# The Relationship between the Cryptocurrency Value (Bitcoin) and Interest for it in the Region

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## Abstract

Recently the term Cryptocurrency is a frequently used in the mainstream media. The main reason for that is a bitcoin occurrence with reference to the technology and cryptographic inventions that stand behind the bitcoin. Cryptocurrency is legal in region because the European Union has liberal monetary regulations and it can be seen that region successfully follows the world trends in this field. The goal of this paper is to indicate a strong relationship between the value of Bitcoin and expressed interest for it in 11 South-East Europe region countries. The last four and half years will be analysed on a monthly base and data from service Google Trends will be used. Spearman's rank correlation between the expressed interest and bitcoin values for the last four and half years will be calculated. Comment on strong relationship between those variables will be given at the end.

**Keywords:** cryptocurrency, bitcoin, ICT
**JEL classification:** O31, E42

## Introduction

Bitcoin is not the only cryptocurrency, but it is certainly the most famous one. In recent decades, there were several attempts to introduce cryptocurrencies, but they all failed. For now, that cannot be said for Bitcoin.

In a relatively short period Bitcoin has become a term encountered in the mainstream media that offer various views on this globally popular cryptocurrency. Its creator, certain Satoshi Nakamoto, whose identity is still unknown, in his work from 2008 set the basis of decentralized currency that prevents double spending of funds and virtually eliminates the need for a third party in transactions between currency users (Nakamoto, 2008).

Bitcoins are created in a process called mining in which participate volunteers with their computers and in that process they are verified and store information on transactions. Volunteers participating in mining are rewarded with a certain amount of Bitcoins, but the mining process is a form of a game of chance in which "hash" of pre-set properties is sought. Absolutely all information on Bitcoin transactions are public and stored in the so-called Blockchain. Blockchain is constantly upgraded with new blocks including new transactions and complete Blockchain copy is located on computers named Full Nodes. At the moment there are approximately 6,000 Full Nodes that are distributed around the world. Full Nodes use special protocols for sharing information and since it is decentralized system there is no single computer that can be regarded as system's "central point" (Franco, 2015).

End users use special programs for transactions called wallet and they can be used from personal computer, smart phone or web application. Each wallet has at least one unique public address which represents account number in traditional banking systems. Public address is obtained from a public key and a secret key is

known only to the user as is used for signing transactions, i.e. payments. Regardless the fact that all transactions are publicly available, the system protects user's identity by allowing the users to create their own keys and an address which are of such size that it is virtually impossible for two users to have identical keys and an address. If the user wishes to remain anonymous, it is sufficient not to publish the ownership over a public key, i.e. the address (Franco, 2015).

Regardless the enthusiasm for Bitcoin, some authors point out to flaws in the concept. Regarding Bitcoins, some critics point out to the fact that practically half of funds amounting to over USD 3 billion, which is the total value of all existing Bitcoins, are owned by less than 1,000 users who have acquired them when the currency was being created and its value was low (Wile, 2013). On the other hand, O'Dwyer in his research claims that energy used for mining and maintaining Bitcoin network is in range of Ireland's energy consumption (O'Dwyer, 2014).

The goal of this paper is to indicate a strong correlation between the value of Bitcoin and expressed interest for it in 11 South-East Europe region countries. This paper is organized as follows. In section *Bitcoin in Croatia* and *Bitcoin in the region* an overview of Bitcoin usage is presented. The proposed methodology, usage of Google Trends and the final results are presented in sections *Methodology* and Results. Discussion and Conclusions deal with the cause of described correlation.

## *Bitcoin in Croatia*

One of the properties of cryptocurrencies and Bitcoin is high anonymity of their users, which is not absolute as intended with the protocol itself (Maiklejohn et al, 2013), but it is sufficient to prevent the majority of the research and analysis of the user. Also, this feature prevents analysis of the transaction at the state level, so the analysis of the use of Bitcoin in Croatia will mostly be a qualitative analysis of available services related to Bitcoin.

In Croatia we have two portals dealing with cryptocurrencies and Bitcoin. More active one is „Hrvatski Bitcoin Portal" at www.crobitcoin.com, initiated by the students of the Faculty of Organization and Informatics. It offers a range of information on cryptocurrencies, including Litecoin, and a discussion forum (Marković, 2014). Slightly less active portal is "Bitcoin Magazin Hrvatska" at www.bitcoinmag.hr, which offers a similar content to the aforementioned, but in a lesser extent.

Regarding exchange offices, i.e. web sites that offer the possibility of purchasing and selling Bitcoins, there is one such office in Croatia. It is Res Rei Ltd company from Split which offers these services at its website www.bitkonan.com. The advantage for customers from the Republic of Croatia is that they are enabled to do transactions between Croatian banks and exchange offices without intermediaries. In addition to the aforementioned company, there is also a website www.bitcoin-mjenjacnica.hr which is an interface to the Finnish Bitcoin exchange office Local bitcoins at www.localbitcoins.com.

