CRYPTOCURRENCIES PERSPECTIVES AND CHALLENGES IN THE GLOBAL MARKET

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Abstract
The purpose of this paper is to analyze the perspectives and challenges of cryptocurrencies in Georgian and the global market. As the cryptocurrencies has emerged as the most successful cryptographic currency in history it enables us to conduct an insightful analysis of its properties and future stability. In this article we provide the results of the survey that clearly demonstrates how the part of the Georgian population perceive cryptocurrencies. Cryptocurrencies are a new class of investible instruments, but besides this fact they can provide an interesting benchmark as they are effectively unregulated. In order to analyze how do cryptocurrencies perform in the long term, we have compared them to some other well-established assets. We analyzed the performance of representatives from 3 asset categories over the last 10 years. Cryptocurrencies have brought various benefits to its users such as decentralization via blockchain technology, giving power and control over finances to its users and cutting out intermediaries.

Key words: *Cryptocurrencies, Georgia, Government bonds, Global Market, Stocks.*

JEL Classification: *F41, F47, F62, F65, G12.*

I. INTRODUCTION

As cryptocurrencies boom yet again and provide investors with outstanding returns in early 2021, media all over the world once again cover this topic heavily. Most of the news currently pay attention to the enormous price gains which cryptocurrencies have recently achieved, however, not many speak about the true potential cryptocurrencies have other than being a spectacular speculative asset.

Cryptocurrencies are decentralized digital currencies that use cryptography (Richards, 2020) in order to safely record and store transactions on a public database managed by a disparate network of computers commonly known as blockchain. This network is formed by computers which are not owned by a singular entity, rather anyone in the world who has the hardware needed for the so called "mining" cryptographic equations through the use of computers." (Crane, 2020) can take part and is financial rewarded for their work. This ensures that the public ledger does not have a singular point of failure, because it consists of thousands of computers all over the world. Therefore, if one of these computers stops working, the database is not in danger as thousands of other computers are taking care of it.

Even though cryptocurrencies are just recently getting a worldwide recognition, they have been around for quite a while. In the year 1989 corporation Digi Cash has been established and has been working on a first prototype of a cryptocurrency. Unfortunately, this corporation had to declare bankruptcy in 1998 and had to stop working on this project. Around the same time other projects like B-Money and Bit Gold tried to create their own versions of cryptocurrencies but never fully succeeded. In 2010 bitcoin was used in a first transaction, where Laszlo Hanyecz bought two pizzas for 10 000 bitcoin (BTC). As Bitcoin continued to be more and more popular, new alternative cryptocurrencies commonly known as altcoins have been created. All trying to improve what Bitcoin has established (Marr, 2017). Currently there are over 4000 cryptocurrencies in the world.

Nowadays, 90% of the Worlds money is already digitalized. Creation of a cryptocurrency wallet is free, anyone in the world with the access to the internet can create a cryptocurrency wallet that can hold and send cryptocurrencies. The adoption of this technology would not only help people around the world to be able to send funds easier, but it would also help businesses reach more customers, creating higher possible demand for their goods and services.

II. WHAT ARE CRYPTOCURRENCIES

Nowadays all over the world almost all media covering finance integrated reports on cryptocurrencies to at least some level. This proves that cryptocurrencies are becoming mainstream and general public is interested in this new technology. Even though cryptocurrencies seem as this new and fascinating area, the truth is that the idea has been here for a long time.

The first paper about cryptocurrencies was published by David Chaum on anonymous electronics payments systems in June 1983. In 1989 Chaum founded DigiCash, a company whose mission was to create the first functioning electronic payment system using cryptographic protocols for security and to protect user's anonymity (Hussey, 2019), thus being the first cryptocurrency. DigiCash had a great success in the category of micropayments. Micropayments were not well supported by known large companies like Master-Card and Visa, because there are several costs in handling all the payments, but not enough money to be made from the fees since the payment's value was very small. Therefore, DigiCash had a chance to succeed in this category. Unfortunately for David Chaum, DigiCash encountered one crucial problem, no one wanted it. Even though DigiCash was promising and launched several projects such as joint pilot project with Deutsche Bank AG testing usage of electronic cash on the internet (CBR Staff Writer, 1996) it filed for bankruptcy in 1998 and was sold off for assets eventually. Chaum later stated the problem was that the merchants said there weren't enough customers and customers complained that there weren't enough merchants. In spite of the fact that DigiCash never succeeded, it laid the foundation to the cryptocurrencies the world knows today.

