Central Bank Policy and Cryptocurrencies

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Abstract: Private cryptocurrencies became an integral part of the financial market. Central banks expressed various positions with respect to cryptocurrency from strong denial to non-intervention. We found out a common and dominating trend in the central bank's policy to lead the further development of crypto-currency by restrictions, robust surveillance and licensing. The first section contains common information about central banks's approach to regulation cryprocurrencies. Next section summarizes the treatment of cryptocurrency by central bankers, also it cointains 2 tables devoted to typology of cryptocurrency legality by countries and recognition of cryptocurrency by countries. Section 3 is devoted to the impact of global crisis on the dissemination of digital cryptocurrencies and contains 5 tables with information about banknotes and coins in circulation and a tables with top-10 cryptocurrencies. Section 4 describes the typology of warning signals sent by central banks to general public, investors, and market players. Section 5 concludes the material.

Keywords: Currency, Money, Central Bank, Monetary Policy, Cryptocurrency.

I. INTRODUCTION

Many digital currencies are now global in terms of dissemination. Despite the fact that their scale of issuance is insignificant in comparison with fiat money, they grow at a rapid pace. The role of central banks in the development of crypto currency is extremely important, since these instruments are directly related to monetary policy and the functioning of payment systems. At the global level, there are prerequisites for creating a common framework for regulating such quasi-money, although questions arise regarding the need for external influence. Central banks expressed various positions with respect to cryptocurrency from strong denial to non-intervention. At present, these positions are coming closer together or at least we observe harmonization of approaches. The form of expression of this position also differs: interviews and articles of leading leaders, consultations, official statements, projects, strategy. The position itself is represented by the widest set: ignoring, silence, observation, research, prevention, prohibition, and finally the development of the national central bank's digital currency. The policy is influenced by many factors, including trust in the central bank and payment systems, the level of development of cashless society, the functions of the central bank, the development of Internet commerce and the level of economic development of the national economy. The author has made distribution of positions of the central banks taking into account three parameters: legacy, signals for public, and definition of cryptocurrency. Broad discrepancies exist in the recognition of crypto-currencies, although among serious publications the refusal to recognize their role as full-value money predominates. It is necessary to state that many central bankers continue to take a wait-and-see attitude, and this is the danger of the regulatory mechanism lagging behind the practice. Authors detected a clear trend in the policy of central banks to lead the further development of crypto-currency by restrictions, robust surveillance and licensing.

II. TREATMENT OF CRYPTOCURRENCY

Private digital currencies differ from digital currencies of central banks. Experts also define State-Sponsored Cryptocurrency, where central bank expands or contracts the money supply of the distributed ledger, validates, authorizes, and governs over the ledger's processors, therefore maintaining distributed but trusted group of processors (State-Sponsored, 2015). Accordingly, central banks are called upon to develop both types of currencies, and not only for one of them, for example, pretending that the crypto-currencies do not exist or that they do not fall into the central bank's vision.

It should be noted that there is still no unified treatment of the global currency by the Bank for International Settlements, the Financial Stability Council or the G20. Depending on how the crypto-currencies are defined in the conceptual plan, a particular central bank shall formulate and declare its relevant policy. Only in few jurisdictions, the definition is given in a legal act, while in most cases everything is limited to a communiqué or declaration. The

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E-ISSN: 1929-7092/18

interpretation of crypto-currency is important for taxation, so in many cases this definition is not given by the central bank, but by the tax authority and/or ministry of finance. A number of countries do not tax any transactions with crypto-currencies. Since Bitcoin is the leader of the crypto-currency market, regulators (authorities) often restrict their positions to precisely this quasi-currency.

Virtually all unprejudiced experts currently recognize many technological shortcomings of cryptocurrencies: high commissions for payment, scaling problems, fragility to hacker attacks, fraud, non-acceptance in retail networks, although under the state patronage these problems could quickly disappear with the appearance of decisions scaling. In particular, the decision to ban or admit a specific cryptocurrency instantly affects its market value. Below we provided some global data on legality of cryptocurrencies.

Most of central banks prefer to issue notes and refusal on recognize any cryptocurrency as legal tender, followed by implicit avoidance of regulating cryptocurrencies as money. In many countries, the treatment of virtual currency mainly is the subject for taxation. However, as a rule, only income of service

