ANALYSIS OF THE ELECTRICITY CONSUMPTION AND CRYPTOCURRENCY PRICE DYNAMICS (GEORGIAN CASE)

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Abstract
Recent fluctuations in the cryptocurrency prices raised a question about profitability of the mining process. As a result, a lot of companies around the world stopped producing cryptocurrency. Same happened in Georgia, however the share of electricity consumed in the mining process (counting only direct consumers) in the total electricity supply of the country exceeded 5 percent in 2019. The same indicator for the whole world is small enough and approximately equals to 0.3 percent of the total world electricity consumption. It is relatively new and remarkably important for the countries around the world to work on various approaches of regulating mining and usage process of cryptocurrencies. The regulatory methods significantly differ country by country. Existing regulations mainly cover status of the cryptocurrency and taxation approaches. Given foreign experience, it is desirable to consider the main models of tax regulation of cryptocurrencies and to adjust them to the reality of Georgia.

Key words: *cryptocurrency, cost of electricity, price of cryptocurrency, regulation of cryptocurrency, Energy Sector Risk.*

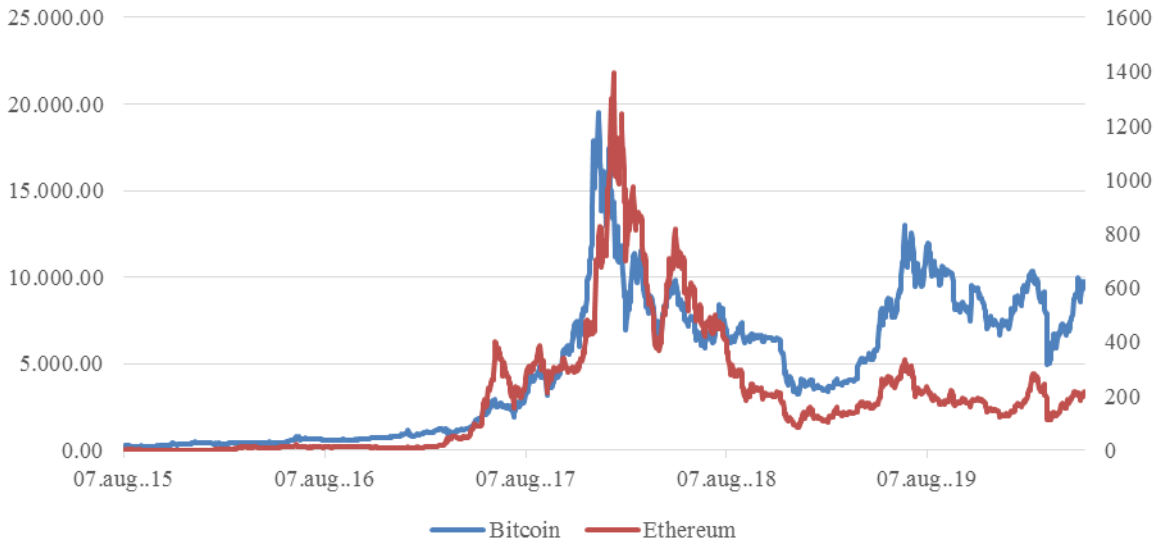
JEL Classification: *O13; P48; Q43.*

I. INTRODUCTION

In 2017 price of bitcoin was one of the hottest topics for discussion and a lot of countries around the world realized that some measures should have been taken regarding regulation of the cryptocurrency production and its usage. In the footsteps of bitcoin, the price of other cryptocurrencies started to raise and numerous investors appeared willing to invest in the mining business. China and United States of America became top cryptocurrency producer countries. In the list of top producer countries appeared Georgia, since BitFury, one of the largest producer entered to Georgian market. Mining process of cryptocurrency requires a lot of energy, respectively consumption of electricity has significantly increased in Georgia.

However, started from 2018, as it can be seen from the graph below, market participants witnessed significant instabilities on the cryptocurrency Market. At the end of 2018 the price of bitcoin has dropped under 4,000 USD. One of the main reasons of drastic price drop was announced regulations. Negative expectations and low price raised a question about profitability of the mining process and became the main reason why some miners stopped production process of cryptocurrencies.

