Gyancity Journal of Electronics and Computer Science,
Vol.8, No.1, pp. 1-18, March 2023
ISSN: 2446-2918 DOI: 10.21058/gjecs.2023.81004

ANALYSING THE RISKS AND RETURNS OF CRYPTOCURRENCY. WHAT AWAITS NOW?

Jackie Chong Cheong Sin
International Institute of Applied Science of Swiss School of Management, Switzerland
jackie@unies.my

Abstract

This study aims to explore the potential use of the cryptocurrency bitcoin as an investment instrument in Indonesia. The return obtained from bitcoin cryptocurrency is compared to other investment instruments, namely stock returns, gold and the rupiah exchange rate. The research period was carried out based on research data from 2011 to 2020. This study employee compares means test (t test) and analysis of variance (F test) on rate of return of bitcoin investment. The bitcoin return compare to the rate of return form the others investments instruments namely exchange rate, gold and stock. The study collected 120 data of each investments instruments: bitcoin, exchange rate, gold and stock from various of sources during 2011–2020. Then, we calculate the return and risk of individual investment instruments. The results showed that the bitcoin currency had the highest rate of return 18% with a standard deviation of 61% compared to exchange rate, gold and stock returns. While the rate of return for the others investment instruments showed less than 0.5% with standard deviation less than 5%. The rate of return bitcoin has significance difference compare to the rate of return of exchange rate, gold and stock. The study contributes for the investors who would like to invest on bitcoin. The investors should understand the characteristic of bitcoin in term of rate of returns and also the risk. This study also contributes to government of Indonesia on crypto currency development. The Indonesia government should adopt and regulate on crypto currency in the future to secure the investor and economic growth.

Keywords: *Cryptocurrency, Market Analysis, Returns of Cryptocurrency, Cryptocurrency Risk*

.

1. Introduction

As cryptocurrencies become popular and market places for cryptocurrencies are growing rapidly. Understanding the rate of return can support cryptocurrency world is and how design choices affect investors. One threat to cryptocurrencies is high fluctuations in traders' willingness to buy or sell [1]. The adoption of crypto assets has been a great concern for policy makers ever since Facebook announced its cryptocurrency, Libra, in June 2019 [2].

The technology behind these cryptocurrencies, a decentralized and open-source system named "blockchain" is often presented as one of the most innovative technologies offering several many disruptive innovations in the next years [3, 4, 5, 6]. The crypto-currencies trading volume also has a granger-causality to energy consumption [7]. A crypto asset is an intangible digital asset whose issuance, sale or transfer are secured by cryptographic technology and shared electronically via a distributed ledger [8].

The era of digitalization of technology has given birth to the cryptocurrency Bitcoin (BTC) as a new exciting currency for the world community, including Indonesia. BTC is an alternative to complement the needs of global financial transactions that want convenience, efficiency and security. Use of the digital computing tools to process scientific, economic, and social information has changed the human capacity, considerably. Virtual space is being activated year over year being the result of efficient application of information resources [9].

The development of BTC is very rapid in Indonesia. Indonesia, which has a total population of 271,349 889 people in 2020 (BPS, 2021). The population of Indonesia is very potential for the growth of the investment climate for BTC.

Almost all countries in the world experienced a decline in economic growth in 2020 due to the 19-virus pandemic. However, BTC price growth showed a very significant increase in 2020. BTC prices recorded the best performance since 2013 amounting to 260 USD / BTC. The price of BTC is USD 12,310 in 2020 or an increase of 68.04% compared to 2019 amounting to USD 7,326 / BTC (investing, 2021). Table 1 shows the development of the value of BTC (USD / BTC) in 2010–2020 [10].

Table 1

Development of The Value

Variable	**Indicator**	**Measurement**	**Type of data**	**Source**
Stock	Indonesia Composite Index	Average Stock Price/Baseline*	Ratio	www.investing.com
Exchange Rate	Convert from USD to IDR currency	IDR/USD	Ratio	www.investing.com

