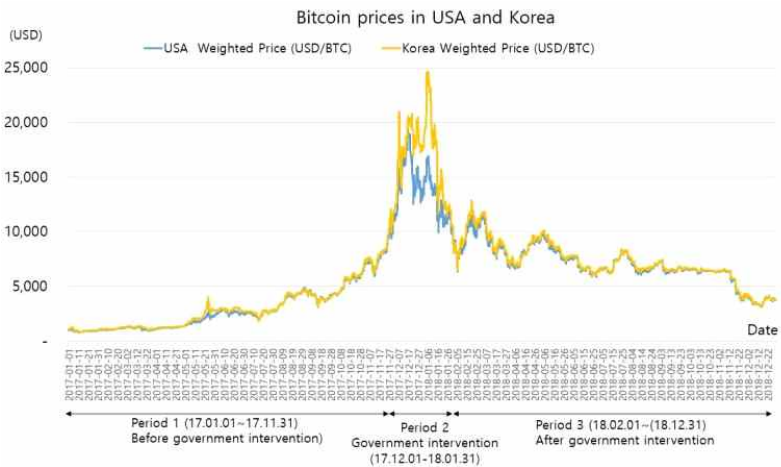
* Independent variable: Government interventions

* Dependent variable: Bitcoin premium

To examine the effect of government intervention on Bitcoin premium, this paper sets three periods covering from January 1st 2017 to 31st 2018. The period before 2017 is excluded because the liquidity in crypto markets was significantly lower than in later periods as Makarov & Schoar (2018) notes. Also, since government policies were deployed heavily for two months from December 2017 to January 2018,

this paper compares the market situation of the time before (Period 1) and after the market intervention (Period 3). So this paper divides the research period into three sub-periods as follows:

- Period 1 (2017.01.01.–2017.11.30.): Before Active Intervention
- Period 2 (2017.12.01.–2018.01.31.): Active Intervention
- Period 3 (2018.02.01.–2018.12.31.): After Active Intervention



Since active and comprehensive anti-speculation policies were bombarded during two months between December 2017 to January 2018, it is set as Period 2 that represents the time of intensive market interventions. Period 1 exhibits the market where it enjoys a vacuum of government regulations while Period 3 shows the time after the last regulative measure was implemented.

This paper assumes that the lower premium rate is to be observed in Period 3 than Period 1 because of the impact of the government intervention that negatively affects speculative demands. This paper assumes it is hard to verify the impact of government intervention in Period 2 because a series of policies are in process of implementation and the true impact can be realized after a certain period of time.

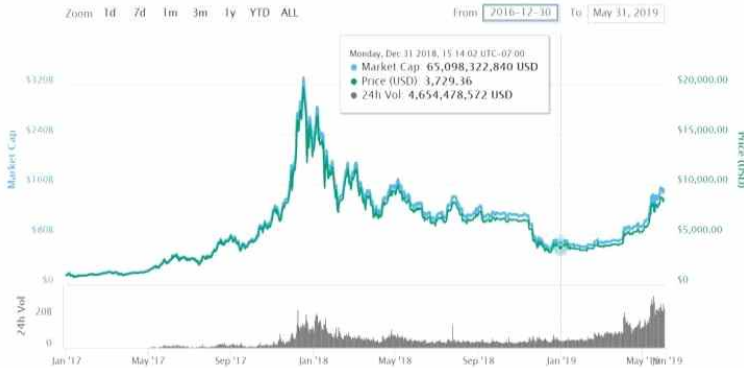
		Period 1	Period 2	Period 3
Independent Variable	Government intervention	X	Under the process of implementation	O
Dependent variable	Expected Premium	High	Hard to determine	Low

In addition, this paper incorporates a price trend (increasing/decreasing) factor as a second independent variable that is said to be a significant factor in Bitcoin premium in the previous study (Makarov & Schoar, 2018). When the price trend is considered, each period holds determinants as follows :

		Period 1	Period 2	Period 3
First independent variable	Government intervention	X	Under the process of implementation	O
Second independent variable	Price trend	Increasing	Increasing	Decreasing
Dependent variable	Expected Premium	High	Hard to determine	Low

In this case, it is hard to explain the change of Bitcoin premium is due to the government intervention (First independent variable) or the price trend (Second independent variable). So this paper adds Period 4 (2019.01.01.–2019.05.24.) where Bitcoin price increases with the government intervention in effect.