In 2008 a paper called "Bitcoin - A Peer to Peer Electronic Cash system" was published to a cryptography mailing list at metzdowd.com. This was the first mention of Bitcoin, nowadays a well-known cryptocurrency with the biggest market capitalization of all cryptocurrencies. The paper introduced Bitcoin as a peer-to-peer version of electronic cash that allows online payments to be sent from one party to another directly without the involvement of financial institution. It also proposed solution to the double spending problem. The Bitcoin white paper proposed the solution to this problem through peer-to-peer network (Nakamoto, 2008). In 2009, just one year later after the Bitcoin white paper was published, the Bitcoin software was made publicly available. This enabled people to take part in the proof of work system, verify and record transactions on the blockchain and create new bitcoin. On March 17th, 2010, the first cryptocurrency exchange has been launched. Bitcoinmarket.com was the first place where users could exchange BTC for fiat currency.

As Bitcoin evolved and increased in popularity, new alternative cryptocurrencies commonly known as altcoins have been created. All trying to bring better transaction speed, greater anonymity, and other advantages (Marr, 2017). Currently there are over 4000 cryptocurrencies in the world. One that is worth mentioning is Ethereum. Ethereum created by Vitalik Buterin in 2015 is currently second largest cryptocurrency by market capitalization right after Bitcoin. It offers similar features as Bitcoin, but also has some that make it stand out. It enables its users to build decentralized application on the Ethereum network. It also offers the ability to create smart contracts. These are electronic contracts placed on the blockchain that are able to automatically execute a contract once a requirement is achieved (Mazer, 2017). Ethereum has caught an eye of large organizations, because of its strong potential. The Enterprise Ethereum Alliance has been created to help enterprises with Ethereum integration. Companies such as Microsoft, JP Morgan, ING and many more are part of this Alliance, and all agreed to learn about Ethereum and the ways how they can use this innovative technology (Enterprise Ethereum Alliance, 2020).

One of the main terms very often mentioned when talking about Bitcoin is blockchain. Blockchain is a form of database Bitcoin uses to store transactional information. This type of management is called centralized as only the company is taking care of the data in the database. Traditional database uses tables to save its data, whereas blockchain as the name suggests creates groups of information called blocks and connects them together forming a chain. Every block contains a block header, which is a combination of Merkle Root (hash of all the transactions in the block) and a hash of previous block header. As it can be seen every block includes information about the previous block, thus creating a chain. This ensures that none of the transactions recorded can be changed, because if even a slight change is done to any of the blocks, as mentioned previously, the hashing algorithm changes the results completely, therefore disrupting all the blocks after the altered one.

As mentioned earlier Bitcoin has a set amount of BTC to be mined, this means that its amount is fixed. The amount is 21 000 000 BTC by 2140. This makes it anti-inflationary, because even if time passes there will never be more BTC created. Similarly, as gold, it's finite amount increases its value over time. If a Bitcoin is considered as currency, it has a huge advantage in comparison to its alternatives such as US dollar or any other

fiat currency. Fiat currencies are controlled by governments who print more money if the economy requires a boost. This means that by printing new currency the current currency loses its purchasing power. Companies that are cash rich and have significant amount of profits allocated in cash would be better off if they transferred their wealth from fiat currencies to cryptocurrencies, this way they would mitigate the effects of inflation, thus protecting their assets from a loss. A possible counter argument to this is the fact that cryptocurrency market is inclined to high volatility. The possibility of a large increase or decrease of value is very common, thus creating the danger of losing potential investment.

If bitcoin is to be considered an alternative store of value, its advantage would be that it is fully digital. One of the most popular and time-tested storage of value is gold. Gold has been a storage of value for very long time. It has been popular in historic civilizations, however, its actual storage is inconvenient. If one would like to buy, own and store gold, it can become difficult as many precautions are required. Space where the gold will be stored is needed. Security measures need to be taken in order to prevent any possible robbery and if the gold is to be sold, the transport of gold will be taking enormous amount of efforts as well. Bitcoin being fully digital, makes everything very convenient. It is almost impossible to be stolen because the only way to access someone's crypto wallet is to have their private keys. It doesn't take any physical space because it is fully digital and can be moved around in matter of minutes. On the other hand, cryptocurrencies have one problem. Because they are decentralized, they are unregulated. No single entity has power over it.

III. HOW CRYPTOCURRENCIES ARE VIEWED IN GEORGIAN MARKET

Georgia's integration of the digital world is remarkable even though it is not the biggest country in the world. The possibility to make a limited lability company or rewrite the ownership of a real estate on to someone's name in just one day is very convenient and is possible thanks to usage of digital records. But how does Georgia view cryptocurrencies and blockchain? Is it something Georgia could use to their advantage? The truth is that Georgia is using blockchain technology since 2016. In addition, in a study by Joe Robinson titled the world's most crypto-friendly cities Georgia ranked 8th among top 10 countries by number of Bitcoin ATMs per 10 residents and ranked 1st among top international cities by Bitcoin ATMs per $10 Billion GDP (Robinson, 2021).