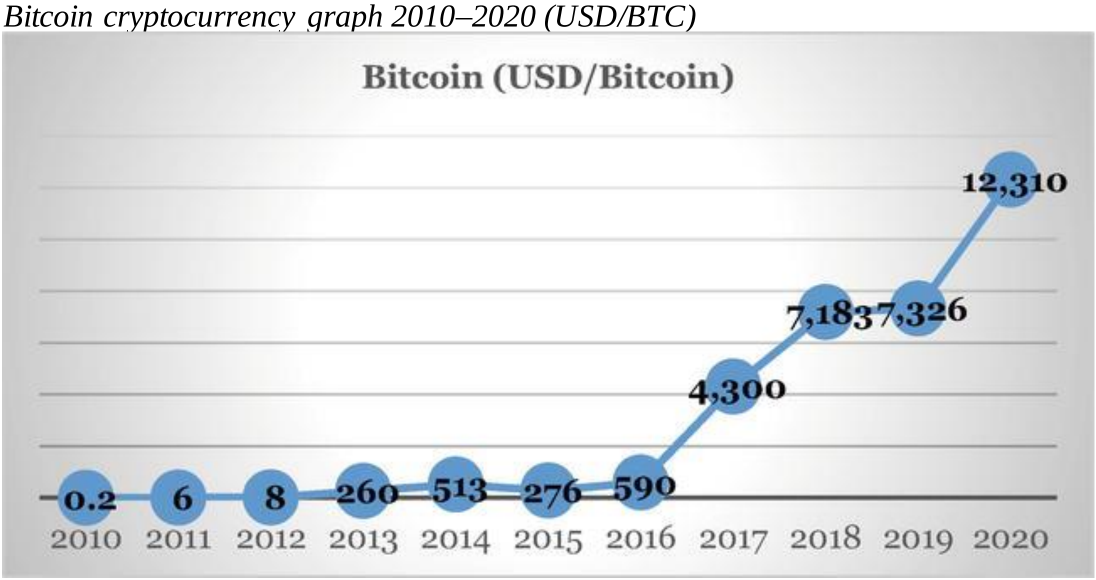
Gold	Gold price in USD per 1 Troy Ounce	USD/Troy Ounce	Ratio	www.harga-emas.org
Bitcoin	Bitcoin price in USD per Bitcoin	USD/BTC	Ratio	www.investing.com

Indonesians who start investing in bitcoin currency can change the existing financial asset structure. The development of bitcoin currency in Indonesia can disturb the stability of the rupiah as the only valid currency for domestic transactions. Therefore, Bank Indonesia as the determinant of monetary policy has not or has not legalized bitcoin currency as a virtual currency in Indonesia.

This research aims to examine bitcoin cryptocurrency as an investment instrument opportunity compared to other investment instruments, namely stocks, gold and the rupiah exchange rate. For the government as policy makers, this research is expected to be an input for the development of digital currency in the era of information technology. In addition, for investors, this research is expected to illustrate the returns and risks faced when investing in bitcoin, see Figure 1 [11].

Figure 1

Bitcoin cryptocurrency graph 2010–2020 (USD/BTC)



2. Risks of treading cryptocurrency

It is considered that you have agreed to all risks at account creation time [12], [13].

- **Price Change Risk**

The price of cryptocurrency fluctuates constantly. Your cryptocurrency trade or balance could surge or drop suddenly. Please note that there is a possibility that the price of cryptocurrency could drop to zero.

- **Business Hours Risk**

The price of cryptocurrency could fluctuate, sometimes heavily, after bitFlyer market hours. bitFlyer does not take any responsibility for not being able to buy and sell cryptocurrencies after bitFlyer market hours.

- **Liquidity Risk**

There is a possibility that trades cannot be settled, may be difficult to settle, or can be traded only at significantly adverse prices depending on the market situation and/or market volume.

- **Cryptocurrency Network Risk**

Cryptocurrency transactions (transaction authentication on the Blockchain) will be held for a certain period of time until an adequate amount of trade confirmations have been received. Transaction results will not be reflected to your bitFlyer account balance until an adequate number of confirmations have been received and confirmed by bitFlyer. There is a possibility that your transaction may be cancelled on the Blockchain.
Risk of Losing the Private Key or Password of the External Wallet Services
In the case you use an external wallet, you may not be able to access your cryptocurrency if you lose your private key or password. bitFlyer does not take any responsibility in this case.

- **System Risk**

There is a risk that your transactions may be affected due to system failures resulting from events such as changes in the external environment.

A system failure is considered to have occurred when our company determines that a clear failure has occurred in our system, and the customer is either unable to place orders on the internet or is delayed in doing so, or otherwise not able.

With regards to opportunity loss (e.g., a customer's order could not be received and the customer lost the opportunity to place the order, resulting in loss of profits which could have been obtained) due to things such as emergency maintenance or system failure of our company's system, we shall not take corrective actions on such error because we are not able to determine the details of the original order which was attempted to be placed. There may be a possibility that our system calculates an abnormal cryptocurrency buy or sell price. Please note that we reserve the right to cancel transactions which have been completed with an abnormally valued price.

- **Bankruptcy Risk**

There is a risk that we cannot continue our business due to events such as changes in the external environment. In the case that we cannot continue our business, all processes including the treatment of customers' assets shall be done according to insolvency law, corporation law, corporate rehabilitation law, civil rehabilitation law and other related laws.

3. Evaluating the cryptocurrency market in avoiding the risk

You have likely heard, it's very important to Do Your Own Research (DYOR), but what does that exactly mean? How do you get started and what does it involve?

To help answer these questions and more, this article outlines a straightforward sequence of steps to help you down this road.

Your approach and mindset are key when performing research and while it’s really easy to qualify a project, a much better (and contrarian) approach would be to look at potential investments with an eye to disqualify them.

If the crypto project ticks all the right boxes and you find it difficult to disqualify it, chances are you have stumbled upon a decent project [14]. With this in mind, let’s get into the sequence of steps to evaluate a cryptocurrency project.