< Bitcoin price trend in Period 4 (2017.01.01 – 2019.05.24.) >



		Period 1	Period 2	Period 3	Period 4
First IV	Government intervention	X	Under the process of implementation	O	O
Second IV	Price trend	Increasing	Increasing	Decreasing	Increasing
DV	Expected Premium	High	Hard to determine	Low	Low

Bitcoin prices

This paper confines attention to the most liquid and largest cryptocurrency market: Bitcoin (BTC). Bitcoincharts.com is used to gain Bitcoin market prices data in Korea and the USA. Since Bitcoincharts.com offers historical data about Bitcoin price in coin exchanges around the world, it has been widely used to assess premium price by researchers (Choi, Lehar & Staffer, 2019; Makarov & Schoar, 2018). For comparability, this paper also uses data from Bitcoincharts.com. This paper chooses Korbit and Bitstamp as exchanges to gather Bitcoin price data in Korea and USA respectively. These exchanges are one of the most liquid exchanges in the countries that are frequently adopted by researchers in their papers (Choi, Lehar & Staffer, 2019; Makarov & Schoar, 2018). Bitcoin Weight Price data was downloaded from Korbit and Bitstamp because it is thought to be more appropriate to reflect 24/7 open market feature of virtual currency than daily price.

KRW/USD exchange rate

Daily official KRW/USD exchange rates were used to convert Bitcoin price in Korean Won into US dollars. Daily exchange rate data pair between the two currency is obtained from Oanda. This paper used Oanda as a source for the exchange rate as it is widely used by other researchers (Spade, 2018; Makarov & Schoar, 2018). As Spade (2018) notes, Oanda

is one of the most trusted providers of currency information covering up to 25 years of historical exchange rate data on more than 38.000 currency pairs. For analysis, currency rate data were downloaded from Oanda and then matched with the date of each transaction gathered from Bitcoincharts.com.

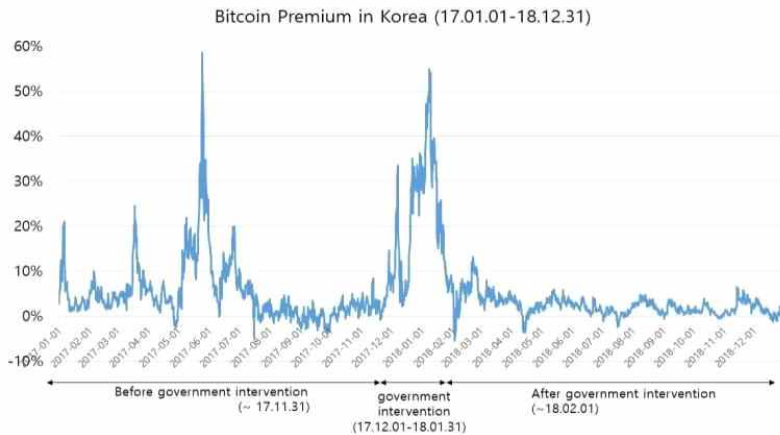
Korean Bitcoin premium rate (KBPR)

The Korean Bitcoin premium rate over the Bitcoin price in USD, which is defined as follows:

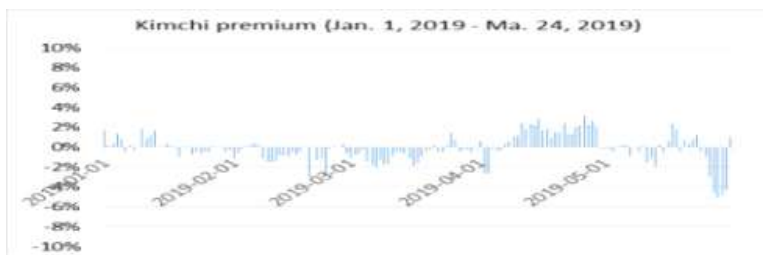
$$= \frac{KRW/BTC_{price} \times USD/KRW_{exchangerate} - USD/BTC_{price}}{USD/BTC_{price}} \times 100$$

3.2. Result: Changes in Bitcoin premium in Korea

This paper finds that changes have been made in the Bitcoin market with intervention policies. Especially, significant price deviations, frequently witnessed during the first two periods, are not well-observed in the third period. In other words, a noticeable Kimchi premium does not exist after the strong anti-speculation moves. As the premium is thought to lead to higher speculative demand, the evened out trend of the premium indicates speculation craze have fairly been tranquilized.



