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Characteristic Systemic Risks of Crypto-Currencies and Necessary Regulatory Response

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Undergraduate

1. Introduction.

The rise in popularity and technological feasibility of crypto-currencies (typified by Bitcoin), has set in motion a revolution in the way we conceive of financial currency systems. By analysing the nature of crypto-currencies, this essay aims to reveal the inherent risks associated with crypto-currencies and in response, advise and make regulators (mainly government central banks) aware of these factors. Modern day economics is not equipped to facilitate an entirely crypto-currency based economy and should thus investigate the risks posed by non-fiat currency. Subsequently, this essay is structured as follows; Section two will identify systemic risks and delve into a definition of crypto-currencies as well as examine the structure and characteristics of crypto-currencies and the factors that determine their value. Section three will argue that crypto-currencies are inherently risky, based on their characteristics and source of value (as described in Section two). Section four, will explore the options available to regulators in order to secure safer and a wider use of crypto-currencies with emphasis on maintaining stable money supply whilst mitigating the risks. Section five will conclude.

2. Economics of Crypto-Currencies.

2.1. Defining Crypto-Currencies & Systemic Risks.

Economic theory generally deviates on a definition of currency. A state theory of currency emphasises taxability and legal tender status as necessary conditions for currency status, where spontaneous theory of money, simply requires universal acceptance as a unit of exchange for currency status (Nabilou & Prüm, 2018: 5-6). Due to this disparity on a concise currency definition and in an attempt to categorise crypto-currency, the South African Reserve Bank (2014) saw it fit to broadly define crypto-currency as a digital store of value, which can be traded through digital platforms as a means of exchange, a unit of value, but does not hold legal tender status in South Africa.

It is important to note a crucial difference; electronic money is digitally stored fiat money, whereas crypto-currency is exclusively an electronic store of value pegged to no currency (Kaminskaya & Petrova, 2018: 111). Hence, crypto-currencies in their current form cannot be considered currency in a pure economic sense or legally, in South Africa (Bech & Garratt, 2017: 57; Nabilou & Prüm, 2018: 7).

Additionally, the author argues that systemic risks are inherently ‘indirect’ in its ascription i.e. systemic risks are both exogenously and endogenously caused and linked, where a ‘typical’ systemic risk entails a compromise in the proper functioning of the financial regulatory system, in this case (Smaga, 2014: 2-3). Allen and Carletti (in Smaga, 2014: 5) states that

there are six broad systemic risks, namely; the occurrence of price bubbles, liquidity provision, numerous equilibria and market panic, contagion, political instability, and currency mismatches in the banking sector. Examining crypto-currencies, exposes the presence of some of the above-mentioned risks within crypto-currencies.

2.2. Compositional Structure of Crypto-Currencies.

2.2.1. Blockchain and Network Effects.

Crypto-currencies are the purest form of peer-to-peer electronic cash which can be sent directly from one user to another without a central financial institution verifying the transaction (Nian & Chuen, 2015: 8). This is done by using a cryptographic proof-of-work (blockchain), which stamps each transaction based on a unique mathematical signature derived from each previous transaction in chronological order (Investopedia, 2018). This technology enables crypto-currency to be completely decentralised and unrestricted by national borders or private banks which makes direct taxability and central bank regulation virtually impossible.

2.2.2. Decentralisation and Denationalisation.

Due to blockchain technology, crypto-currencies are 'decentralised' i.e. there is no third party/authority involved in verifying currency exchanges (Nian & Chuen, 2015: 17). Instead, verification falls upon the users who are mostly (if not always) anonymous (ibid). Compared to centralised currency, crypto-currency is held entirely by the user which means users control their funds autonomously and anonymously (Madeira, 2017). This causes crypto-currency to have very low liquidity i.e. the behaviour of any one user buying or selling crypto-currency, has a substantial impact on the value and speed at which the crypto-currency is exchanged (Amadeo, 2018). Additionally, crypto-currencies are difficult to use due to the mathematical and computing labour required and are untraceable to any country or person of origin. This complicates crypto-currency demand-and-supply behaviour within markets.

2.2.3. Transparency.

Anonymity amongst crypto-currency users, causes transactions to be non-transparent compared to conventional electronic money transactions (Sullivan, 2015). The effects of this, coupled with the above-mentioned characteristics, makes crypto-currencies a preferred means of exchange for money launderers, criminals, warlords and other illicit activity perpetrators (Pellegrini & Perna, 2018). Subsequently, the importance of knowing where crypto-currency originates from and who demands it, becomes important for regulators to assess the risks involved.