Georgia was firstly introduced to cryptocurrencies when a virtual currency mining giant BitFury opened its first Gldani data center in 2014 in order to mine bitcoin (Kvintradze, 2021). Later BitFury expanded and created data center in Gori and then in Tbilisi. Tbilisi opened a Free Industrial Zone, where companies had incentives to open business. Whichever company would operate in this zone would get benefits such as exemption from taxes, this was a great opportunity for BitFury and that's why they build another data center (Agenda, 2015), thus strengthening their position on the Georgian market. In 2016 Georgian National Agency of public Registry (NAPR) announced a partnership with BitFury and announced that BitFury would develop a transparent and secure ledger for managing land titles for the NAPR (Agenda, 2016). In 2019 Georgian Ministry of Education, Input Output Hong Kong (IOHK), the Free University and the Business and Technology University of Tbilisi signed a memorandum of understanding. IOHK was tasked to create a credential verification system in the education field running on cryptocurrency called Cardano.

As it can be seen Georgia has integrated blockchain technology into its already existing systems to improve them. As innovative as these actions are, the real question is how does the population of Georgia react to these technologies, because if the wide population doesn't integrate them into their day to day operations, the wide adoption will not be possible.

We conducted a primary qualitative research using questionnaire as it's data gathering tool. The questionnaire was answered by 110 respondents. The results were analyzed and used to address on how does Georgian market perceive cryptocurrencies.

Table 1. Respondent gender structure

Gender	Total amount	Percentage
Male	66	60%
Female	43	39,09%
Other	1	0,91%

Table 2. Age structure of the respondents

Age	Total amount	Percentage
<18	1	0,91%
18-20	15	13,64%
21-25	43	39,09%
26-30	24	21,82%
31-35	11	10%
36-40	3	2,73%
41-45	7	6,36%
46+	6	5,45%

The educational levels and fields of studies have been also recorded. The structure was following:

Table 3. Educational level of the respondents

Education level	Total amount	Percentage
Secondary education	25	22,73%
Bachelor's degree	47	42,73%
Master's degree	30	27,27%
Doctoral degree	8	7,27%

Table 4. Field of studies of the respondents

Field of studies	Total amount	Percentage
I don't have a degree	25	22,73%
IT	14	12,73%
Economics	8	7,27%
Psychology	6	5,45%
Business administration	17	15,45%
Finance	6	5,45%
Engineering	5	4,55%
Law	4	3,64%
Art	3	2,73%
Social science	5	4,55%
Marketing	3	2,73%
Politics	3	2,73%
Medicine	1	0,91%
Physics	2	1,82%
Public health	2	1,82%
Management	2	1,82%
Public administration	1	0,91%
Mathematics	2	1,82%
Philosophy	1	0,91%

Table 5. Yearly income table of the respondents

Wage	Total amount	Percentage
<10 000 GEL	26	23,64%
10 000 – 14 000 GEL	38	34,55%
14 000 – 18 000 GEL	18	16,36%
>18 000 GEL	28	25,45%

After examination of Tables 1-5, it can be observed that the age of the sample is mostly in the range of 18-35 with the largest group being 21-25 which is represented by 39,09% of the respondents. The sample of this research is largely people who achieved some extent of university degree as 77,27% of the respondents have some kind of a university degree. The fields of studies are quite varied, one of the largest groups is Business administration with 15,45% followed by IT with 12,73% and Economics with 7,27%. The income of the respondents has been somewhat balanced with the largest group being income of 10 000 – 14 000 GEL, represented by 34,55% of the respondents.

The questionnaire also showed that 65 out of the 110 participants own some kind of cryptocurrencies and 45 out of the 110 participants do not own any cryptocurrencies.

The respondents who do own cryptocurrencies have stated the following as the reason for ownership:

Table 6. Reasons to own cryptocurrencies

What is the reason you own cryptocurrencies?	Amount	Percentage
I use it as a currency	6	9,23%
Fast growth investment	31	47,69%
Store of value	17	26,15%
Hedge against traditional asset crashes	3	4,62%
To avoid government regulation	2	3,08%
To support the development of blockchain technology	6	9,23%

As it can be seen in Table 6 most of the respondents that reported ownership of some kind of cryptocurrency stated that they own cryptocurrencies as a fast growth investment, this was the reason in 47,69% of the cases. Second most common reason for cryptocurrencies has been a store of value with 26,15%. After seeing this data, it can be concluded that the participants use cryptocurrencies as a form of investment mainly.

Table 7. Do participants think usage of cryptocurrencies instead of fiat currencies is efficient?

Do you think using cryptocurrencies instead of fiat currencies is efficient?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
Yes	47	72,31%	12	26,67%
No	18	27,69%	33	73,33%

Table 7 shows results for both part of the respondents who own and do not own cryptocurrencies. It can be seen that 72,31% of the respondents who own cryptocurrencies believe that using them instead of fiat currencies is efficient, this can indicate that they have positive view on cryptocurrencies. On the other hand, respondents who do not own cryptocurrencies mostly consider using them instead of fiat currencies inefficient.