< Kimchi premium in Period 4 >



The table below demonstrates basic statistical data that summarizes sharp differences in Bitcoin premium between before and after the government policy implementation. Maximum premiums were over 50% during the first period. However, it shrank to 13% in the third period. Average Bitcoin premium in the third period was recorded as 2%. Recalling the precedent studies that conclude there is no significant premium price in European market compared to the US market when there is 3% average price deviation (Makarov & Schoar, 2018), the situation in Period 3 indicates the Kimchi premium vanished after the end of Period 2.

If the argument that attributes the extinction of Kimchi premium to the fall of Bitcoin price holds truth, the premium will rise again as Bitcoin price moves upward in Period 4. On the other hand, if the Kimchi premium shows no sign of reviving, this will be a supportive fact to the argument of this paper. The result of our analysis shows that it is clear that predominant premiums are not observed any more even in the price increasing time. Average and median value of Kimchi premium in Period 4 even reach negative value, which is -0.14% and -0.16% respectively. This result implies the decrease of Korean premium is not simply owing to the decline of Bitcoin price.

< Changes in Korean Bitcoin premium >

Period 1	Min	-5.00%	Period 3	Min	-6.00%
	Max	58.00%		Max	13.00%
	Mean	3.00%		Mean	2.00%
	Median	5.00%		Median	2.00%
	STD	0.066		STD	0.021
Period 2	Min	2.00%	Period 4	Min	-5.13%
	Max	55.00%		Max	3.20%
	Mean	21.00%		Mean	-0.14%
	Median	21.00%		Median	-0.16%
	STD	0.136		STD	0.014

This result demonstrates a sharp decrease in Bitcoin premium between ex-ante government policies and ex-post government policies. It suggests there is a possible link between speculative demand reflected in Bitcoin premium and government regulations. The result of the Kimchi premium trend analysis provides evidence for the argument that a devoid of an appropriate response in Korean cryptocurrency market may have provided a ground for abnormal speculative demand (Period 1 & 2). Likewise, strong government interventions targeting the frenzied market would certainly have depressed the buying spree (Period 3 & 4).

In the following chapter, this paper examines how the Korean market intervention is made. Mainly, two types of policies are discussed. For one, an array of policies providing a framework to rule cryptocurrency markets is examined. It includes policy measures such as enacting anti-money laundering

guidelines for financial institutions, holding special crackdowns on criminal use of cryptocurrency, implementing a real-name-only-transaction policy to target anonymity that prevents transaction monitoring. For another, public relations policies that intends to cool down the overly positive public sentiment for virtual currency are reviewed. Especially, reminding the precedent studies on traditional asset markets that emphasize the role of investors' sentiment and expectation on a bubble formation, public alerts and signals that the Korean government frequently issued to warn the market are dealt with significance in the later part of the chapter.

3.3. Additional Analysis

To supplement the analysis in the former part, this paper conducts an additional analysis, comparing the premium trend of Korea and other countries. This paper chooses six countries that are mentioned to have high Bitcoin premiums according to the previous studies. Choi, Lehar & Staffer (2019) mentions countries such as Argentina, Brazil, Mexico, Nigeria, New Zealand and South Africa were reported to have higher Bitcoin premium than Korea in the period starting from January 2016 to February 2018. These countries are reported as not having any government regulations to rule the cryptocurrency market until 2019 (Reese, 2019), which makes a difference from Korea. By conducting this analysis, we can eliminate the effect of the time variable and only look into the effect of government intervention.

Basically, similar methods are applied to conduct the comparison. A Bitcoin exchange that represents each country's market is selected and the data in the exchanges are downloaded from Bitcoincharts.com. Daily weight price is used to calculate Bitcoin premium. To gather currency rate data of these countries, this paper uses data from St. Louis Fed¹²⁾ and the currency data that can't be found in St. Louis Fed are retrieved from Investing.com¹³⁾.

12) Choi, Lehar & Staffer (2019) also use currency exchange data from St. Louis Fed. For compatibility, this paper tries to use same source of data.

13) "Investing.com is a global financial portal and internet brand owned by Fusion Media Limited, registered in the British Virgin Islands, composed of 28 editions in 21 languages. It provides news, analysis, streaming quotes and

The data information that this paper uses is summarized in the table below.