Table 1: Typology of Cryptocurrency Legality*

Type of decision	Clarification	Countries
Ban	Any transactions in virtual currencies have been banned	Bolivia, Ecuador, Kirgizstan, Jordan, Egypt, Nepal, Malaysia
	Using the virtual currency could be jailed under the country's strict anti-money laundering laws	Bangladesh
	The purchase, sale, use, and holding of so-called virtual currency are prohibited.	Algeria
Partial ban	Cryptocurrency exchanges are not allowed and cryptocurrency cannot be accepted as payment for goods and services	Namibia, China
	Banning the use of cryptocurrencies as payment tools, but trading and mining remain not covered by the regulation	Indonesia
Restrictions	Cover exchange platform	Russia
No any regulation	Central bank cannot control or regulate blockchain	Nigeria, Brazil, Hong Kong
	Discourages investing in cryptocurrencies until after the regulations are made	Iran
	Virtual currency has ‘no legal status or regulatory framework’	South Africa
Partial permission	Trader Regal RA DMCC is the first company in the Middle East to get a license to trade cryptocurrencies	United Arabic Emirates
	Bitcoin can be purchased at over 6000 convenience store kiosks	Taiwan
	Two largest Bitcoin markets. Supply and use of Bitcoin and other similar virtual currency is illegal as a mean of payment	Vietnam
	Only exchange Digital Currencies for Thai Baht, are required to operate with e-commerce license	Thailand
	The first BitLicence was issued in October 2015	Luxemburg
	ICO services may be provided as a permanent activity only by authorized entities	Estonia
	Legalized cryptocurrencies including ICOs and smart contracts. cryptocurrency mining, trading and capital gains on cryptocurrencies. ICOs will also be tax-free for the next 5 years (until 2023)	Belarus
	Virtual currencies were legalized and cryptocurrency exchanges are now regulated by Central Bank of the Philippines	Philippines
Permission (no objection)	A seller of Bitcoin has to pay a capital gains tax of 25%. Miners, traders of Bitcoin would be treated as businesses and would have to pay corporate income tax as well as charge a 17% VAT	Israel
	Cryptocurrency exchange businesses must be registered, keep records, take security measures, and take measures to protect customers	Japan
	Bitcoin trading does not require authorization	Czech Republic
	Does not fall under national control	Slovakia, New Zealand

*collated data from central banks` web-sites.

providers is taxed. In Slovenia, belongs to a tax-heavens, where there is no capital gains tax chargeable on Bitcoin, however Bitcoin mining is taxed and businesses selling goods/services in Bitcoin are also taxed, while in Denmark crypto trades are not taxed, and capital gains on BTC are tax exempted (Khatwani 2017). Reserve Bank of New Zealand staff paper provides the following brief summary of terminology: digital currencies represent value electronically, and they may or may not be denominated in legal tender; virtual currencies are digital money but are not denominated in units of legal tender; crypto-currencies are decentralized currencies that use cryptography to secure transactions and validate balances. In this order virtual, digital and crypto- terms are considered as different. Finally, crypto-currencies are a decentralized technology designed to facilitate transactions without recourse to a central institution (Kumar, Christie 2017). We conducted the review of terminology, stipulated by national regulators, and detected wide deviation in opinions, but lack of grounds for suggestions.

In Japan Financial Services Agency task force group on the development of payments recommended in 2015 to introduce registration for cryptocurrency exchange businesses, money laundering regulations, and to protect cryptocurrency users (Regulation 2018). The Act requires cryptocurrency exchanges businesses to establish security systems to protect the business information they hold. When such a business entrusts part of its operations to a contractor, it must take measures to ensure that business is appropriately conducted. The Act also requires cryptocurrency exchange businesses to provide information regarding fees and other contract terms to their customers. Cryptocurrency exchange businesses must separately manage customers' money or cryptocurrency apart from their own.

Additionally we ranked countries by GDP per capita as indicator of nation wealth and broad money as percent of GDP (see Table **2**). Most of supporters of digital currency are developed economies, while majority of developing countries restrict the transactions with this instrument. There is no clear correlation between Broad money / GDP and attitude of central banks to digital currency.

The sample of countries (jurisdictions) with total GDP $60 895,62 billion is segregated into three large sub-groups: banned cryptocurrencies in 12 countries ($16 256.60 Billion, 27% of total sample GDP), and allowed – in 19 countries ($36 179.32 Billion, 59%). We predict that most regulators who have not yet determined their position are likely to give up a complete ban.

Meanwhile many authorities prefer to avoid clearly defining cryptocurrency, but some jurisdictions provide comprehensive provisions. For instance, transacting with Bitcoin in Australia is akin to a barter arrangement, with similar tax consequences, Bitcoin is neither money nor a foreign currency, and the supply of Bitcoin is not a financial supply for goods and services tax (GST) purposes. Bitcoin is, however, an asset for capital gains tax purposes (Tax 2017).

In Poland the regulator treats virtual currencies (including Bitcoin) that not issued or guaranteed by the central bank, not money, neither legal tender nor currency, these instruments cannot be used to pay tax liabilities, do not meet the criterion of universal acceptability in shopping and service points, are not electronic money, not payment services (in legal terms), and are not financial instruments (in legal terms). In Germany, sale of Bitcoin and usage of them as a means of payment constitutes a sale, if the Bitcoin owner uses Bitcoin to pay for the acquisition of goods and services. In both cases, private sales transactions– also known as "speculative transactions" – exist within the meaning of Section 23(1) no. 2 of the German Income Tax Act. (Bitcoin Taxation).