3.1 Check the Market Listing

The first step is to look up the project on a cryptocurrency aggregator. The two largest cryptocurrency aggregators are CoinMarketCap and Coingecko. CMC is the most well-known while CoinGecko is known to smaller-cap projects [15].

These sites provide a high-level overview of the project: trading history, crypto ranking, a brief description of the project as well as the primary links to the project website and the project’s social media links.

- **Project Ranking**

The project ranking provides a quick assessment of where the project ranks when compared to all other cryptocurrencies. There are well over 10,000 different cryptocurrencies actively traded and the ranking (which is determined by the project’s market capitalization) is a good initial indicator of where the project currently stands.

Depending on your investment style and preferences, you may only be interested in the top 100 ranked projects, which generally offer the least risk. However, if you are looking for those lesser-known ‘gems’ with massive growth potential [16], then you will likely want to be looking for those projects ranking in the 1,000s and above. Projects ranked 5,000s and higher are generally considered highly risky projects and in most cases should be avoided.

- **Market Cap**

The project ranking is determined by the Market Cap and it is calculated by multiplying the current price of the coin/token with the total number of coins/tokens in circulation. In general, the higher the value of the market cap (the higher the ranking) the less volatile and safer the investment (relatively speaking of course) [17].

- **Price History**

Taking a quick look at the daily, weekly, monthly and yearly trading history will provide a high-level overview of the price and performance of the project, trends and also highlight any potential issues.

- **Trading Volume & Liquidity**

The trading volume is how much is bought and sold over a period of time and is a very important metric. Liquidity is a measure of how easily a crypto asset can be bought or sold and this is important as it will allow you to buy sell when you want, especially when considering low volume projects where you may not be able to sell out when you want [18].

A low trading volume of a medium-cap project can also be an indicator of a project which has been abandoned, lacks real-world use-case, or small community and something to watch out for.

- **Circulating Supply vs Total Supply**

It is also important to distinguish between the circulating supply and total supply of a project. The circulating supply is the number of coins/tokens which are in actual circulation while the total supply is a fixed value of the total number of coins/tokens that can ever exist.

Bitcoin offers a good reference point when considering the circulating supply and total supply of a project. For Bitcoin, there are only 21 million in total supply while there are about 19 million currently in circulation [19].

When compared to a project like XRP, which has a total supply of 100 billion and a circulating supply of around 47 million, the scarcity of Bitcoin coins can easily be seen (thus the higher value for one Bitcoin). Also, in cases where the total supply is of many magnitudes larger, a large influx in the circulating supply can quickly debase the price.

- **The Price**

While projects which are traded at less than a penny may seem like a good opportunity at first glance, the total supply and circulating supply need to be taken into consideration.

Going back to Bitcoin as an example, with only 21 million in total supply, it has a much lower total supply than many other cryptocurrencies. Using XRP as a comparative example, it has a total supply of 100 billion and a trading price of less than $1.

It's important to realize that low-priced cryptocurrencies have the psychological effect of seeming like a potentially good deal, but this can only be determined after taking into account the circulating and total supply [20].

Be wary of projects which an extremely large total supply, which in turn results in a very low market price.

3.2 Visit the Project Website

If the initial review of the project details on the cryptocurrency aggregator site looks positive, then the next step would be to check out the project website [21], [22], [23].

- **Visiting a project's official website is a must!**

There is no excuse for a poorly developed website. Today it is very easy and relatively inexpensive to develop a clean and functional website. The project website should be well put together, functional and openly share details about the project, the people behind it, the roadmap and the investors (if applicable).

If the website is of poor quality, has spelling mistakes, is reluctant to disclose to the team members or even worse is a copy-and-paste of a prior fork, then these are all cause for concern and should be avoided.

- **The Team (developers, executives, partners, advisors)**

For most projects, especially newer projects it is the team and developers involved in the project who are the most valuable assets. It's the credibility and experience of the team behind the project which will have a direct result in the success or failure of the project. It's for this reason, I personally am reluctant to move forward on projects whose team is not openly disclosed.

When assessing the team, determine the prior experience in the market and prior projects. Is this their first project or do they have a solid history developing successful projects in this market?

Unfortunately, many smaller projects have been known to fake their team (using AI-generated photos), so it isn't enough to take at 'face' value what the website says. If LinkedIn of other social profiles of the team is provided, it's always prudent to follow up and verify their authenticity.

When assessing the team, it's also important to take into account the leadership (executives). Projects with partnerships with well-known firms are also a good sign, but as with most information on the website, verify where possible.

- **The Road Map & Vision**

As an investor, you are looking into the future potential for the project and the road map and vision are also critical components to the assessment.

A solid project will have a strong and well-defined vision with a roadmap and dates attached providing details for the development at each stage. It goes without saying, without a clear vision and roadmap, the future success of the project is in doubt.