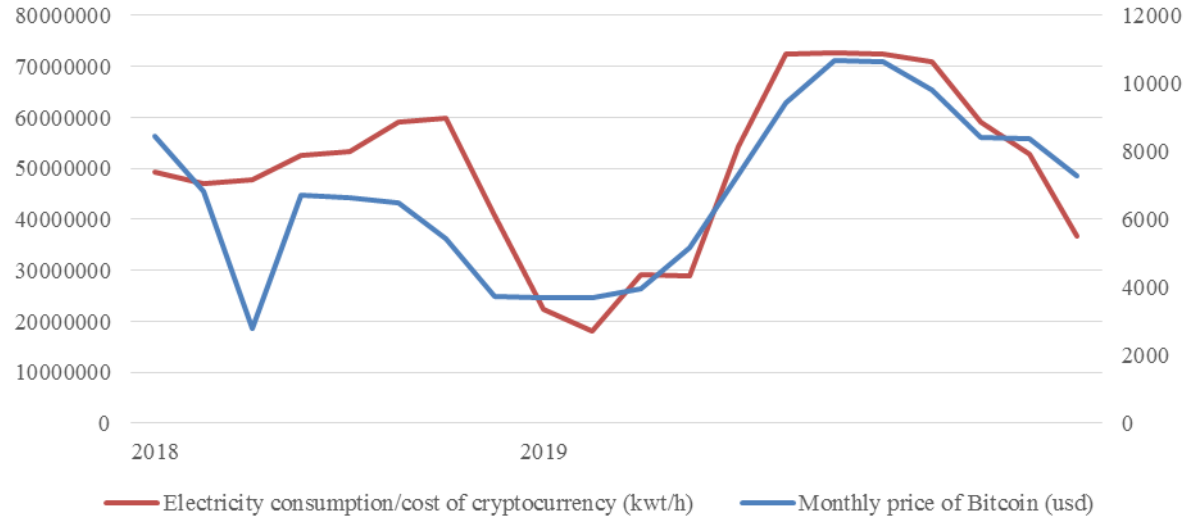
Figure №1. The daily price statistics of Bitcoin and Ethereum, USD



Source: https://coinmarketcap.com/

Statistical information of the monthly electricity cost of cryptocurrency replicates bitcoin price fluctuations and is in line with the above mentioned idea. This gives an opportunity to observe behavior of the producer companies in process of crypto currency price fluctuations. From the graph below it can be seen that in Georgia electricity cost of crypto mining is highly correlated to the bitcoin price. The process of price fall was reflected to the electricity cost of cryptocurrency with two months lag.

Figure №2. Crypto currency cost (in KW/h) and monthly price of bitcoin[1]

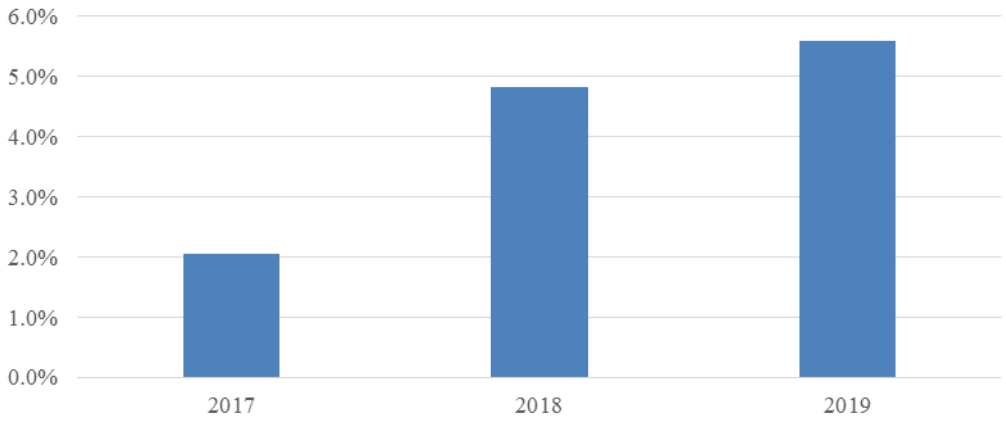


Sources: https://coinmarketcap.com/; https://esco.ge

Apart from the fact that cpyptocurrency prices have started to fall and some crypto miners became unprofitable, there exists significant risk of cryptocurrency price fluctuations, that on the other hand depends on a lot of factors, among them, expectations and regulations initiated by countries worldwide. As a consequence, despite the fact that nowadays the price of bitcoin is not low and exceeds 9,000 USD, starting production process of the cryptocurrency is associated with high fixed costs and therefore rises profitability risk of an investor.

The share of electricity spent on cryptocurrency mining process in the total electricity supply of the country has increased in Georgia for the last three years.