The basis for the functioning of the Bitcoin system is Full Nodes containing complete copies of Blockchains. Currently there are approximately 6,000 of them, and it is interesting to see how much Croatia contributes to that number. At getaddr.bitnodes.io, information on the global distribution of Full Nodes are available, and it is evident that majority of them come from the United States (approximately 2200), while Croatia contributes with 6 server.

## *Bitcoin in the region*

*The term "region" used in the title is considered to be the region of Southeast Europe and includes the following countries (in alphabetical order): Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Macedonia, Montenegro, Romania, Serbia and Slovenia. Figure 1 shows the area in question.*

*Figure 1*
Southeast Europe Region

Source: http://www.amcharts.com/visited_countries/546 (accessed 04.07.2015)

Given the fact that research on Bitcoin and cryptocurrency use in this area is practically non-existing, further analysis will mainly be based on qualitative indicators, i.e. technical papers published on portals related to cryptocurrency or general web portals.

The number of ATMs where you can purchase Bitcoins in the region is close to 900. Of that number, 877 are located in Romania, seven in Slovenia and one in Croatia, Serbia, Bulgaria and Greece (Wong, J.I., 2014) (CoinATMRadar, 2015). The first Bitcoin ATM was installed in Sofia, Bulgaria in August 2014. (Ulm, 2014) and headquarter of one of the largest Bitcoin exchange in the world called BTC-e is also in Bulgaria (Fink, 2014). In Slovenia, the first ATM was installed in September 2014 in Ljubljana, and today there are 6 such ATMs in Ljubljana and one in Koper (coinatmradar, 2015) (Knafelc, 2014). Only one such ATM is installed in Croatia in a catering facility in Zagreb, and was installed in September 2014 (Madunić, 2014), while in Serbia one was presented in Belgrade in September 2014 (Mudrinić, 2014). Since June 2015 Bitcoin ATM is finally available for use in Belgrade (Mudrinić, 2015). Greece installed its first Bitcoin ATM in June 2015 and is located in Athens (Michalakis, 2015).

Unlike a number of the aforementioned Bitcoin ATMs whose primary function is purchasing and selling Bitcoins, the introduction of Bitcoin ATMs in Romania was realized in a different way. The existing ATM operator ZebraPay in cooperation with Romania Bitcoin Company has upgraded existing software of the conventional ATMs and added them a function for purchasing Bitcoins, but not for selling them. This approach is in contrast to the introduction of exclusive Bitcoin ATMs far less risky, and has a far greater impact on the popularization of cryptocurrency and Bitcoin (Wong, J.I., 2014). In addition, 3 more exclusively Bitcoin ATM s were installed in Romania

where it is possible to purchase and sell Bitcoins, which regardless of the previously mentioned 874 ATMs makes this country the most developed in terms of the extent to which Bitcoin ATM transactions are enabled (coinatmradar, 2015b). There is no information available for other countries in the region regarding installing Bitcoin ATMs.

Regarding developments in the region related to Bitcoins and cryptocurrencies, last year Ljubljana hosted a conference titled "The Bitcoin Central and Eastern European Conference". The conference hosted the whole range of experts and leaders of companies engaged in cryptocurrencies and above all with Bitcoins (Ploshay, 2014).

Regarding organisations linked to cryptocurrencies and Bitcoins in the region, Romania once again stands out since it hosts a subsidiary of Bitcoin Foundation. It is a foundation established in 2012 whose mission is to finance development of Bitcoin projects and support Bitcoin infrastructure (Tanzarian, 2014).

The aforementioned Foundation among other things finances the previously mentioned website getaddr.bitnodes.io where you can find available information on the global distribution of Full Nodes. It is interesting to look at the distribution of Full Nodes in the region, as shown in Table 1.

*Table 1*
Full Nodes Number by Country

| Country | Full Nodes Number |
|---|---|
| Bulgaria | 35 |
| Romania | 32 |
| Greece | 28 |
| Slovenia | 21 |
| Croatia | 6 |
| Serbia | 5 |
| Bosnia and Herzegovina | 2 |
| Macedonia | 2 |
| Montenegro | 1 |
| Albania | 1 |
| Kosovo | 0 |

*Source:* https://getaddr.bitnodes.io/ (accessed 04.07.2015)

There are many authors from region who have written about Bitcoin and cryptocurrencies. Rogojanu from Romania has concluded that Bitcoin is way to ensure the existence and simultaneous cryptocurrency circulation with the traditional currency (Rogojanu, 2014) and Dinic from Serbia has concluded that "the future of Bitcoin and similar cryptocurrencies will depend both on the regulation of such currencies, and on how secure and stable they are." (Dinic, 2014)

After an introduction and an overview of available qualitative and quantitative information on the use of cryptocurrencies and Bitcoin in Croatia and the region, the following will describe the methodology used for the analysis of interest for the term "Bitcoin" in the region, and the measurement of the correlations between expressed interest and the value of Bitcoin in relation to US dollar.