- **Investors**

Does the project already have investors and if so, who are they? Projects which have already been invested in by well-known investment firms are an excellent sign. These firms often specialize in specific niche markets and if they have already invested, chances are they have also done their due diligence and believe in the project.

3.3 Check Social Media Profiles

If everything looks good at this point, the next step is to check the social media profiles. This step will take a bit more time to assess [24], [25], [26], [27].

- **Twitter**

The first social media site to visit is the project's Twitter account. Twitter is a quick method to determine how socially active the project is and the most recent tweets. It's also good to note the interaction within the tweets. The number of Twitter followers is another important metric to be aware of.

- **Telegram / Discord**

Telegram and Discord are chat groups that can offer even greater insight into the project, the team and their community. The follower count is a good indicator to look for. Within chat groups, take some time to read through the posts and get a feel for the type of people interested and involved. Are their questions being answered? Groups that overly engage in psychological tactics such as inducing FOMO should be considered red flags.

- **Reddit**

One of my favorite sites is Reddit. Oftentimes Reddit will have non-project sponsored groups and or discussion subreddits about the project which are not under the direct control of the project. With the upvoting system employed by Reddit, it is a great source for ‘street knowledge’ which may not be otherwise publically available.

Things to look for on Reddit include, how active is the community? How many followers are on the sub-Reddit? Does the team offer AMAs (ask me anything)? Is the team helpful in sharing information about the project?

If the coin has potential, there is almost always a Reddit discussion about it. If Reddit isn't yet talking about it, you are either really early to the party or it's yet another potential red flag.

3.4 Assess the Community

It's likely been said many times and worth saying again — No community, no future. It is the community supporting the project which makes it successful!

It can't be underestimated the importance of the community. If you are familiar with either Doge or Shibu, it was the community that brought these projects to great heights. The enthusiasm and size of the community play a large role in the initial and continued success of the project [28].

Look for cryptocurrencies with strong, active communities. This is a good sign that there is genuine interest and belief in the project. Again, it's worth noting that Reddit is a great place to start researching the community and gaining 'street knowledge' not otherwise available anywhere else [29].

3.5 Read the White Paper

A white paper is a document created by a crypto project that provides investors technical information about the project, including the concept, the roadmap as well as how the project plans to grow and succeed.

A project's white paper can provide insight into the inner workings of the project. Although many white papers may be highly technical [30], it is an important data point in assessing the quality of the project and the team behind it.

If there is no White Paper, generally this is seen as a red flag. Also, White Papers with spelling mistakes, unnecessary technicality or lacking basic grammar and punctuation are also red flags [31].

3.6 Understand the Utility & Use Case

For the long-term viability of a project, it needs to have a well-defined and clear use case. Does the project solve an important problem? If you are looking to invest in this project for the long term, then the answer needs to be a definitive YES.

A project's success is directly related to something which its users will need (or want). While gaming and metaverse projects may not at first glance solve an important problem, they do offer something people want. No matter the niche or project, it must be able to solve an important problem (or need) [32].

When assessing the utility or use case of a project, it's important to look at both the current demand and potential future demand. Does the potential future demand include worldwide adoption or is it only local? If you are not able to determine the reasons or motivations for significant future demand, then then it's likely not a project you will want to hold for the long term.

3.7 Scam Checks

Unfortunately, there are many scams within crypto and these scams are becoming increasingly more sophisticated, such as malicious contracts and rug pulls which are very difficult to detect for the average investor [33].

To help protect against these potential scams as well as provide additional (technical) analysis of the project, there are many free online tools that can help. Some of the tools I use include [34], [35], [36]:

- **Scamsniper**

Provides token information, honeypot check, liquidity check and audit information. Also uses data collected from BSCheck.eu, TokenSniffer.com & StaySafu.org → Scamsniper.net

- **BSCheck**

Provides overall risk assessment, dev wallet information, token owner and top holder information → BSCheck.eu

- **RugDoc**

Offers overall assessment of smart contracts and identifies potential rugs. Works for BSC, FTM and POLY contracts.→ RugDoc.io

- **Token Sniffer**

Offers overall assessment of smart contracts for ETH contracts.→ Tokensniffer.com

- **StaySafu**

Offers overall assessment of smart contracts → StaySafu.org

4. Cryptocurrency vision and coming future

This all leads to one big trend. Cryptocurrency, once only understood among a relatively fringe community of anti-establishment investors, is now becoming a household name – and quickly. Analysts estimate that the global cryptocurrency market will more than triple by 2030, hitting a valuation of nearly $5 billion [37]. Whether they want to buy into it or not, investors, businesses, and brands can't ignore the rising tide of crypto for long.