Absolute majority of central bankers do not consider crypto currencies (or digital currencies) as a real money and legal tender, as such instruments do not perform key functions of money: unit of account, a means of payment and a store of value. The Governor of the Bank for International Settlements A. Carstens gave the most extensive interpretation of cryptocurrency (Carstens, 2018), stressing that in Bitcoin common goods are rarely evaluated, and very seldom used in transactions, and the costs are too high. With regard to the store of value, the volatility of market price of crypto-currencies makes them so far a very risky investment. A. Carstens emphases on two key components of money circulation – trust and convention. The rise of cryptocurrencies only highlights the important role central banks have played, and continue to play, as stewards of public trust, but crypto-assets must not endanger this trust in the fundamental value and nature of money. He reminds, that money is result of convention, «but if trust in money does not prevail, the legal mandate that conveys value to money becomes meaningless» (Carstens, 2018). However, further A. Carstens transforms his position,

Table 2: Ranking Countries by GDP and Broad Money*

Jurisdiction	Type of decision	GDP (Nominal) per capita 2018 (IMF forecast)	Broad money (% of GDP)	GDP
Luxemburg	Partial permission	120 061	NA	62
Switzerland	Permission (no objection)	86 835	190,0	679
USA	Permission (no objection)	62 152	90,3	19 391
Germany	Partial permission	50 842	NA	3 677
Hong Kong	No any regulation	48 829	376,5	341
Canada	Permission (no objection)	48 466	NA	1 653
France	No any regulation	44 934	NA	2 583
New Zealand	Permission (no objection)	44 639	NA	206
United Kingdom	No any regulation	44 177	142,3	2 622
Israel	Permission (no objection)	42 115	84,8	351
Japan	Permission (no objection)	40 849	242,4	4 872
United Arabic Emirates	Partial permission	39 484	93,5	383
Taiwan	Partial permission	25 977	NA	575
Czech Republic	Permission (no objection)	23 750	80,2	216
Estonia	Partial permission	23 610	NA	26
Slovakia	Permission (no objection)	20 508	NA	96
Egypt	Implicit ban	12 994	98,1	235
Russia	Restrictions	11 947	59,1	1 578
Malaysia	Implicit ban	11 237	130,4	315
Brazil	No any regulation	10 224	100,4	2 056
China	Partial ban	10 088	208,5	12 238
Kazakhstan	No any regulation	9 709	42,2	159
Thailand	Partial permission	6 992	125,9	455
South Africa	Partial permission	6 459	72,6	349
Belarus	No any regulation	6 301	35,7	54
Ecuador	Partial permission	6 263	49,0	103
Jordan	Implicit ban	5 838	121,9	40
Namibia	Implicit ban	5 627	51,7	13
Iran	Partial ban	5 086	90,4	440
Algeria	No any regulation	4 669	79,4	170
Indonesia	Implicit ban	4 052	40,3	1 016
Bolivia	Partial ban	3 622	93,0	38
Philippines	Implicit ban	3 095	77,4	314
India	Partial permission	2 135	75,2	2 597
Ukraine	Partial permission	2 821	46,3	112
Vietnam	No any regulation	2 546	151,1	224
Nigeria	Partial permission	2 108	20,4	376
Bangladesh	No any regulation	1 734	65,8	250
Kirgizstan	Implicit ban	1 188	34,4	8
Nepal	Implicit ban	919	109,3	24

*collated data from The World Bank data and World Economic Outlook Database, April 2018.
Notes: for countries Estonia and Luxembourg we applied value of broad money/GDP figures of Central Europe and the Baltics; for Slovakia – indicator of Czech Republic due to similarity and affinity of these countries.

Table 3: Recognition of Cryptocurrency*

Cryptocurrency is -	Entity
convertible decentralized virtual currency	The U.S. Treasury
commodity	The Commodity Futures Trading Commission
commodity	The Canada Revenue Agency
akin to a barter arrangement	Australian Tax Office
property	Internal Revenue Service, USA
barter exchange	Monetary authority of Singapore
not considered as currency	Central Bank of Costa-Rica
assets (property)	Market Supervisory Authority, Switzerland
financial asset	The Swiss Federal Tax Administration; The Supervision on Financial Services Law, India
property value that can be used as payment	Payment services Act, Japan
not currency, not money, but units of account and exchangeable	BaFin, German regulator
security	Government of Estonia
good	Civil Code, Argentina
taxable assets (no currency, neither security)	Central Banks of Israel and Canada; Australian Taxation Office
virtual commodity	Monetary authority HKMA, central banks in South Korea and Vietnam
intangible good (not as electronic money)	Czech National Bank
neither a currency nor an asset	Slovenia, Central bank
private money, similar to foreign currency	Central banks in Germany, and United Kingdom
means of payment	Central bank in Sweden
currency	Central bank in Luxemburg

*collated data from central banks` web-sites, and The Law Library of Congress. -https://www.loc.gov/law/help/cryptocurrency/brazil.php

emphasizing the pluralism in forms of money, referring to the paper by M. Bech and R. Garratt in BIS Quarterly Review, where they presented the *money flower* as a way of organizing monies in today's environment (Bech, Garratt, 2017). The money flower highlights four key properties on the supply side of money: the issuer, the form, the degree of accessibility and the transfer mechanism. Bech and Garratt suppose that cryptocurrency should consider as a form of money.

Furthermore, A. Carstens summarizes key postulates: (1) the issuer can be either the central bank or "other". "Other" includes nobody, that is, a particular type of money that is not the liability of anyone; (2) in terms of the form it takes, money is either electronic or physical; (3) accessibility refers to how widely the type of money is available. It can be either wide or limited; (3) transfer mechanism can either be a central intermediary or peer-to-peer, meaning transactions occur directly between the payer and the payee without the need for a central intermediary.