Table 8. Would participants use cryptocurrencies as a form of payment?

If a business would accept cryptocurrencies, would you use them to pay for goods and services?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
Yes	56	86,15%	24	53,33%
No	9	13,85%	21	46,67%

In Table 8 it can be observed that participants who own cryptocurrencies are willing to use them as a form of payment if businesses would accept them. Respondents who do not own cryptocurrencies are more split with 53,33% would use cryptocurrencies if businesses would accept cryptocurrencies and 46,67% wouldn't.

Table 9. Are participants considering buying any cryptocurrencies?

Did you think about buying cryptocurrencies?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
Yes	65	100%	24	53,33%
No	0	0%	21	46,67%

Georgian respondents who own cryptocurrencies have clearly showed interest in buying, however, if data from respondents who do not own any cryptocurrencies is analyzed, it can be seen that 53,33% of the them have considered buying cryptocurrencies. This shows that even though these participants do not own any cryptocurrencies, they still might buy some in the future.

Table 10. How likely are participants to invest in cryptocurrencies this year?

How likely are you to invest in cryptocurrencies this year?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
Very likely	31	47,69%	2	4,44%
Somewhat likely	25	38,46%	14	31,11%
Not so likely	6	9,23%	14	31,11%
Not at all likely	3	4,62%	15	33,33%

In order to see how likely, the non-owners are to buy cryptocurrencies this year Table 10 can be analyzed. It can be seen that 4,44% of the non-owners are very likely to buy this year and 31,11% are somewhat likely,

therefore it can be considered that 35,55% of the non-owners are to a certain extent likely to purchase. 64,45% of the non-owners do not consider buying cryptocurrencies this year.

Table 11. What do participants consider the riskiest asset?

In your opinion which of these assets is the riskiest to invest in?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
Stock market	12	18,46%	10	22,22%
Real estate	0	0%	1	2,22%
Cryptocurrencies	40	61,54%	23	51,11%
All are equally risky	13	20%	11	24,44%

Another reason why respondents might not own any cryptocurrencies is the fact that they consider them risky. Table 11 shows that 51,11% of the participants who do not own cryptocurrencies consider them risky, thus it can be assumed this could be the main cause why some of the respondents do not own any.

Table 12. What do participants consider the most profitable asset?

Which do you think would be most profitable asset to invest in?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
Stock market	11	16,92%	9	20%
Real estate	11	16,92%	18	40%
Cryptocurrencies	37	56,92%	8	17,78%
All are equally risky	6	9,23%	10	22,22%

In addition to Table 11, Table 12 analyzes which asset is according to the respondents the most profitable. When column of non-owners is observed, it can be seen that 40% of the respondents consider real estate to be the most profitable asset, whereas only 17,78% of the non-owners believe that cryptocurrencies are the most profitable asset. Therefore, it can be assumed that the reason for not owning any cryptocurrencies by the respondents is the combination of believe that cryptocurrencies are too risky and are not as profitable as other assets. On the other hand, respondents that own cryptocurrencies vastly believe that they are the most profitable asset with 56,92% of the participants believing so.

Table 13. How much will be cryptocurrencies worth in 5 years?

Which do you think would be most profitable asset to invest in?	Amount (participants who own)	Percentage	Amount (participants who don't own)	Percentage
A lot more	36	55,38%	10	22,22%
Somewhat more	28	43,08%	16	35,56%
About the same	1	1,54%	10	22,22%
A lot less	0	0%	9	20%

From Table 13 it can be observed that vast majority of respondents who own believe cryptocurrencies will be worth more with 55,38% of respondents believing cryptocurrencies will be worth a lot more and 43,08% believe that they will be worth somewhat more. On the other side non-owners are somewhat spread in between all the answers with biggest representation in the somewhat more category with 35,56%. This split opinions again suggest that the non-owners are not 100% against cryptocurrencies. 57,78% of the non-owners believe that cryptocurrencies will go up in value to at least some extent.

After analyzing the data, it can be concluded that respondents who own cryptocurrencies show high level of confidence in cryptocurrencies, therefore it can be stated that the part of Georgian population view cryptocurrencies positively.

IV. COMPARING CRYPTOCURRENCIES TO OTHER INVESTMENT INSTRUMENTS

Cryptocurrencies are a new class of investible instruments, but besides this fact they can provide an interesting benchmark as they are effectively unregulated. Some of the most popular investment instruments are government bonds and stocks. However, stocks they are certainly riskier than government bonds. According to Goldman Sachs over the past 140 years, U.S. stocks averaged 10 year returns of 9.2% (Scheid, 2020). Another form of investment that has a very long tradition is real estate. Buying apartments, houses and lands has been around for hundreds of years. It is considered to be one of the safer options as in most cases.