< Data description for additional analysis>

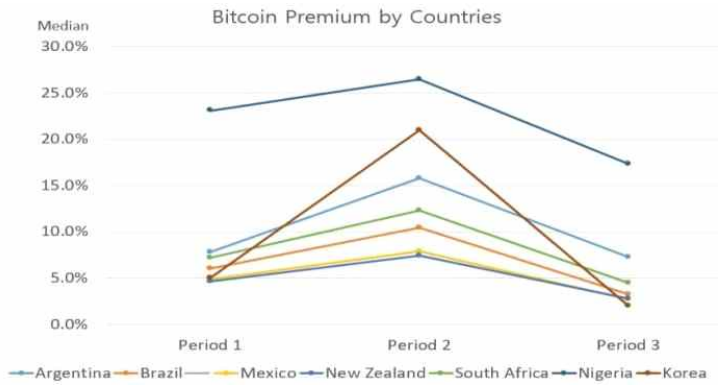
Country	Currency	Bitcoin exchange	Currency rate
Argentina	ARS	LocalBitcoin	Investing.com
Brazil	BRL	LocalBitcoin	St. Louis Fed ¹⁴⁾
Mexico	MXN	LocalBitcoin	St. Louis Fed
New Zealand	NZD	LocalBitcoin	St. Louis Fed
South Africa	ZAR	BitX	St. Louis Fed
Nigeria	NGN	BitX	Investing.com
Korea	KRW	Korbit	OANDA

The result of analysis is shown in the graph below and it implies Korea experienced the sharpest decrease in Period 3. Considering only Korea applied regulative policies to the cryptocurrency market while other countries in this analysis maintained non-intervening stance, it means the sharpest premium decrease in Korea is due to the government policy.

This paper acknowledges other countries also experienced decrease in Bitcoin premium even though they did not implement any government regulations on cypto markets. It means price trend also plays a role in determining Bitcoin premium. But when you hold the price factor still, we can witness the impact of government intervention, showing that the government intervention acts in reducing Bitcoin premium.

charts, technical data and financial tools about the global financial markets. (Wikipedia,Retirieved from <https://en.wikipedia.org/wiki/Investing.com>)”

14) Retrieved from <https://fred.stlouisfed.org/>



* This graph illustrates median premium of each country

Chapter 4. Korean Government Interventions

4.1. Introduction

While other major countries such as the US, Japan and China recognized the need for a regulatory system and started to take measures to deal with relevant issues as early as 2013, it was not until 2017 that Korean government issued their first official announcement toward cryptocurrency markets. Even when Korea made its first announcement toward the cryptocurrency market on September 2017, it was written in a reserved and cautious manner based on a wait-and-see approach. Only since December 2017 did the government took an assertive move and could Korea witness the Kimchi premium decreasing. A series of government policy responses can be summarized as shown in the table below.

The government approach toward the booming cryptocurrency market that contributed to decrease speculative demand and eventually extinguish Kimchi premium can largely be described in two ways. ① They devised measures to regulate transactions itself, as well as ② intentionally and frequently issued alerts and alarms to discourage the speculative sentiment and demand of their people. Though both approaches share a policy goal to stabilize the frenzy cryptocurrency market, they can be analyzed into two different categories because they had a slightly different policy target. While the first approach is about building up a framework to provide rules on 'transaction' itself,

the second approach is to send out public notices with alerts and warnings to deflate maniac ‘speculative sentiment’ .

**< Table: Cryptocurrency policies >
implemented by the Korean government**

Date	Government policy	Contents
17.09.01	Announcement after 1st Virtual Currency-Related Authorities Joint TF	<ul style="list-style-type: none"> ▪ The first official government announcement toward cryptocurrency market <ul style="list-style-type: none"> - Describing the concept and feature of virtual currency - Reviewing both merits and demerits in a cautious and reserved manner ▪ Not a comprehensive approach <ul style="list-style-type: none"> - Focusing on controlling criminal use of virtual currency
17.09.29	Announcement after 2nd TF meeting	<ul style="list-style-type: none"> ▪ Checking out an implementation status of 1st meeting decisions <ul style="list-style-type: none"> - Banning ICO and credit offering - Starting a joint raid on cryptocurrency related crimes ▪ Commenting on the need for government response so that cryptocurrency is not used as a criminal or simple means of speculation beyond the function of the original purpose
17.12.04	Announcement after 3rd TF meeting	<ul style="list-style-type: none"> ▪ Presenting negative views toward a recent trend in cryptocurrency market