Cash is issued by the central bank, is not electronic, is available to everyone and is peer-to-peer. Bank deposits are not the liability of the central bank, mostly electronic. Digitalization is nothing new: financial services and most forms of money have been largely digitalized for many years. As such, there is not a new model. The money flower then also easily accommodates these forms. Further A. Carstens leads to thought, that 'each central bank will have to make its own decision on whether issuing digital money is desirable, after considering factors such as the structure of the financial system and underlying preferences for privacy'. The central bank community is actively analyzing this issue (Committee, 2017). A potentially important and leapfrogging digital-related development, however, is distributed ledger technology (DLT), the basis for cryptocurrency such as Bitcoin.

We strongly agree with thesis of A. Carstens, that the tried, trusted and resilient modern way to provide confidence in public money is the independent central bank. This means legal safeguards and agreed goals,

i.e. clear monetary policy objectives, operational, instrument and administrative independence, together with democratic accountability to ensure broad-based political support and legitimacy. While not fully immune from the temptation to cheat, central banks as an institution are hard to beat in terms of safeguarding society's economic and political interest in a stable currency. Nevertheless, the society needs to be confident in expediency of independence for the provision of public goods, namely – to insure financial stability. M. Carney, Governor of Bank of England, expressed the similar suggestion: "In the depths of the global financial crisis, the coincidence of technological developments and collapsing confidence in some banking systems sparked the cryptocurrency revolution. Its advocates claim that a decentralized cryptocurrency, such as Bitcoin, is more trustworthy than centralized fiat money" (Carney, M., 2018). M. Carney also recognizes poor performance of key functions by cryptocurrencies in store of value, if look at the average volatility of the top ten cryptocurrencies by market capitalization exceed more than 25 times that of the US equities market in 2017. This extreme volatility reflects in part that cryptocurrencies have neither intrinsic value nor any external backing, and their worth rests on beliefs regarding their future supply and demand—ultimately whether they will be successful as money. Indeed, we believe that the excitement around crypto-currencies is strongly encouraged by the community of stakeholders (primarily – miners and founders), which seek to artificially expand the circle of participants in the system at the expense of newcomers ('neophytes'). The system continues to function until it approaches the saturation point, but after that the model of collective enrichment does not disappear, but is embodied in a new cryptocurrency. We note the rapid development of Internet sites and even respectable magazines and scholars involved into the implicit promotion of rapid enrichment for anybody.

Moreover, the most fundamental reason to be skeptical about the longer term value of cryptocurrencies is that it is not clear the extent to which they will ever become effective media of exchange. M. Carney states, in cryptocurrencies, the speed and cost of the transaction is generally slower and more expensive than payments in conventional instruments. That is because the more heavily used cryptocurrencies face severe capacity constraints compared with other payment systems. For example, Visa can process up to 65,000 transactions per second globally against just 7 per second for Bitcoin. The fees for payment are currently around £2, but even that is expensive relative to cash, cards or online payments which cost the retailer around 1.5 pence, 8 pence and 19 pence respectively (Payment Survey, 2017).

Modern cryptocurrencies are virtually non-existent units of account, given that they are poor stores of value and inefficient and unreliable media of exchange. Retailers that quote in Bitcoin usually update at very high frequency so as to maintain stable prices in traditional currencies such as US dollars or sterling. In our opinion, in some respects such arguments are too categorical, since they do not recognize the possibilities of innovation. Look at payment cards, which remained a limited instrument for a long time in settlements due to rejection by retailers, and then followed by rocket growth and even a transition in a number of countries to a 'cashless society' (for instance, Sweden). Much will depend on political support for such innovations, and to what extent the benefits in the public eye outweigh the costs.

Vítor Constâncio, Governor of European Central Bank, also supposes that cryptocurrencies are not currencies: they cannot fulfill the classic functions of a currency, the first of which is to serve as a stable unit of account, which can be used to express the value of other goods. If the value of the currency itself is so volatile, then it cannot perform this function; it is in fact a speculative instrument. Moreover, their use as a means of payment is very limited. They are used in the shadow economy and in countries where institutions have collapsed and monetary systems are not working – there they are used as a payment instrument of last resort. They in no way represent a threat to traditional currencies. Of course, rising prices have led to such high market capitalization that a collapse could have consequences. However, they would not be systemic. In addition, he added: 'I call these instruments "tulips", recalling the famous tulip bubble and subsequent crash in the Netherlands in the 17th century' (Cryptocurrencies, 2018).

Central bank of Canada is preparing new rules on regulation of cryptocurrency, and implementing the special project Jasper related to digital currency of central bank. Meanwhile Governor of the bank, Stephan Poloz pointed out on popular misconception: "the term "cryptocurrency" is a misnomer — "crypto," yes, but "currency," no" (Poloz, 2017), because these instruments are not reliable store of value and do not used in settlements commonly. As he grounds, these instruments can be thought of as securities. That

means, any income on trading needs to be reported for tax purposes, these things means buying risk, which makes it closer to gambling than investing. Nevertheless, the Canadian central banker stated, that blockchain technology that underpins cryptocurrency is 'a true piece of genius and it will be applied to many areas in the economy' (Tso, Kharpal, 2017). Carolyn Wilkins, the Bank of Canada's senior deputy governor, who is leading researcher on cryptocurrencies, and said that cryptocurrencies are not true forms of money: "This is really an asset, or a security, and so it should be treated that way". Like others, she viewed distributed-ledger technology as promising for making the financial system more efficient. BOC researches are also exploring the circumstances under which it might be appropriate for the bank to issue its own digital currency for retail transactions (BOC, 2017). Somewhat earlier C. Wilkins stressed, that 'money that's worth the name to be called money really does have to be a medium of exchange, a store of value -- and the digital currencies that are out there right now don't fulfill them" (top Bank, 2017).