Cryptocurrencies have also recently become a popular choice. In the beginning of 2021, cryptocurrencies broke the total market capitalization of 1 trillion US dollars and later in April surpassed market capitalization of 2 trillion US dollars. Cryptocurrencies like Ethereum and Bitcoin reaching their market capitalization all-time highs. Ethereum reached over $450 billion and Bitcoin reaching over $1 trillion. Not only did recently cryptocurrencies grow drastically, but they also became part of portfolios of large companies for the first time.

The first publicly traded company that has bought cryptocurrencies as a part of their investment portfolio was MicroStrategy, a company providing mobile software, business intelligence and cloud-based services. Michael J. Saylor the CEO of MicroStrategy on August 11th, 2020 announced that the Nasdaq-listed company was making a long term investment of $250 million in Bitcoin. He later said that Bitcoin is a "dependable store of value and an attractive investment asset with more long-term appreciation potential than holding cash". Later on September 15th MicroStrategy has added another $175 million worth of bitcoin to its balance sheet. At that point of time MicroStrategy has gathered 38 250 BTC to its balance sheet. Later after the initial announcement about buying bitcoin, MicroStrategy has also issued corporate bonds in order to buy even more bitcoin and as of March 1st, the company has purchased total bitcoin worth over $2.2 billion (Jakobson, 2021). According to article written by Daniel Palmer, MicroStrategy is holding around 92 089 BTC bought at average price of about $24 450 per BTC. At the time of writing this work this amount if sold would create a profit of around $771 million (Palmer, 2021), which is around 35% profit.

Another large company that has decided to enter cryptocurrency investing was Tesla. Around the time MicroStrategy started publicly announcing that it has invested into Bitcoin, Elon Musk the CEO of Tesla has been talking about cryptocurrencies on social media quite frequently. On December 20th, 2020, Michael J. Saylor replied to one of the Elon's posts with "If you want to do your shareholders a $100 billion favor, convert the $TSLA balance sheet from USD to #BTC. Other firms on the S&P 500 would follow your lead & in time it would grow to become a $1 trillion favor." (Saylor, 2020), towards which Elon Musk replied with a question whether such large transactions were possible. Michael J. Saylor confirmed and suggested a meeting where MicroStrategy would share its playbook with Tesla. On February 8th, 2021, Tesla announced in an SEC filing that it has bought $1.5 billion worth of bitcoin. Tesla has also stated that it would accept payments in bitcoin in exchange for its products "subject to applicable laws and initially on a limited basis" (Kovach, 2021), however, this statement has been later changed as on May 13th, 2021, Tesla suspended vehicle purchases using Bitcoin due to climate change concerns. According to Fortune magazine Tesla has purchased around 43 000 BTC with an average price around $34 700 per BTC. It later sold 4 800 BTC for about $55 100 per BTC. This created profit of around $101 million (Tully, 2021). However, Tesla is still holding the 38 000 BTC, which at the time of writing this work is worth $32 824 per BTC, which in case Tesla would sell would create a loss of around $71 million.

So, what can be derived from these real-life examples? The truth is not much can be said from the data provided as these price data are fairly new, therefore they can't really represent the price growth over time, however, the fact that large companies started to invest into cryptocurrencies signifies that there could be potential in this new technology and companies believe that it could be used as store of value in the future. Nonetheless the long-term price data of cryptocurrencies must be analyzed in order to confidently say if the growth is continual and cryptocurrencies have a place among good long-term investments, or it is just a bubble.

In order to analyze how do cryptocurrencies perform in the long term, long term price data is analyzed, moreover, to determine whether cryptocurrencies perform well, they need to be compared to some other well-established assets. We analyze the performance of representatives from 3 asset categories over the last 10 years. Therefore, we look through the price growth of stocks, real estate, and cryptocurrencies. The SPY exchange traded fund price data will be used. SPY is an exchange traded fund representing the S&P 500 stock market index. This index reflects on stock growth of the biggest 500 publicly traded companies in the American market. Real estate price data will be provided by DQYDJ who's sources are The National Association of Realtors, The Federal Housing Finance Agency, Robert Shiller, and the U.S. Bureau of Labor Statistics. The data provided represents historical monthly median single-family home values in the United States (DQYDJ, 2021). Cryptocurrencies price data is provided by Statista and the price data of Bitcoin (BTC) and Ethereum (ETH), the two largest cryptocurrencies are also analyzed. All the data collected is subject to descriptive statistics and parameters such as mean, mode, median, standard deviation and others are calculated via Microsoft Excel. In

addition, Microsoft Excel is used to analyze the price trend by generating a linear regression line in order to find out whether the overall price trend is upwards or downwards facing.

To better understand the data collected for all the assets, descriptive statistics has been calculated for all of them.