17.12.13	Announcement of requesting caution	<ul style="list-style-type: none"> ▪ Financial Services Commission expressed serious worry about market overheating
17.12.13	Urgent Deputy Undersecretary Meeting	<ul style="list-style-type: none"> ▪ Deputy Undersecretary Meeting (presidency: The Office for Government Policy Coordination), was called upon to craft guideline for Special Measures ▪ Provide guideline for upcoming Special Measures <ul style="list-style-type: none"> – Determined reaction to criminal use of cryptocurrency – Implementing Anti-speculation measures – Providing a comprehensive management framework
17.12.28	Announcement of Special Measures	<ul style="list-style-type: none"> ▪ Special Measures announced as a result of the 1st meeting of Deputy Undersecretary Meeting, <ul style="list-style-type: none"> – Declaring abnormal speculation should not be neglected – Enforcing real-name transaction – Suggesting maximum punishment for illegal activities – Reviewing a shutdown of exchanges as a possible option
18.01.08	Financial Services Commissioner' s public statement	<ul style="list-style-type: none"> ▪ Warning on Irrational speculation

18.01.08	On-site inspection on Banks	<ul style="list-style-type: none"> ▪ Checking commercial banks' compliance with government policy
18.01.15	Announcement of Governmental caution	<ul style="list-style-type: none"> ▪ Reemphasize the strong willingness of intervention to cryptocurrency speculative markets
18.01.23	Financial sector follow-up policies after 12.28 Special Measures	<ul style="list-style-type: none"> ▪ Introducing real-name transaction system ▪ Initiating AML guideline for cryptocurrency
18.06.27	Revision of AML guideline	<ul style="list-style-type: none"> ▪ Strengthening AML guideline
18.10.24	Notice to virtual currency funds investors	<ul style="list-style-type: none"> ▪ Warning that those funds are not a fund under the legal laws nevertheless the name 'funds'
18.10.24	Distribution of partial report from BIS	<ul style="list-style-type: none"> ▪ Deliver major warnings from BIS such as value instability, fragile trust structures

4.2. Policies providing a regulatory framework

The basic outline of the present regulatory system was constructed with three pronouncements that delivered significant tools to govern the cryptocurrency market. They are ① Announcement after 1st Virtual Currency–Related Agency Joint TF issued on Sep. 1st 2017 (‘1st Announcement (17.09.01)’), ② Special Measures issued on Dec. 28th 2017 (‘Special Measures (17.12.28)’) and ③ Financial sector follow-up policies after 17.12.28 Special Measures issued on Jan. 13th 2018 (‘Follow-up Policies (18.01.13)’).

① 1st Announcement (17.09.01)

It was not until December 2017 that government took an assertive regulatory move. On the first day of September 2017, the Korean government formed a Task Force (TF, see the organization chart below) and issued their first statement to deal with a growing market of cryptocurrency.

< Virtual Currency–Related Authorities Joint TF >

□ Presidency: Deputy Commissioner of Financial Services
○ Related Authorities
• National Police Agency • Korea Communications Commission
• Ministry of Justice • Fair Trade Commission
• National Tax Service • Ministry of Strategy and Finance
• The Office for Government Policy Coordination
○ Related Institutions
• Bank of Korea • Financial Supervisory Service
• Korea Internet & Security Agency

Even though they expressed their will that the government would certainly respond in a decisive manner in dealing with virtual currency related crimes or illegal activities, the announcement was basically written in reserved and cautious manner based on a wait-and-see approach. Starting with introducing principle concepts including possible merits and demerits of cryptocurrency, which showed the government was in their preliminary stage of understanding the new market, the TF stated that a future course of action will be devised through sufficient discussion, looking at the trends of other countries.

The expressions in the sentence that the TF used in their 1st Announcement also shows their wavering stance. In other words, it says “it is necessary to analyze and assess the feature and utility of virtual currencies from a balanced perspective and carefully examine whether regulatory oversight is necessary (Joint Authorities Report, Sep. 2017, p.1)¹⁵⁾. Since Korea chose to have a reservation and did not take active preemptive steps to intervene in a virtual currency market, it was inevitable for Korea to face red-hot markets in December 2017 virtually without any appropriate regulatory framework.