This approach reflects the aspiration of state authorities to treat crypto-currencies as an asset (financial instrument) that generates income, and income itself is taxable. However, in our opinion, it would be quite difficult in practice to overcome the obstacles: income accounting, income volatility and anonymity of operations. Researchers from Federal Reserve Bank of Cleveland, USA A. Berensten and American scholar F. Schar argue that Bitcoin created money different from any other forms of money such as commodity money, cash or digital money (Berentsen and Schar, 2018). Experts characterize various currencies, and their dimensions. The first dimension is representation. Money can be represented in virtual form or physical form. The second dimension is transaction handling. Money can be transacted in centralized or decentralized payment systems. Finally, the third dimension is money creation. Some monies are created by a monopoly, while others are issued under competition. In addition to cash, commodity money, Berentsen and Schar consider commercial bank deposits are virtual money, which has no physical representation, and exists only as a record in an accounting system. Central bank electronic money is also virtual money, which is issued monopolistically and transactions are conducted in a centralized payment system. They suppose, that Bitcoin is the first virtual money for which ownership rights to the various monetary units are managed in a decentralized network. The Bitcoin blockchain is the decentralized accounting system, and the so-called miners are the bookkeepers. In this interpretation, the conclusion about crypto-currencies as a kind of full-value money needs more feasibility. This approach leads us to the vision of the crypto-currency as an analogue of gold, whose deposits are discovered here and there (creating new crypto-currencies in different jurisdictions with using regulatory arbitrage), and the participation process itself appears as a kind of 'gold rush' that will end sooner or later (in this case - saturation by reaching the limit of participants or the collapse of confidence, and closure of coin game).

III. IMPACT OF GLOBAL CRISIS ON THE POPULARIZATION OF CRYPTOCURRENCIES

The global financial crisis of 2007-2008, subsequent systemic and local crises in the banking sector triggered interventions by central banks; as a result, the rescue of certain systemically important banks sharply increased the debt-to-GDP ratio in many countries, but also undermined confidence in the financial system. Therefore, the demand for cash continues to be maintained at a high level, as evidenced by the statistics of the leading countries of the world (see Table **3**). With relative stability of cash in absolute terms and per capita, the money supply relative to GDP increased by 4%. The growth of cash with existing payment instruments may be caused by willingness of households to withdraw savings from banks and investment funds as a manifestation of mistrust in these institutions.

The data by countries show a significant variation in the dynamics and the absence of a correlation between the level of development of the national economy and the increase in money supply (see Table **3**). In our opinion, the increase in cash in the US and Switzerland can be treated as a direct consequence of the monetary policy of the respective central banks. At the same time, large issuers of cash in the Eurozone, the United Kingdom, Brazil, Japan and Russia are showing a curtailment of cash. Sweden and Australia are a confirmation of the course towards the transition to a cashless society.

Several leading countries of the world have been building up the money supply for the last 10 years, as the graph below shows (Figure **1**).

Until now, Bitcoin, and any cryptocurrency are widely valued in US dollars, the most popular reserve currency. Significant volatility of market value of any cryptocurrency also indicates that there is no 'intrinsic

Table 4: Banknotes and Coin in Circulation: Euro Area and Leading Economies (End of Year) *

		Euro area	CPMI excl. euro area
Total value *(USD billions)*	2012	1 237,83	3 378,30
	2013	1 354,86	3 306,77
	2014	1 267,29	3 246,05
	2015	1 210,42	3 325,31
	2016	1 217,91	3 469,03
Value per inhabitant *(USD)*	2012	3 677,6	1 364,6
	2013	4 016,8	1 322,5
	2014	3 749,0	1 275,9
	2015	3 570,0	1 292,7
	2016	3 579,0	1 335,2
Value as a percentage of GDP	2012	9,54	8,22
	2013	9,89	8,06
	2014	10,28	7,77
	2015	10,57	8,39
	2016	10,71	8,58
Value as a percentage of narrow money	2012	18,21	22,29
	2013	18,11	22,30
	2014	17,49	22,48
	2015	16,76	22,58
	2016	15,96	22,39

*Statistics on payment, clearing and settlement systems in the CPMI countries - Figures for 2016. BIS. Committee on Payments and Market Infrastructures. Dec 2017. No 172.

Table 5: Banknotes and Coin in Circulation: Sample of Jurisdictions *

	Banknotes and coin in circulation	
	Total value (USD billions) 2016	**Growth in 2012-2016**
Korea	80,48	59%
Hong Kong SAR	54,16	39%
Saudi Arabia	53,33	31%
United States	1 509,34	29%
Singapore	29,39	23%
Switzerland	79,68	13%
Mexico	68,72	6%
CPMI excl. euro area	*3 469,03*	*3%*
Turkey	35,41	2%
Euro area	1 217,91	-2%
United Kingdom	93,78	-4%
Canada	64,40	-7%
India	196,49	-9%
Australia	57,71	-11%
Japan	915,72	-14%
Brazil	71,23	-22%
Russia	145,11	-43%
Sweden	6,88	-54%
South Africa	7,20	-61%

*Statistics on payment, clearing and settlement systems in the CPMI countries - Figures for 2016. BIS. Committee on Payments and Market Infrastructures. Dec 2017. No 172.