Table 14. Descriptive statistics calculated for the assets

	Real Estate	SPY	BTC	ETH
Mean	217 799,14	220,75	4 481,39	227,17
Standard Error	3 207,04	5,83	545,54	28,93
Median	213 461,62	210,54	2 170,98	183,37
Mode	#N/A	#N/A	#N/A	#N/A
Standard Deviation	36 846,06	62,83	5 088,41	233,22
Sample Variance	1 357 632 152,44	3 947,32	25 891 964,17	54 392,24
Kurtosis	-0,94	-0,76	4,79	2,36
Skewness	0,48	0,26	1,70	1,47
Range	130 598,01	258,86	28 572,82	1 066,06
Minimum	170 388,68	109,93	196,02	0,66
Maximum	300 986,69	368,79	28 768,84	1 066,72
Count	132,00	116,00	87,00	65,00
Largest(1)	300 986,69	368,79	28 768,84	1 066,72
Smallest(1)	170 388,68	109,93	196,02	0,66
Confidence Level(95,0%)	6 344,29	11,55	1 084,49	57,79

When Table 14 is examined, it is possible to see that some of the assets have quite large standard deviations in comparison to their mean. This can suggest that the price of a given asset can be inclined towards higher volatility. In order to examine to what extent are these assets volatile, relative standard deviation was calculated.

Table 15. Relative standard deviation

	Real estate	SPY	BTC	ETH
Mean	217 799,14	220,75	4 481,39	227,17
Standard deviation	36 846,06	62,83	5 988,41	233,22
Relative standard deviation	16,92%	28,46%	113,5%	102,66%

After looking at the results of Table 15, it can be seen that BTC and ETH price data showed large amount of volatility, therefore it can be predicted that generating a good regression line that will fit with the price trend might be difficult.

To visualize the collected price data, graphs have been generated by Microsoft Excel with the inclusion of linear regression line. The real estate price data has been collected for the period from 01/01/2010 to 01/12/2020. The graph constructed from collected price data over the stated period has showed the following:

Figure 1 -Real estate price data

The SPY exchange traded fund price data has been collected for the period from 01/06/2011 to 01/12/2020. The graph constructed from collected price data over the stated period has showed the following:
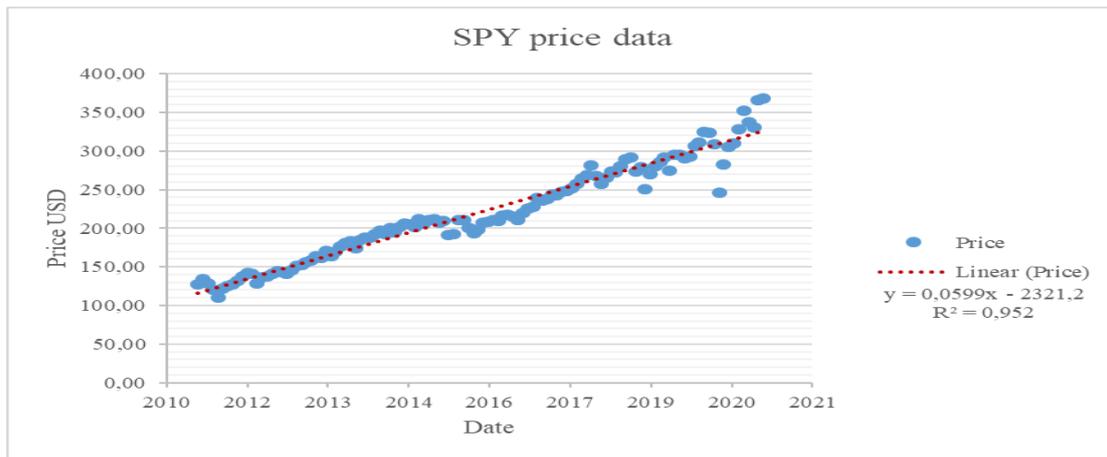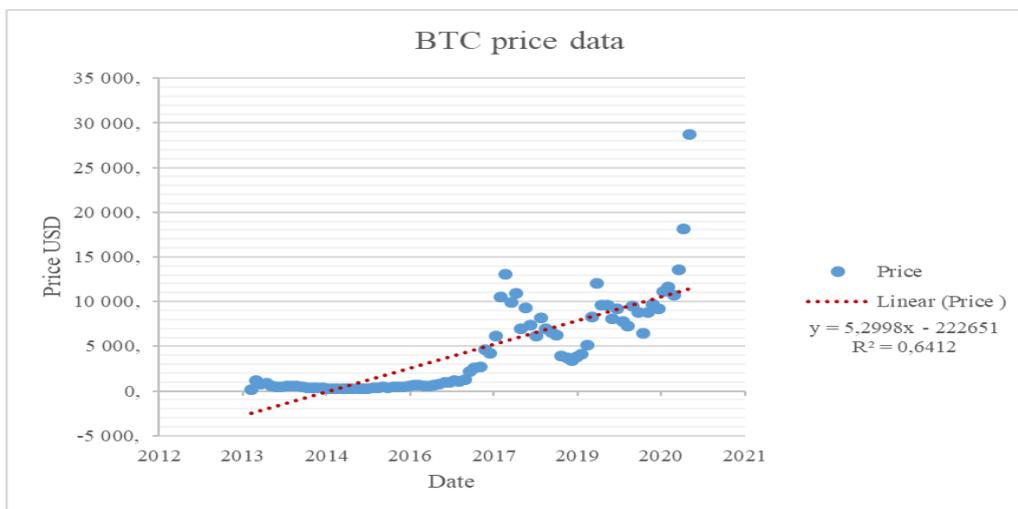