15) The paper can be retrieved from
https://www.fsc.go.kr/info/ntc_news_view.jsp?bbsid=BBS0030&page=1&sch1=subject&sword=%EA%B0%80%EC%83%81%ED%86%B5%ED%99%94&r_url=&menu=7210100&no=32027

② Special Measures (17.12.28)

Recognizing the seriousness of the market boom, the Korean government called upon Urgent Deputy Undersecretary Meeting* on Dec. 13th 2017 to discuss a more comprehensive and strong regulatory plan. As a result of the meeting, a guideline for upcoming Special Measures was provided.

* Participated department: Ministry of Strategy and Finance, Ministry of Justice, Financial Services Commission, Korea Communications Commission, Fair Trade Commission, Ministry of Science and Technology Information and Communication

Two weeks after the Deputy Undersecretary Meeting, the government announced Special Measures on Dec. 28th 2017. The government noted that it was now inevitable to enforce more rigorous approaches to root out speculation as well as to tackle anonymity and money laundering in the cryptocurrency space. It is interpreted that the government took a further step since the market frenzy did not seem to be dissolved despite the precedent government actions. The most powerful and restrictive decisions were made. Especially, the introduction of real-name-transaction-only policy and the announcement that the government was under a review of the complete shutdown of cryptocurrency exchanges threw a tremendous shock to the market. Bitcoin, which had been traded at more than 21 million won until Dec. 28th morning, plunged to the 19 million won level as of the next day morning. The Bitcoin price in the global market also plummeted. It was traded at around \$15,400 before the Korean government announced the measures, but drop to \$13,500. The main contents are summarized in the table below.

< Main contents of Special Measures (17.12.28) >

□ Securing transparency in financial transactions

- **Introduction of real-name-transaction-only policy (Jan.)**
 - The use of previous non-real-name accounts are banned
 - Switching to a service that allows deposits only between an identified customer and an exchange where their accounts are both opened in the same bank.
 - Prohibit minor and non-resident transactions
 - Immediate stop of issuing new virtual accounts
 - A transition of existing virtual accounts to real-name accounts
-

○ **Suspension of providing financial services to unlawful exchanges**

- Exclusion from financial services for the unlawful exchange that does not comply with the Emergency Measures (18.12.13).
-

- Enacting Anti Money Laundering (AML) guidelines for virtual currency
 - Strengthening exchange verification and monitoring of suspicious transactions so as to manage exchanges and transactions
 - Strengthening Customer Due Diligence (CDD) duty
 - Strengthening Suspicious Transaction Report (STR) duty
 - * (Customer type) Large amounts of frequent transactions with minors, low-income earners
 - * (Cash transaction) High cash deposit and transfer to virtual currency exchange
 - * (Distributed transaction) Receive funds from multiple individuals and transfer them to the virtual currency exchange
-

□ Intensifying regulation on exchanges

- Recommending voluntary check up for online advertising
- Plan for reviewing terms and conditions of major virtual currency companies (BTCKorea.com and punishing major virtual currency companies by reviewing unfair terms and conditions

□ Intensive crackdown on related crimes

□ Reviewing complete closure of virtual currency exchange

*Data: Translated and summarized using (OGPC, 2017.12.28.)

③ Follow-up Policies (18.01.23)

Since more detailed implementation system and plans were needed to actually enforce the regulatory outline announced from Special Measures (17.12.28), Follow-up Policies was issued on Jan. 23rd 2018. Specifically, details to introduce real-name-transaction-only policy and apply Anti Money Laundering (AML) obligations on banks to oversight cryptocurrency transaction and exchanges were disclosed.

Real-name-only-transaction system (Launch: Jan. 30th)

Previously, investors could deposit money through non-real-name accounts attached to a corporate account held by the exchange. The system was difficult for banks to comply with their Know Your Customer (KYC) obligation since it was almost impossible to identify account holders.

However, under the new rule, “a buyer of cryptocurrency coins is only allowed to make money transactions between a personal account with the holder’s identification verified and a corporate account held by a cryptocurrency exchange. The two accounts must be issued from the same bank to allow coin investors to deposit and withdraw money. If the accounts are from different banks, the investors cannot make a deposit (Son, 2018, p.1)” (see example below).