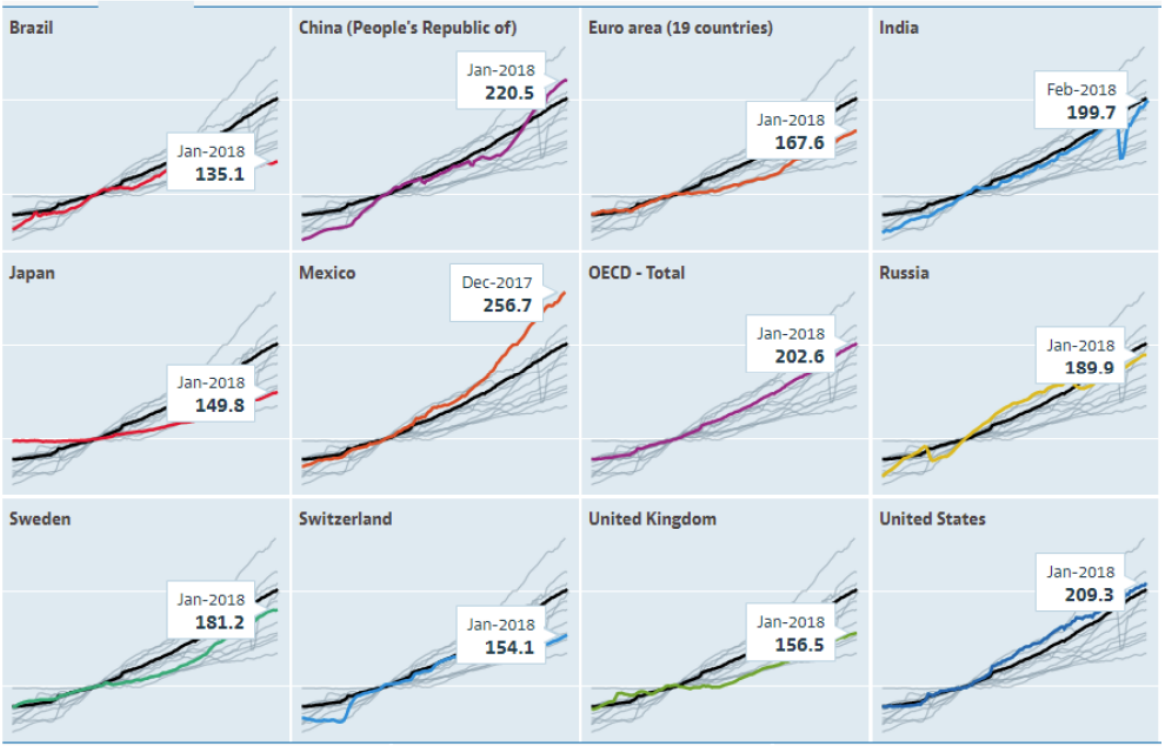

Figure 1: Narrow money (M1) Total, 2010=100, Jan 2007 – Feb 2018.*

*composed by author from OECD data. Note: M1 includes currency i.e. banknotes and coins, plus overnight deposits. M1 is expressed as a seasonally adjusted index based on 2010=100.

value' of this instrument. Below is a sample of the 20 largest crypto-currencies by the volume of market capitalization as of the beginning of March 2018, the absolute majority pseudo-currency demonstrates horrendous volatility (Table **3**). We found, that for the most popular crypto-currencies, there are siblings that exploit the trademark already promoted on the market, similar to the marketing technologies of co-branding.

At present, crypto-currency assets do not yet represent significant risks for financial stability, since they are too small in relation to the financial system. By calculation of author, of the total number of monitored 1,550 cryptocurrencies at the beginning of March 2018, totally 1218 "currencies" reached less than $10 million of capitalization (excluding undisclosed networks), and the general capitalization of the entire digital currencies 'universe' was $388 billion (Cryptocurrency, 2018), or 2% of USA monetary aggregate M3 in 2016 ($17 trillion).

Below we present performance of Top10 cryprocurrencies. Availability of data about market capitalization and volumes of deals is not verified by any regulator or association.

This dynamic (Table **6**) gives us the grounds to suggest about the purely speculative nature of these instruments. Careful analysis shows outstanding, but relative, stability of two of the above coins - NEM and Tether, - reveals their stagnation and fading, especially in the case of the NEM. Comparison of volatility in terms of prices of leading cryptocurrency and NEM shows simultaneous changes (Figure **2**).