Figure №3. The share of cryptocurrency cost in the total electricity supply[2]

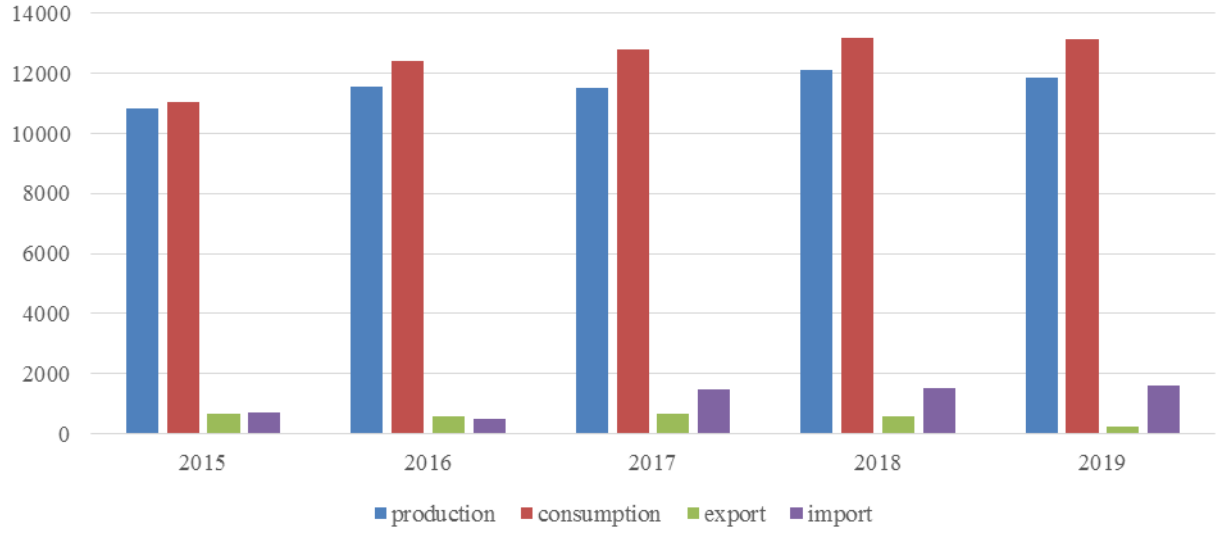


Source: https://esco.ge

Increasing consumption of electricity in the cryptocurrency production can become a problem for Georgian electricity balance. As it can be seen from the graph below, in the last three years, consumption and import of electricity has increased in Georgia. One of main reasons of this fact is increasing number of miners in the country.

[1] *Data includes only direct consumers, mainly directly connected to the transmission network.*
[2] *Data includes only direct consumers, mainly directly connected to the transmission network.*

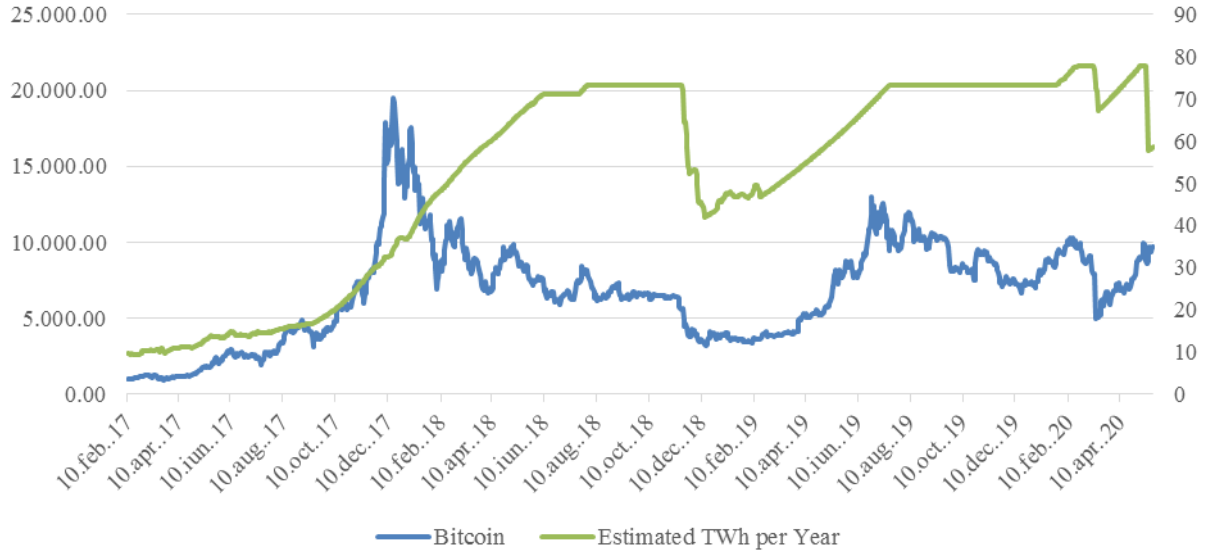
Figure №4. Energy Balance, mln. KW/h



Source: https://esco.ge

Bitcoin's current estimated world annual electricity consumption is 57.92 TW/h and amounts to 0.26 percent of the world's total electricity consumption[3]. This indicator has dramatically increased from the end of 2017 when price of bitcoin and other cryptocurrencies hit historical maximum. Because of rigidity, despite tremendous price fall started from the beginning of 2018, consumption of electricity stayed high and adjustment in the amount of electricity consumed began from the end of 2018. This indicator is back to its high level from June 2019, when price of Bitcoin started to increase and reached 12,000 USD.