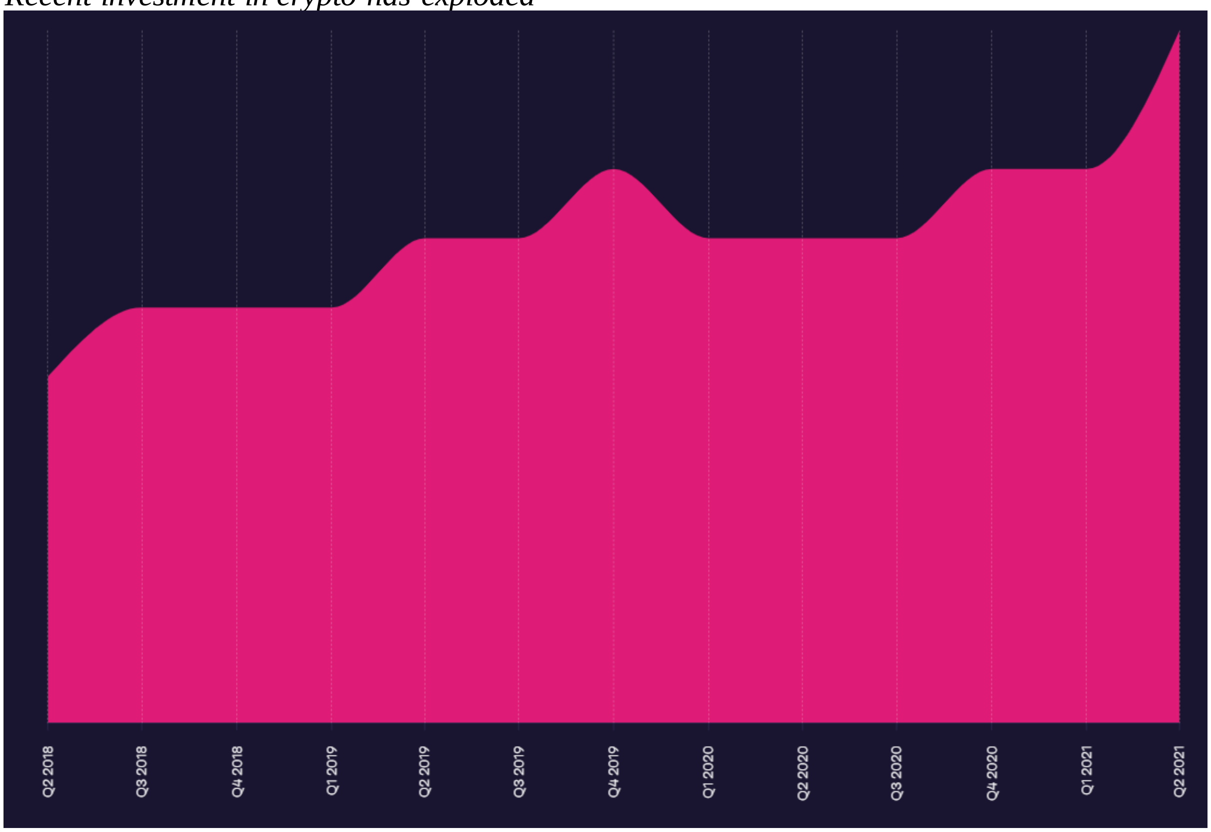
But crypto can't seem to escape paradoxes anywhere. Investors believe in regulation, yet are worried about many of the impacts that regulation will bring about. They're eco-conscious, but crypto has a huge carbon footprint.

Digging into these nuances is key to understanding overall consumer sentiment – and predicting consumer behaviour – around a very uncertain future of cryptocurrency [38].

The number of cryptocurrency investors has been steadily increasing around the world for a while, but recent growth has been explosive.

What's more, the profile of investors has evolved. In the age of meme stocks and stimulus checks, it's not such a niche hobby anymore [39]. Rather, everyday consumers have seen this new asset class as a way to pad their portfolios with potentially more rewarding, albeit riskier, assets, see Figure 2 [40].

Figure 2
Recent investment in crypto has exploded



Compared to 2018, older consumers have begun to back crypto at much faster rates. In the U.S., consumers over 35 years old make up nearly half (47%) of those who expect to invest in cryptocurrency in the next 6 months.

For a lot of these current and potential investors, crypto offers a new way to handle their finances, and many also find that the financial freedom of crypto has liberated them from the rigidity of traditional banking.

More recently, the upsides of cryptocurrency have begun to attract institutions, and traditional finance is rushing to cater to the increased demand, such as U.S. Bank's recent creation of a bitcoin custody service, which allows hedge funds to take a stake into digital currency.

While a larger pool of investment means greater potential for everyday investors, more institutional involvement also threatens digital currencies' ability to operate outside of traditional finance. Here begins the paradox [41].

The institutional money that has been pouring into cryptocurrency over the past few years has begun to change the power structure of the market. Thirteen years ago, cryptocurrency recruited users out of a desire to shake up the exclusive, institutionalized world of finance; to create a widely accessible way to move money and pay for goods and services, regardless of individual circumstances.

Unlike traditional banks, you didn't even need to have an address to trade in crypto; all you needed was an internet connection. Cryptocurrency, in principle, relies on the collective actions of everyday users to self-regulate; they keep the ledger of transactions – the blockchain – secure and updated, and the process allows anyone with a computer the ability to mine coins.