< Example: Real-name-only-transaction >

Bank name that an exchange use		Bank name that a customer use	Availability of Deposit
◆◆◆	≠	○○○	YES
◆◆◆	=	◆◆◆	NO

* Withdrawal available in both cases

* Participating banks: Nonghyup Bank, Shinhan Bank, KEB Hana Bank, KB Kookmin Bank, The Industrial Bank of Korea and Gwangju Bank (total of 6)

『AML Guidelines for Virtual Currencies』 (Launch: Jan. 30th)

With the clampdown on anonymity, the government enacted 『AML Guidelines for Virtual Currencies』 to clarify the role and duty of financial institutions as an AML watchdog. It includes three major points. Firstly, it imposes a higher level of KYC obligations. Financial institutions should carry out Enhanced Due Diligence (EDD) if they find out they are carrying out a financial transaction using their banking service. Secondly, the guideline encourages active Suspicious Transaction Report (STR) with more staff and additional standards. Lastly, the guideline asks financial institutions to emphasize an internal control system which casts relevant duties to the board of directors to comply with the guidelines.

4.3. Public relations activities to depress market sentiment

While implementing the above policies, the Korean government took steps to extinguish the abnormal craze by issuing warnings and concerns over cryptocurrency. Emergency Measure (17.12.13) includes public relations policy plans 'to send out periodic warnings of the risk of virtual currency investment, such as loss of value, fraud, and hacking risks.'

It is notable to see the language and tone of public statement that the government used to suppress speculation fever. This paper finds the government often used dramatic and strong expressions to deliver its will to shrink overly optimistic market sentiments. For example, MOJ stated that "it is an 'extremely unstable market [극도로 불안정한 시장]' with repeatedly plummeting prices, raising concerns and criticism that it is 'a casino which opens 24 hours [24시간 도박장]' or 'a roller coaster of fear [공포의 롤러코스터]" in its press release on Dec. 4th 2017 (MOJ, 2017.09.29, p.2). Strong expressions such as 'No-Questions-Asked speculation [묻지마식 투자]' and 'Exaggerated and false rumor [과장·허위풍문 유포]' were widely used in public statement in FSC press release issued on Dec, 13th 2017 (FSC, 2017.12.13., p.2). Other expressions such as 'Severe fraud and speculative attributes [심각한 사기 및 투기성]' or 'Social pathology [병리현상]' were also found in government statements.

Further, Korea actively involved ministers to deliver intense warning signals. Press releases headed by ministers were highly effective to express strong will of the government to suppress maniac market atmosphere. For example, in a statement posted after a cabinet meeting on Nov. 28th 2017, Prime minister Lee Nak-yeon said “this can lead to serious distortion or social pathological phenomena, if left unaddressed [현실을 이대로 두면 심각한 왜곡현상이나 병리현상이 벌어질 것¹⁶⁾]” to warn against Bitcoin speculation. For another example, At the New Year's press conference in 2018, Minister of Justice Park Sang-ki said the ministry was preparing a bill that would basically ban virtual currency transactions through the exchange due to the huge concern over a virtual currency (Yeonhap News, 2018). This statement directly affected the cryptocurrency market and the Bitcoin price collapsed by 20% than the 24 hours before. FSC also seemed to use their commissioner' s remark to efficiently deliver their message. Commissioner of Financial Services Choi Jong-gu hold a press release meeting on Jan. 8th 2018 and made a public statement that thoroughly expounded on their regulatory framework. Since these press releases and statements were made by a prime minister and chief ministers who were TF leaders, Korean government could successfully convey their determination to stabilize the markets.

16) Arjun K. (Nov, 29th 2017) Bitcoin could lead kids into illegal activities like drug dealing, South Korean prime minister warns, CNBC, retrieved from <https://www.cnbc.com/2017/11/28/Bitcoin-could-get-kids-into-drug-dealing-south-korean-pm-warns.html>

This paper finds that the Korean government also used another tactic, quoting only negative mentions from famous scholars and financial experts, to effectively convey its warning messages. For example, the press release from MOJ on Dec. 4th 2017 delivers quotes as follows:

[Warning about Bitcoin introduced in domestic media]