Figure 2-SPY price data

The BTC price data has been collected for the period from 01/10/2013 to 01/12/2020. The graph constructed from collected price data over the stated period has showed the following:

Figure 3 - BTC price data

The ETH price data has been collected for the period from 01/08/2015 to 01/12/2020. The graph constructed from collected price data over the stated period has showed the following:
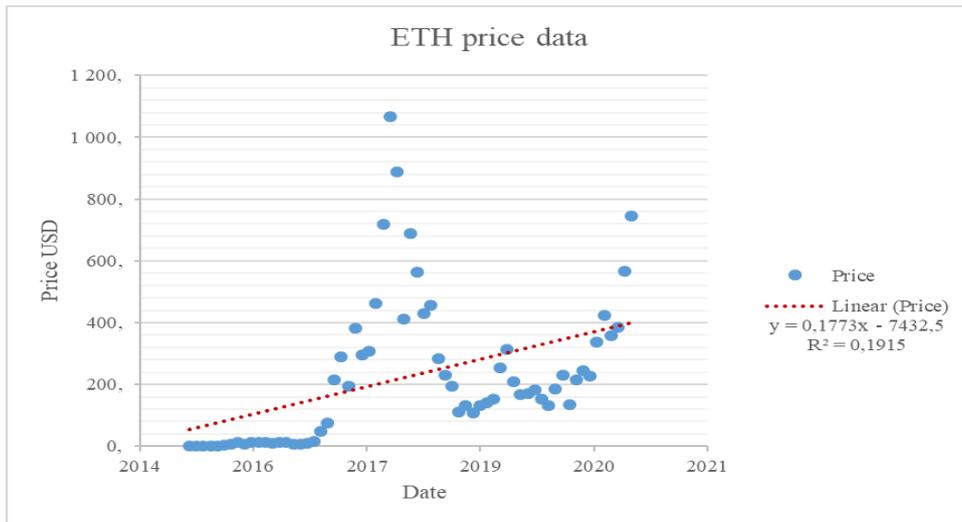

Figure 4 - ETH price data

In order to visually compare the price data collected for all the assets, scatter plot graph with logarithmic scale can be used. This makes it possible to see the rate of change over time even though the assets have different prices.
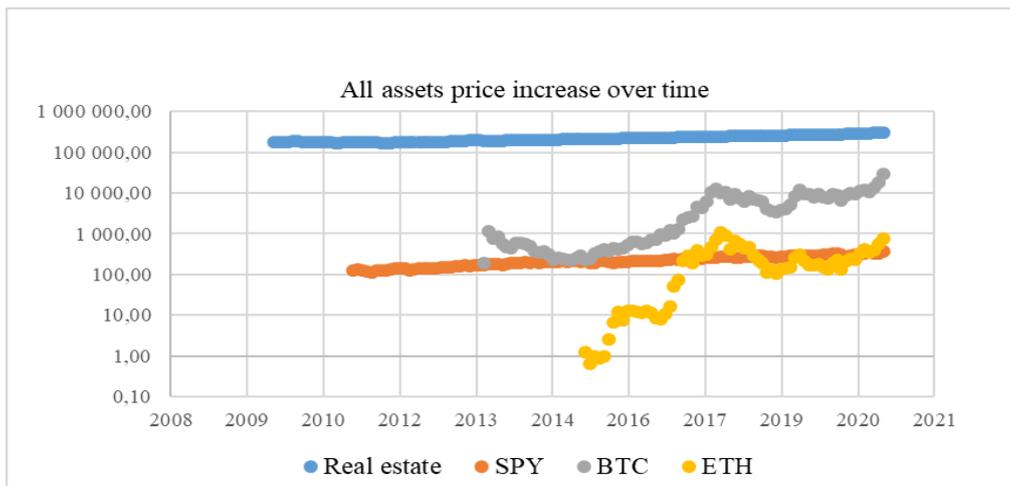

Figure 5 - All assets price increase over time in a Logarithmic scale

After analysis of Figure 5. it can be observed that real estate and SPY have been growing steadily in an upwards trend, on the other hand BTC and ETH have gone through much larger percent rate of change in an upwards trend. This does not mean that this rate of appreciation is sustainable, nevertheless for the sake of this work the percentage increase will be calculated.