Fast-forward to 2021, and the future of cryptocurrency is quite different. Crypto enthusiasts aren't the ones mining bitcoin anymore, nor are they the only ones profiting from its success. Over time, the mining network has been ring-fenced by a few companies who can provide the huge amounts of computing power and electricity required to mine at scale, making it very difficult for independent users to get involved.

At the same time, the realization that massive corporate investments, like one by Tesla which caused the price of bitcoin to jump 20% in a single day, cast further doubt on how democratic the market truly is.

What started out as a fringe movement has, like so many other things, gone corporate as a result of its own success.

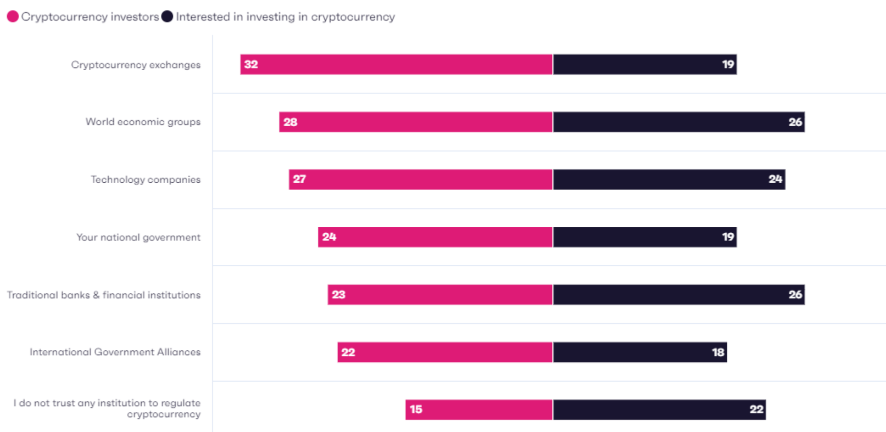
Alongside corporations entering into the market, crypto trading and mining has caught the eye of government overseers like never before.

Since the invention of bitcoin, governments have done relatively little compared to traditional investment categories to regulate or moderate the market. For the most part, cryptocurrency has been allowed to spread around the world as a uniquely decentralized financial asset.

Now, the laissez-faire attitude toward decentralized finance is waning. Perhaps surprisingly, investors are actually supportive of new regulations, though they have quite conflicting views about what these policies could mean and who should create them, see Figure 3 [42].

Figure 3

Governments to Take a Back Seat



While this does not reflect well on consumer views of their government, it does bode well for brands. Building trust and credibility in the crypto space is, in the eyes of consumers, easier if you're not a government entity. Perhaps this reflects the anti-establishment ethos of crypto's early culture.

Either way, it certainly presents opportunities for brands in technology and related fields to become a trusted partner, educator, and safety net – swooping in to fill the gap where governmental trust is lacking [43].

Crypto has always been volatile, both in price and in consumers' perception. Despite the explosion in recent years, what the future of cryptocurrency holds is still unclear.

For the average investor, for government regulators, and for those attempting to make crypto greener, this is a time of paradoxes to navigate. If one thing is certain, it's that the market in 5 years' time could be just as unrecognizable to us now as the market was 5 years ago.

While the future of cryptocurrency will be shaped by regulators, it can also be influenced by brands, many of which are jumping into the market to fill the needs of the growing marketplace that governments have so far ignored [44]. This can be through facilitating trades in a more comfortable, safe environment for “newbies,” or offering education and resources for curious intenders.

Peer-to-peer payment app Venmo is doing both of these things – offering its customers the opportunity to use a platform they’re already comfortable with to dip their toes into crypto, and providing easy-to-understand content to help educate intenders along the way. Established finance brands and fintech disruptors alike can be a bridge to the future of crypto [45].

Part of that future means leaning in to the changing profile of investors, and anticipating what the more “mainstream” audience might demand. Traditional payment companies that offer access and education will no doubt make the market more attractive for older investors [46], while the growing list of businesses accepting the digital currencies can make the market feel safer and more stable.

Whatever the future of cryptocurrency holds, there’s a lot of work to be done to balance the risks with the rewards, and there’s a lot of opportunity for the brands and individuals who take on the task.

5. Conclusion

Based on the research results discussed in the previous chapter indicate that the investment in bitcoin still promising. The price of bitcoin rapidly increases during the study 2011–2020. The rate of return of bitcoin investment is the highest compared to the other investment instruments: stock, exchange rate and gold. Meanwhile, the bitcoin investment also has the highest risk compared the others investment instruments.

It can be concluded that bitcoin investment provides the highest return (18%) compared to other investment instrument returns. However, the very high return on bitcoin comes with high-risk investment. The risk of investing in bitcoin is indicated by a standard deviation of 61%, while the standard deviation of other instruments: stock, exchange rate and gold less than 5%.

Based on the results of the paired sample test, it shows that the average return on bitcoin shows a very significant difference compared to the others instrument. Meanwhile, the return on the others instrument: stock, exchange rate and gold show the same return.