- Joseph Stiglitz, Nobel Economics laureate
"Bitcoin was successful because of its potential deceptive...What needs to be outlawed... ..doesn't function socially useful" (Nov. 29)
- William Dudley, president of the Federal Reserve Bank of New York
"Bitcoin is close to speculative activity ... There is no 'value stability' that is essential for money." (Nov. 29th)
- Ulrich Stefan, Deutsche Bank Chief Strategist
"It's amazing that the value of Bitcoin is so exaggerated that it has a tremendous impact on the market, and I would simply not recommend this to the everyday investor (Nov. 23rd)
- Lloyd Blankfein, CEO of Goldman Sachs
"Bitcoin is like a bubble" (Nov. 9)
- Jamie Dimon, chairman and CEO of JP Morgan Chase & Co.
"Bitcoin is a fraud, bubble will burst eventually" (Sep. 12nd)
- Morgan Stanley Analyst Team
"Bitcoin is typical speculation, there is a question if it's a legal currency"(Jul. 12nd)

* Note: translated in English by author from MOJ (2017, p.2)

Chapter 5. Conclusion

Not only an innovative emergence and a huge possibility of various applications of virtual currencies but also its phenomenal growth and fluctuations of related markets have garnered attention from all over the world. While the novelty of the concept of virtual currency and its operating principle intrigued early scholars in this field, the latest works of researchers are more devoted to examining dramatic volatility of its market price and its speculative demands. This paper also aims to contribute to one of many research topics that the virtual currency has thrown into the academic world. In particular, focusing on Korean Bitcoin market, this paper looks into a phenomena so-called 'Kimchi premium', in which virtual currencies are traded at a significantly higher price in Korea compared to other foreign markets.

The precedent studies commonly link the premium price with variables such as a competence of financial institutions. Those researchers explain the failing or poorly functioning traditional financial markets make people have higher speculative demands on cryptocurrency, which lead to a higher Bitcoin premium. According to their arguments, Korea experienced a surprisingly high Bitcoin premium that reached more than 50% at some point because financial institutions and economic situations are failing. However, as the authors frankly confess themselves, such a claim does not fully explain the huge price deviations. So

this paper tries to explore another explanatory variable, a government intervention. As noted in previous studies on traditional asset markets, the existence and the intensity of government intervention may deeply affect the speculative demand on assets. So this paper suggests a government negligence an absence of an appropriate regulatory framework in the cryptocurrency market may provide a ground for abnormal speculative demand. Likewise, strong anti-speculation policies and alerts targeting the frenzied market would certainly depress the buying spree. Starting from this conjecture, this paper finds a link between Korean government policies and Bitcoin premium price. This research believes Korea faced phenomenal Bitcoin premium because its market enjoyed negligence from the Korean government and a vacuum of regulations until late 2017 while other major countries started to issue relevant policies and warnings against their markets as early as 2013. And since Korea implemented a series of regulative policies and public relation activities from December 2017 to January 2018 in order to manage the booming cryptocurrency market, it would have contributed in extinguishing speculative demand and Bitcoin premium.

In order to look into a trend of Korean Bitcoin premium from the start of 2017 and the end of 2018, comparing different periods with and without government interventions, this paper divides market period into three sub-periods which represent pre-intervention period (before December 2017), active

intervention period (December 2017 to January 2018) and after implementation period (after January 2018) respectively. The result shows that there are clear differences in Bitcoin premium before and after active government interventions, which indicates a significant linkage between them.

In the last part of the research, this study zooms into how the Korean market intervention is made. Mainly, two types of policies are discussed. For one, an array of policies providing a framework to rule cryptocurrency markets is examined. It includes policy measures to provide a regulatory framework such as enacting anti-money laundering guidelines for financial institutions, holding special crackdowns on criminal use of cryptocurrency, implementing a real-name-only-transaction policy to target anonymity that has prevented a transaction monitoring. For another, public relations policies that intends to cool down the overly positive public sentiment for virtual currency are reviewed. Especially, reminding the precedent studies on traditional asset markets that emphasize the role of investors' sentiment and expectation on a bubble formation, public alerts and signals that the Korean government frequently issued to warn the market are dealt with significance.

The most important contribution of this paper is that it offers a different view toward premium price in cryptocurrency from precedent studies. It argues that the case of Korea shows the absence of government regulatory policies may lead to higher speculative demand in assets which results in a higher

premium price. While strong regulatory policies and government warnings can decrease price premium by depressing speculative demands. However, since this paper does not cover comprehensive statistical analysis comparing regulatory frameworks of different countries with different Bitcoin premiums, it may leave validity concerns as its limitation. Also, this paper does not investigate the possible reasons why Korean government was late in taking early actions in the cryptocurrency market and this constitutes another limitation of this paper. Follow up studies are highly requested in this regard.

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