Figure №5. The daily price statistics of Bitcoin (USD) and Bitcoin Energy Consumption Index (TW/h)



Source: https://coinmarketcap.com; https://digiconomist.net

[3] *https://digiconomist.net.*

II. REGULATION OF CRYPTOCURRENCY

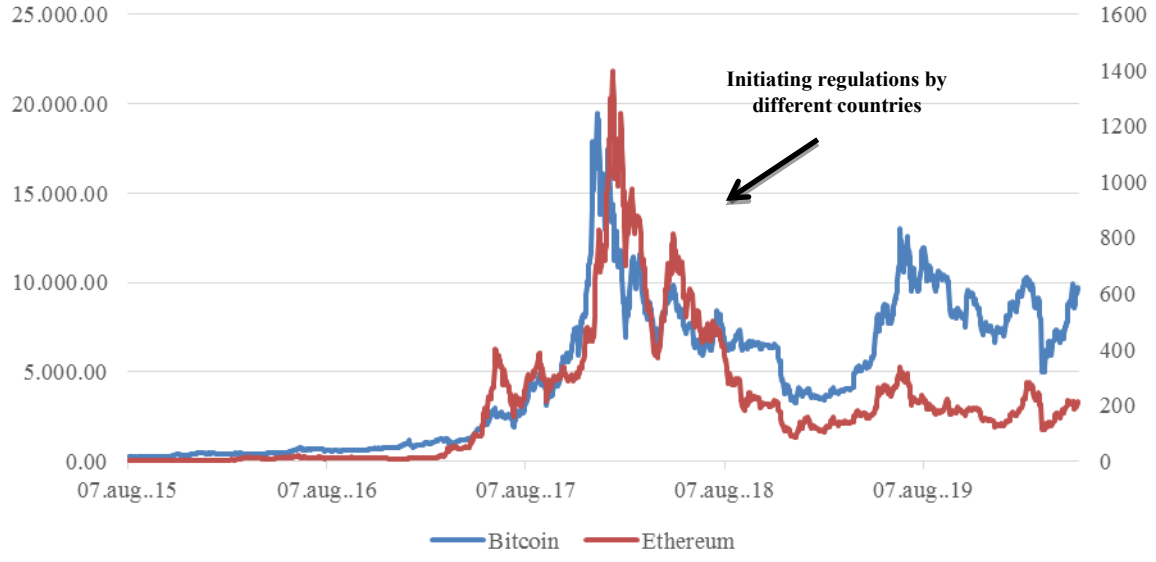
It is relatively new and remarkably important for the countries around the world to work on variouse regulatory approaches of cryptocurrency. The regulatory methods significantly differ country by country. While some countries prohibit the possession and usage of cryptocurrency, some countries even announced creation of their own cryptocurrency. In the literature it is underlined that problem is not only in the regulation of the cryptocurrency, but also the fact that it is not a financial asset and there is not any macroeconomic statistics in the national statistics bureaus about the volumes of cryptocurrency produced or energy consumed for its production. Moreover, there is not any financial standards regarding accounting of operations related to cryptocurrency[4].

Most developed countries consider cryptocurrency as a property, an asset. Therefore regulating cryptocurrency as an asset or property is most widely spread. Mainly regulations cover legal status of cryptocurrency and taxation approaches. Some countries prohibit ownership and usage of cryptocurrencies, but allow blockchain technology in various directions. China is a good example of above mentioned[5].

Georgia is actively involving blockchain technology in the real estate and business registration process. In 2016 the Public Registry of Georgia, together with specialists of Bitfury, has developed a pilot project for a real estate registration blockchain technology-based system. Currently, the Public Registry of Georgia is launching the second phase of blockchain technology[6].