For the investors who love risk, then the investment in bitcoin could be an alternative for an investment. The investment on bitcoin promises higher return compare to the other investment instruments. For the investors who are risk aversion, an investment on bitcoin doesn’t fit since this investment have the highest risk.

This research has practical implication for the investors who require high return. In the same time, the investors also have to understand the risk along the investment on bitcoin.

The other implication for government of Indonesia as policy maker on crypto currency. The crypto currency quite develops rapidly in this crypto world era. The role and regulation on crypto currency are needed to secure investors and economic growth.

This research also offers a generic 7-step process for evaluating any cryptocurrency and offers a starting point for those looking to DYOR. However, it needs to be noted that specific niche markets within the crypto space will require slightly different and more specialized assessment approaches, as would be the case in gaming or DeFi projects.

Nevertheless, it’s always good practice to have a standardized approach for evaluating cryptos and your approach can be adjusted and improved over time. Having a standardized approach will help to avoid emotional buys and help you to become a better analytically based investor.

While every investor is looking to get in early on the next ‘Bitcoin’, what is more important, is making sure you buy into projects which are solid (if you are planning to hold for the longterm) so that you can leverage the success of the project and its growth over time.

There is no shortage of new and interesting projects and with the many new exciting projects being developed, there will continue to be many projects with tremendous growth potential.

Most importantly, the skills necessary to be able to assess and evaluate a cryptocurrency are skills that need to be honed and practiced. If you are looking to spend any time in the crypto space, this is likely one of the greatest skills you can develop. If you do well with this, it may very well turn into a highly lucrative and very profitable skillset.

References

"Blind Signatures for Untraceable Payments" (PDF). Archived from the original (PDF) on 18 December 2014. Retrieved 26 October 2014.

"Untraceable Electronic Cash" (PDF). Archived (PDF) from the original on 3 September 2011. Retrieved 10 October 2012.

Pitta, Julie. "Requiem for a Bright Idea". Forbes. Archived from the original on 30 August 2017. Retrieved 11 January 2018.

"How To Make A Mint: The Cryptography of Anonymous Electronic Cash". groups.csail.mit.edu. Archived from the original on 26 October 2017. Retrieved 11 January 2018.

Law, Laurie; Sabett, Susan; Solinas, Jerry (11 January 1997). "How to Make a Mint: The Cryptography of Anonymous Electronic Cash". American University Law Review. 46 (4). Archived from the original on 12 January 2018. Retrieved 11 January 2018.

"Bitcoin: The Cryptoanarchists' Answer to Cash". IEEE Spectrum. Around the same time, Nick Szabo, a computer scientist who now blogs about law and the history of money, was one of the first to imagine a new digital currency from the ground up. Although many consider his scheme, which he calls "bit gold", to be a precursor to Bitcoin

Jerry Brito and Andrea Castillo (2013). "Bitcoin: A Primer for Policymakers" (PDF). Mercatus Center. George Mason University. Archived (PDF) from the original on 21 September 2013. Retrieved 22 October 2013.

Bitcoin developer chats about regulation, open source, and the elusive Satoshi Nakamoto Archived 3 October 2014 at the Wayback Machine, PCWorld, 26 May 2013

Wary of Bitcoin? A guide to some other cryptocurrencies Archived 16 January 2014 at the Wayback Machine, ars technica, 26 May 2013

"UK launches initiative to explore potential of virtual currencies". The UK News. Archived from the original on 10 November 2014. Retrieved 8 August 2014.

"UK regulatory approach to cryptoassets and stablecoins: Consultation and call for evidence" (PDF). HM Treasury. Retrieved 1 October 2021.

"Bitcoin legal tender in El Salvador, first country ever". Mercopress. 10 June 2021.

"Cuba's central bank now recognizes cryptocurrencies such as bitcoin". CNBC. 27 August 2021.

"China declares all crypto-currency transactions illegal". BBC News. 24 September 2021. Retrieved 24 September 2021.

Lansky, Jan (January 2018). "Possible State Approaches to Cryptocurrencies". Journal of Systems Integration. 9/1: 19–31. doi:10.20470/jsi.v9i1.335. Archived from the original on 12 February 2018. Retrieved 11 February 2018.

Hajric, Vildana (21 October 2020). "Bitcoin Surges to Highest Since July 2019 After PayPal Embrace". Bloomberg Law. Retrieved 25 October 2020.

"Forget Bitcoin: Inside the insane world of altcoin cryptocurrency trading". CNET. Retrieved 22 November 2021.

Vigna, Paul (19 December 2017). "Which Digital Currency Will Be the Next Bitcoin?". The Wall Street Journal. Retrieved 25 October 2020.

Steadman, Ian (11 May 2013). "Wary of Bitcoin? A guide to some other cryptocurrencies". Ars Technica. Retrieved 19 January 2014.

Popper, Nathaniel (1 October 2017). "Understanding Ethereum, Bitcoin's Virtual Cousin (Published 2017)". The New York Times.