Table 16. Percentual price change

	Real estate	SPY	BTC	ETH
Beginning	180 903,42	127,60	196,02	1,25
End	300 986,69	366,02	28 768,84	746,06
Percentage increase	66,38%	186,85%	14 576,48%	59 584,80%

Table 16 suggests that ETH has been the most successful asset from the assets analyzed, followed by BTC, SPY and real estate. However, this does not mean it is the best long-term assets to invest in. As mentioned before BTC and ETH have quite large relative standard deviation, therefore they are volatile assets and taking one price point data to determine whether they are a better asset than others would be wrong. The best way to

determine which asset is the best in the long term is to create an average of the price increase over time of all the assets and compare them together. Thus, best way to find out which asset is the best in the long term is to analyze regression line calculated by Microsoft Excel in Figures 3-5 and compare their slope to see which asset can provide the most value to its investors over time.

Table 17. Linear regression

	Real Estate	SPY	BTC	ETH
Linear regression line equation	y = 30,743x - 1E+06	y = 0,0599x - 2321,2	y = 5,2998x - 222651	y = 0,1773x - 7432,5
R^2	$R^2 = 0,9436$	$R^2 = 0,952$	$R^2 = 0,6412$	$R^2 = 0,1915$

After analyzing all the data for all the assets, linear regression line equation can be formed for all of them. To find out which asset has the best price increase over time, therefore providing investors with the highest returns in the long term, the slope of the equations can be compared in order to see which asset provides biggest increase over time. If Table 4 is examined, it can be seen that highest slope has real estate (30,743), BTC (5,2998), ETH (0,1773) and last SPY (0,0599). However, the R^2, which is a statistical measure that represents the proportion of the variance for a dependent variable that's explained by an independent variable in a regression model (Fernando, 2020), if examined, it is possible to see that for real estate and SPY the value of R^2 is high. This means that their regression line is an accurate representation of the increase in price over time. But the value of R^2 for BTC is lower and for ETH is much lower. Therefore, it can be concluded that the linear regression line for BTC and ETH isn't the best representation of the increase price data trend that can be observed on the graphs. Thus, assuming that the current slope values calculated are the final determinant of which assets is the best would be wrong.

After all the price data was collected and analyzed, the results showed several outcomes. If only the beginning price of the asset and ending price would be playing role, Ethereum would be the clear winner as it showed outstanding price growth of 59 584,8% from the beginning of its creation. After that would be BTC, SPY and real estate. This approach might look totally fine if all the assets measured would output similar steady growth over time. However, when an asset is as volatile as cryptocurrencies, this approach cannot be used, as even though at one point the price of the asset might be up, it can go down as fast as it went up. This could be seen for example on 01/01/2018 ETH price reached $1 066, two months later on 01/03/2018 the price dropped to $411,02. This is a drop of 61%. Therefore, picking one price point as a determinant of the asset performance is wrong, because it might be like that at one point of time, but drop drastically later.

The correct way to approach the examination of asset performance is to analyze the average over time. Thus, linear regression line is an applicable tool for this. After analyzing regression line equations, it can be seen that real estate is clearly the best option, after that would be BTC, ETH and lastly SPY. As it can be observed, fitting an accurate trend line into the cryptocurrency price data has been difficult due to high price volatility,

V. CONCLUSION

Some consider cryptocurrencies a major financial revolution, on the other hand some think it is a scam and a bubble. Cryptocurrencies have brought various benefits to its users such as decentralization via blockchain technology, giving power and control over finances to its users, cutting out intermediaries.

The main objective of this article was to understand this new fascinating technology by exploring how the cryptocurrencies works. In addition, it explored the views and opinions on cryptocurrencies of one of the global markets, Georgia. Lastly it tried to understand to what extent are cryptocurrencies a viable option as an investment instrument by comparing it to other traditional investment instruments.

Currently most popular usage of cryptocurrencies is investment. In order to understand to what extent are cryptocurrencies a viable option, we have compared cryptocurrencies price growth data with two well established investment instruments, stocks and real estate. All the price data has been collected through the period of 2010-2020. The results showed that cryptocurrencies have made the biggest price increase from all the assets. ETH during the period of 2015-2020 increased by 59 584,80% and BTC during the period of 2013-2020 increased by 14 576,48%. However, this enormous increase was caused by large price volatility of cryptocurrencies and picking just one price data point at the beginning of the period and at the end. The slopes of all the trend lines were compared to evaluate which asset had the steepest increasing line, thus creating the largest steady increase in price over time. The results showed that real estate was the best asset, then BTC, ETH and SPY.

Overall, we have demonstrated that not only do people view cryptocurrencies positively, but also cryptocurrencies are an alternative investment tool that can provide investors with profits, therefore businesses

that are trying to stay relevant and are trying to innovate should take this information in consideration and position themselves by leveraging this information as much as possible. We have shown that cryptocurrencies are a valid investment that offers its investors increase in value over time.

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