IV. WARNING SIGNALS TO MARKET PARTICIPANTS

Below we provided the collation of typical signals sent to market participants by regulators (such as central banks, AML bodies, supervisors of stock market etc.) with regard to cryptocurrencies. Warning signal classified on three types: risk for investors, prevention of illegal activity, and notification about responsiveness of authorities. Central banks of Saudi Arabia, Jordan, Lebanon, Romania, Finland, Lithuania, Philippines, and UK clearly warned investors about higher risks of investments in cryptocurrencies (virtual/ digital currencies). Effectiveness of cryptocurrencies in terms of public goods looks no so high, if take into account usage of energy for mining. A. Carstens recognized (Carstens, 2018), that DLT-based systems are very expensive to run and slower and much less efficient to operate than conventional payment and settlement systems. The electricity used in the process of mining

Table 6: Cryptocurrency Market Capitalizations: 20 Largest Crypto-Currencies

Name	Market Cap, USD Billion		Volume (24h), USD Billion		Change (24h)	
	March 2018	Sept 2018	March 2018	Sept 2018	March 2018	Sept 2018
Bitcoin	159,7	127,3	7,3	4,0	7,30%	1,33%
Ethereum	72,1	29,5	2,0	1,4	9,10%	0,02%
XRP	33,2	13,4	0,8	0,2	8,60%	-0,36%
Bitcoin Cash	18,1	11,1	0,4	0,4	9,60%	2,12%
Litecoin	10,6	4,0	0,9	0,3	15,30%	4,84%
NEO	6,0	1,6	0,2	0,1	9,80%	7,66%
Stellar	5,8	4,2	0,0	0,0	11,50%	0,44%
Cardano	5,8	2,7	0,2	0,1	10,80%	1,20%
Monero	4,6	2,2	0,1	0,1	13,70%	7,23%
EOS	4,5	6,0	0,3	0,8	12,40%	1,41%

* composed by author on data: - Retrieved March 10, 2018, and September 2018 from: https://coinmarketcap.com/currencies

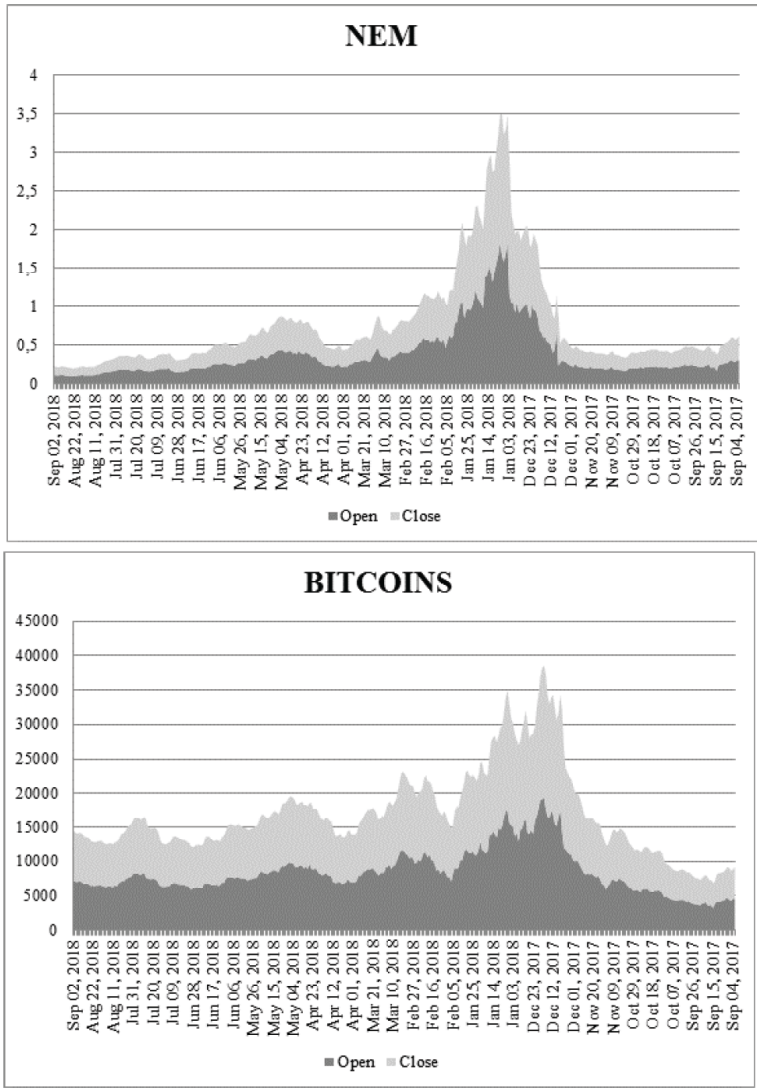

Figure 2: Historical data for NEM and Bitcoin, currency in USD*

*composed by author on data: - Retrieved September 04, 2018, from: https://coinmarketcap.com/currencies

Table 7: Signals to Public and Market Participants

Kind of signal	Countries	Content of signals
Warning about high risk will not be guaranteed any protection or rights	Singapore	If Bitcoin ceases to operate, there may not be an identifiable party responsible for refunding their monies or for them to seek recourse
	Qatar	This cryptocurrency is highly volatile and can be used for financial crimes and electronic hacking as well as risk loss of value because there are no guarantors or assets
	Slovakia	Virtual currencies have not a physical counterpart in the form of legal tender and participation in such a scheme is at your own risk. Exchanges or purchases of virtual currencies represent the business risk of investors and investors' money are not protected
	Poland	There are risks related to the possibility of loss of funds due to theft, and frauds, lack of guarantee, lack of universal acceptability, the possibility of fraud, and high price change. Financial institutions should be cautious about engaging and cooperating with virtual currency trading entities.
Warning about usage in illegal activity	Morocco	Cryptocurrencies may be used for illicit or criminal purposes, including money laundering and terrorist financing
	India	Cryptocurrencies can be a channel for money laundering and terrorist financing
	Kenya	Virtual currency carries risk; the regulator should not "be held liable for any losses" incurred by consumers using digital currencies to settle transactions.
	Pakistan	Investigating the traders of digital currencies for tax evasion and money laundering
Warning about close watching	South Korea	Authorities will prosecute illegal activity involving Bitcoin
	Hong Kong	The authority will be closely watching the usage of Bitcoin locally and its development overseas
	Poland	Cryptocurrencies can be potentially used for money laundering and tax evasion purposes
	France	Created working group to develop cryptocurrency regulations. There is evidently a risk of speculation.
	European central bank	Bitcoin's unstable value, its links to tax evasion and crime are major risks.