"Ethereum Upgrade Adds to Crypto Mania Sparked by Bitcoin's Surge". Bloomberg.com. 25 November 2020.

Popper, Nathaniel (27 March 2016). "Ethereum, a Virtual Currency, Enables Transactions That Rival Bitcoin's". The New York Times. Retrieved 25 October 2020.

Hajric, Vildana (28 August 2019). "Bitcoin's Surge Means Smaller Rivals May Be Due for Rallies". Bloomberg. Retrieved 25 October 2020.

Saad, Amena (8 July 2020). "TikTok Takes on Crypto With Dogecoin Soaring 40% in 24 Hours". Bloomberg. Retrieved 25 October 2020.

Denton, Jack. "How a Digital Token Designed to be Stable Fueled a Crypto Crash". www.barrons.com. Retrieved 12 May 2022.

"How Cryptocurrencies Could Upend Banks' Monetary Role". Archived 27 September 2013 at the Wayback Machine, American Banker. 26 May 2013

Narayanan, Arvind; Bonneau, Joseph; Felten, Edward; Miller, Andrew; Goldfeder, Steven (2016). Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton: Princeton University Press. ISBN 978-0-691-17169-2.

"Blockchain". Investopedia. Archived from the original on 23 March 2016. Retrieved 19 March 2016. Based on the Bitcoin protocol, the blockchain database is shared by all nodes participating in a system.

Iansiti, Marco; Lakhani, Karim R. (January 2017). "The Truth About Blockchain". Harvard Business Review. Harvard University. Archived from the original on 18 January 2017. Retrieved 17 January 2017. The technology at the heart of bitcoin and other virtual currencies, blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way.

Park, Sehyun; Im, Seongwon; Seol, Youhwan; Paek, Jeongyeup (2019). "Nodes in the Bitcoin Network: Comparative Measurement Study and Survey". IEEE Access. 7: 57009–57022. doi:10.1109/ACCESS.2019.2914098. S2CID 155106629.

Bedford Taylor, Michael (1 September 2017). "The Evolution of Bitcoin Hardware". Computer.

Hern, Alex (17 January 2018). "Bitcoin's energy usage is huge – we can't afford to ignore it". The Guardian. Archived from the original on 23 January 2018. Retrieved 23 January 2018.

Baraniuk, Chris (3 July 2019). "Bitcoin's global energy use 'equals Switzerland'". BBC News. Retrieved 2 February 2020…

Y. A. Baker El-Ebiary et al., "Blockchain as a decentralized communication tool for sustainable development," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 127-133, doi: 10.1109/ICSCEE50312.2021.9497910.

Y. A. Baker El-Ebiary et al., "Track Home Maintenance Business Centers with GPS Technology in the IR 4.0 Era," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 134-138, doi: 10.1109/ICSCEE50312.2021.9498070.

S. I. Ahmad Saany et al., "Exploitation of a Technique in Arranging an Islamic Funeral," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 1-8, doi: 10.1109/ICSCEE50312.2021.9498224.

J. A. Jusoh et al., "Track Student Attendance at a Time of the COVID-19 Pandemic Using Location-Finding Technology," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 147-152, doi: 10.1109/ICSCEE50312.2021.9498043.

Y. A. Baker El-Ebiary et al., "E-Government and E-Commerce Issues in Malaysia," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 153-158, doi: 10.1109/ICSCEE50312.2021.9498092.

Y. A. B. El-Ebiary et al., "Determinants of Customer Purchase Intention Using Zalora Mobile Commerce Application," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 159-163, doi: 10.1109/ICSCEE50312.2021.9497995.

S. Bamansoor et al., "Efficient Online Shopping Platforms in Southeast Asia," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 164-168, doi: 10.1109/ICSCEE50312.2021.9497901.

S. Bamansoor et al., "Evaluation of Chinese Electronic Enterprise from Business and Customers Perspectives," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 169-174, doi: 10.1109/ICSCEE50312.2021.9498093.

A. Altrad et al., "Amazon in Business to Customers and Overcoming Obstacles," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 175-179, doi: 10.1109/ICSCEE50312.2021.9498129.

Y. A. Baker El-Ebiary et al., "Mobile Commerce and its Apps - Opportunities and Threats in Malaysia," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 180-185, doi: 10.1109/ICSCEE50312.2021.9498228.

M. B. Mohamad et al., "Enterprise Problems and Proposed Solutions Using the Concept of E-Commerce," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 186-192, doi: 10.1109/ICSCEE50312.2021.9498197.

P. R. Pathmanathan et al., "The Benefit and Impact of E-Commerce in Tourism Enterprises," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 193-198, doi: 10.1109/ICSCEE50312.2021.9497947.

K. Aseh et al., "The Future of E-Commerce in the Publishing Industry," 2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE), 2021, pp. 199-205, doi: 10.1109/ICSCEE50312.2021.9498175.