Despite the fact that European regulators admit importance of the single regulation, there are still important differences regarding cryptocurrency regulation approaches used in European countries. Generally, weak regulation is an important component of today's cryptocurrency price. Currently there is not any homogeneity in the regulatory approaches around the world and even single initiative of the big country, like China, affects price fluctuations of the cryptocurrency. Same happened at the beginning of 2018, when a lot of countries initiated various regulations with the aim to control production and usage of the cryptocurrency. At the end of 2018 the topic also was actively discussed on the G20 meeting in Argentina.

Figure №6. Daily Price of Bitcoin and Ethereum, USD



Source: https://coinmarketcap.com

As it was mentioned above existing regulations mainly cover status of the cryptocurrency and taxation approaches. Cryptocurrencies are mainly taxed with income and profit taxes. In case of first approach, countries mainly tax cryptocurrency as a traditional income from employment and realization of production. Second approach considers cryptocurrency similar to traditional assets like bonds, fixed assets or other.

Similar approach is used in the United States of Amerika and Europe. In the United States cryptocurrency is considered as an asset and same tax principles are used like it was already discussed. In 2016 European Commission adopted the definition of virtual currency as a digital expression of value that is not issued by a

[4] *International Monetary Fund (2018), Treatment of Crypto Assets in Macroeconomic Statistics.*
[5] *Edwards R. F., Hanley K., Litan R., Weil R. L. (2019) Crypto Assets Require Better Regulation: Statement of the Financial Economists Roundtable on Crypto Assets, Financial Analysts Journal.*
[6] *https://napr.gov.ge/*

central bank or other public body, but may be accepted by individuals and legal entities as a means of payment and may be transmitted, traded and stored electronically[7].

Central banks of most countries published information that was warning citizens regarding usage of cryptocurrency. At the end of 2017 National Bank of Georgia made similar announcement, according to which virtual currency is not a legal mean of payment in Georgia. The activities related to it are not regulated by the legislation of Georgia and, therefore, virtual currency is not the scope of regulation of the National Bank. Moreover, there is not a central body that will be concentrated to resolve issues related to the cryptocurrency[8].

III. POSSIBLE FINANCIAL AND ENERGY SECTOR RISKS

Financial Stability: According to European Central Bank, Virtual currency schemes themselves are volatile. Nevertheless, currently, they do not pose a risk to financial stability, primarily due to their small contact with the real economy[9]. However, recent fluctuations in cryptocurrency prices have called this conclusion into question.

Proper operation of the energy system: As it is known, the so-called mining process, including the cooling system, consumes significant amount of electricity. Thus, massive mining may lead to an increase in Georgia's dependence on electricity imports and a shortage of electricity. This risk factor is not significant for developed countries, while the share of electricity consumed on mining process is minimal in the total electricity consumption of the country. However, as it was mentioned in the beginning of this paper the share of electricity spent on mining process exceeds 5 percent of total electricity consumption in Georgia and if we consider miners that are not direct consumers or are not officially reported as a cryptocurrency producers this number will be doubled.

Risk of electricity theft: Practice shows that in the process of bitcoin mining, the facts of electricity theft are recorded. This also has a negative effect on the system and increases the rate of losses.

High concentration of energy infrastructure: The required capacity is mainly from free industrial zones, which makes the development of the network and the investments concentrated. In case of a sudden loss of demand in the future (which is often the case with a similar type of demand), the concentrated network (respectively the investments made) may remain dysfunctional.

In addition to the network component, it is also important to note that the investments that are made, put pressure on consumer tariffs, as the additional demand for electricity leads to an increase in imports of expensive electricity, which automatically leads to an increase in the average price of electricity purchased by distribution licensees[10].

IV. CONCLUDING REMARKS

Most developed counties consider cryptocurrency as property, an asset. Therefore, it is most common to regulate it as a property or an asset. Basically, the regulations include the status of cryptocurrencies and taxation. No tariff regulation is used, which in turn may be discriminatory and inconsistent with the requirements of the European Commission's third energy package.

Given the foreign experience, it is desirable to consider the main models of tax regulation of cryptocurrencies and to adjust them to the reality of Georgia. Also, it is advisable to determine the status of cryptocurrencies (for example, as in developed countries: digital assets, commodity, etc.).

It is necessary to register/license the companies that use electricity in the mining process. It is true that today electricity consumed in the mining process is less than 0.3 percent of the world's electricity consumption, but this figure is much higher for Georgia. The required capacity is mainly from free industrial zones, which makes the development of the network and the investments concentrated. In the future, in case of a sudden decrease of demand, the concentrated network (respectively investments) may remain dysfunctional. In addition to the network component, it is also important to note that the additional demand for electricity leads to an increase in the import of expensive electricity, which creates pressure on electricity tariffs.

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[7] *https://www.loc.gov/*
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