Bitcoin is staggering, estimated to be equal to the amount Singapore uses every day in electricity, making them socially wasteful and environmentally bad. M. Carney (Carney, 2018) argues: "The costs of Bitcoin mining are enormous. Its current annual electricity consumption is estimated by some to be up to 52 terawatt hours, double the electricity consumption of Scotland. In comparison, the global Visa credit card network's energy use is less than ½ of 1% of that of Bitcoin, despite processing 9000 times more transactions". Some statements (see Table **7**) show different emphasis in warning investors by authorities.

In addition, majority of central bankers prefer to avoid disclosing their formal opinions. ECB President Mario Draghi said about limited impact of digital currencies on the euro-area economy, adding they posed no threat to central banks' monopoly on money. Many authorities only recommended investors to be more conservative. In particularly, the European Banking Authority advised European banks not to deal in virtual currencies such as Bitcoin until a regulatory regime was in place (Digital, 2017).

Risks for financial stability may increase if the crypto-currencies are used in retail trade, financial institutions will be involved in operations with crypto-currencies, but the standards of countering money laundering and cyber defense will not be significantly improved. Central bankers pointed out on several risks:

Manager of Reserve bank of India stated, that virtual currency pose potential financial, operational, legal, customer protection and security related risks. These instruments are vulnerable to losses arising out of hacking, loss of password, compromise of access credentials, malware attack, and there is no established framework for recourse to customer problems, disputes, and charge backs, etc. "Value seems to be a matter of speculation. Legal status is definitely not there." (Gandhi S. R., 2017). M. Carney reminded about risk of frauds and thefts in operations of private virtual currencies, which crystallized in stolen

Bitcoins from customer accounts and exchanges. In all cases, funds were stolen from “hot wallets”, where the private key is stored on a computer or device that is connected, directly or indirectly, to the internet (Carney, 2018). Central banks` researchers pay attention to the risk of contagion effect, extreme interconnectedness between cryptocurrencies, as detected by independent experts (Huynh, Nguyen, Duong, 2017). Similarity of cryptocurrency business models and causes the danger of simultaneous changes in the behavior of market players with regard to holding coins. Moreover, between players (miners) there are virtual connections, and non-controlled by central bank channels for moving money. Yves Mersch, Executive Board member of the European Central Bank (Mersch, 2018), recently referred to cryptocurrencies as a risk of ‘contagion and contamination of the existing financial system’. By our opinion, one of the common way to mitigate or capsulate risk of contagion is a stricter regulation (surveillance) of cryptocurrency exchanges. Australia’s central bank chief criticized cryptocurrencies, arguing the asset is more likely to appeal to criminals than consumers. “The current fascination with these currencies feels more like a speculative mania than it has to do with their use as an efficient and convenient form of electronic payment,” said Philip Lowe, the Reserve Bank of Australia’s governor (Lam, 2017).

V. CONCLUSION

M. Mojmír Hampl, Vice Governor of the Czech National Bank, stated, that in any case, swift changes in purchasing power were the mortal enemy of any good currency. Some Bitcoin enthusiasts put forward that this problem will moderate over time as more and more Bitcoin are mined and the “velocity” of Bitcoin money demand increases with more universal acceptance of the cryptocurrency”. (Hampl, 2017).

Cryptocurrencies do not function as a unit of account, as well as relevant store of value or means of payment, therefore they might not be treated as sustainable form of money. These instruments are widely deployed as assets for speculating and manipulating. Central banks in coordination with governments, other financial authorities and international organizations are able to react adequately on the development of cryptocurrencies, to regulate commercial banks and other financial service providers, involved in IPOs, and trading. Central banks need to define the nature and outlook for digitalization of money, to safeguard payment business. Development of sound institutional infrastructure would serve the overall financial system and restore the confidence in financial system and central banks.

Efforts of central banks should go beyond AML measures, but also on the development a prudential ‘tool-kit’ for the prevention of bubbles.

The challenge for central banks is provisioning fair level playing field to all participants in financial markets, and in prevention of illicit or inefficient activity of providers do not forget about mission of fostering innovations in financial sector, strict compliance of high service standards. In particularly, financial authorities should pay attention to contagion risk of interconnected cryptocurrencies, to defend public trust and support the public goods creation. In general, central bankers have not reached common understanding and treatment of cryptocurrency to deal with, while it should be their prior responsibility. Central bank digital currency presents the subject for further research of this topic. Private virtual currencies may be treated as a kind of social experiment, or fiel study for the probation of new type of money.

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Received on 29-05-2018 Accepted on 01-10-2018 Published on 12-11-2018

DOI: https://doi.org/10.6000/1929-7092.2018.07.51