# Methodology

Several authors have so far investigated various aspects of interest for Bitcoin and cryptocurrencies, as well as profiles of the users. Regarding the global profile of

Bitcoin user, Lui states that the average Bitcoin user is male (95.2%), 32 years old, with full time employment (44.7%) and in a relationship (55.6%). Furthermore, they are of liberal, i.e. anarcho-capitalist, orientation (44, 3%), and are not religious (61.8%). Key motivators that encouraged people to get involved in the Bitcoin community are: curiosity, profit and political reasons. Data were obtained via online survey (Lui, 2013).

Regarding the interest shown in Bitcoins, Kristoufek noted the strong correlation between the value of Bitcoin in US dollars and the frequency of queries to the Web search engine Google, and Wikipedia. The author has analysed the period from mid-2011 to mid-2013, and the data relates to the global interest in the search engines for the term "Bitcoin". The correlation value of Bitcoin and frequency of queries to Google was 0, 8786, and 0.8271 for Wikipedia.

This paper uses the same methodology used by the author Kristoufek, but only for Google web search engine. The data was collected from January 2011 to April 2015, which amounts little more than 4 years (52 months). Unlike Kristoufek, data are sorted according countries of the region, and 11 values were obtained, instead of a single global value.

Inquiries to Google search engine on a monthly basis for a term "Bitcoin" from the individual countries is available in Google Trends in graphical and numerical form. The data were normalized and the highest value obtained can be 100, and it is a relative value compared to the maximum number of queries. In other words, it is not possible to get a raw number of queries to a search engine for a given term. One of the limitations of this approach is that Google Trends returns a value that is based on a sample from their base, rather than the true value. The consequence of this approach is that for the same inquiry we obtain slightly different values.

Bitcoin value on a monthly basis is other information that is supplied from two sources. Since the beginning of 2011 to May 2013, data were collected by the then largest Bitcoin exchange Mt.Gox, which is no longer functional (Pietila, 2013). From June 2013 to April 2015 the data were collected by the Bitstamp exchange (www.investing.com ).

## Results

Individual correlation coefficients for individual countries in the region are presented in Table 2.

*Table 2*

Spearman's rank correlation – Bitcoin Value and number of Google queries per Month

| Country | Spearman's rank correlation |
|---|---|
| Romania | **0,95** |
| Croatia | **0,92** |
| Greece | **0,91** |
| Slovenia | **0,91** |
| Serbia | **0,91** |
| Bulgaria | **0,90** |
| Macedonia | **0,86** |
| Bosnia and Herzegovina | **0,85** |
| Albania | 0,63 |
| Kosovo | 0,54 |
| Montenegro | 0,43 |

Table with all data is available on address: http://kristiandokic.from.hr/?page_id=15

## Discussion

From Table 2 we can see that for most countries in the region there is a strong correlation between the value of Bitcoin and the number of inquiries to Google web search engine by interested parties for the term "Bitcoin" on a monthly basis. For Albania, Montenegro and Kosovo, the correlation coefficient is lower, but the reason for that is probably the insufficient amount of data produced by the Google Trends for those three countries. For the other eight countries the correlation coefficient is between 0.85 and 0.95, and the value obtained by Kristoufek is within that frame - 0.8786 (Kristoufek, 2013).

Without analysing the causes of changes in the Bitcoin value, the conclusion is that the increase in Bitcoin value affects the interests of potential beneficiaries and generally increases the interest in cryptocurrencies and Bitcoin. Of course, the same phenomenon also applies to the decline in Bitcoin value. This influence is probably exercised through the media, including newspapers, radio, television and the Internet, which could easily be explored, especially in the case of the Internet.

It is clear that in this case we have to consider the possibility that the value of Bitcoin changes due to the changing number of inquiries on Google, since the correlation coefficient does not tell us what is the cause and what is effect. That possibility seems unlikely, especially since some of these countries, such as Croatia, make up less than 0,1% of the world population. It seems highly improbable that such a small number of people can in any way have a significant impact on the value of Bitcoin global currency. However, the author Kristoufek pointed out that it is a two-way process in which the change in the number of inquiries to Google affects Bitcoin value, thus every conclusion needs to be made with caution (Kristoufek, 2013).

## Conclusion

This paper presents some specific countries in the region in the context of Bitcoin use. It points to the existence of a strong correlation between the Bitcoin value and the number of inquiries to Google web search engine by interested parties for the term "Bitcoin" for countries in the region. The assumption was that the effect was achieved through the media, with changes in value affected by the change of interest, but that impact needs to be further explored and it is the subject for the future research. The main limitation of our study is that we have not investigated that impact.

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