2.3. Key Drivers of Value in Crypto-Currencies.

2.3.1. Supply-side.

Depending on the market in which crypto-currency is generated, it is either backed by existing currency (the 'Bitcoin Exchange' market and Initial Coin Offerings [ICO's] being an example) or 'mined', which means it is created digitally and linked to nothing (Taran et al., 2015: 331). The concern with most crypto-currencies at present, is the fact that it is difficult and costly to issue/supply (Van Zyl, 2018). This is due to the excessive costs involved in mining and verifying new currency and/or the limited amount of crypto-currency available for circulation, as is the case with Bitcoin which is capped at 21 million units (see figure 1) (Vlasov, 2017: 221; Asolo, 2017). In essence, however, there is no cap on the amount of crypto-currency which can be supplied (apart from Bitcoin) and this poses a great problem for central banks when one considers implementing crypto-currencies more broadly as a legal means of exchange.

Additionally, the 'Bitcoin Exchange' type markets, are very one sided i.e. they satisfy the demand for crypto-currency but cannot facilitate demand for exchanges in crypto-currency due to the limited legal and retail acceptance of crypto-currencies globally (Asolo, 2017). Subsequently, crypto-currency is under-supplied and constrained, causing supply-side fluctuations in its value.

2.3.2. Demand-side.

The demand for crypto-currencies has also seen fluctuations over recent years (Ghosh et al., 2016: 2). Crypto-currency demand is mainly driven by its desirability as a commodity or asset, a means of payment (where accepted) or as payment for miners (Buchholz et al., 2012: 7). However, it is difficult to estimate the demand for crypto-currencies due to the anonymity and volatility of the currency (Ghosh et al., 2016: 3). Additionally, it is argued that crypto-currencies (Bitcoin in particular) are detached from traditional macroeconomic relations of demand-and-supply and behaves like a speculative bubble or anomaly within current markets (Bouoiyour & Selmi, 2015). What is clear, however, is that crypto-currencies are in excess demand with limited supply, causing prices to rise significantly and markets to behave extremely volatile. As a result, it is imperative to assess the inherent systemic risks posed by crypto-currencies based on the points raised thus far.

3. Inherent Systemic Risks of Crypto-currencies.

3.1. Risks Posed by Crypto-Currency Structure/Characteristics.

Crypto-currencies make it impossible for governments to successfully tax, enforce, regulate, censor or verify any aspects pertaining to crypto-currencies due to their peer-to-peer exchange and verification systems, anonymity and network-based technology stretching across legal government spheres (Nian & Chuen, 2015: 254). In other words, the decentralising and denationalising effects brought about by crypto-currencies, creates an inherent risk to government regulators in maintaining monetary stability, especially if crypto-currencies were to become more widely used, as opposed to existing government backed fiat currency (He et al., 2016: 5).

The eluding nature of crypto-currencies causes them to lack transparency in terms of regulatory and enforcement laws. Governments have no means of knowing who conducts what with their crypto-currency and this leads to numerous problems and risks, including money-laundering, tax evasion and other illicit activities (Pellegrini & Perna, 2018). Brenig et al. (2015: 1) states that these activities pose not only a threat to economic systems but also to the public being exposed to crypto-currency technology. This is due to the fact that criminal organisations and terrorist groups are able to expand their influence and profits, erode tax revenues and harm public and private sectors of the economy (ibid). When one defines money laundering as the disguise of illegal sources of profits as to obscure the link between the profits and original criminal activity, it becomes clear how crypto-currency easily facilitates such action (IMF, 2014). Crypto-currencies thus pose the risk of political instability through public disgruntlement related to the criminal activities promoted by crypto-currencies.

Additionally, crypto-currency complicates the ability of governments to procure tax from its citizens. The South African Revenue Service (SARS) (2018) sates that it falls upon taxpayers to declare their crypto-currency taxable income. However, it is difficult to acquire any form of transactional history of crypto-currency due to blockchain technology. It is even more difficult to determine the value of one's crypto-currency assets considering the erratic fluctuations in prices, and with no definite way of checking whether taxpayers are honest in their declarations, it is impossible for governments to properly enforce tax laws (McKane, 2018).

Subsequently, crypto-currencies have not been embraced by regulators or government central banks, lending to their contested nature which erodes government monetary policies and tax revenues. If crypto-currency becomes widely used in its current form, it will potentially destabilise traditional financial markets and cause panic within certain sectors.

3.2. Risks Posed by Crypto-currency Supply-and-demand Factors.

Crypto-currency is deemed exceptionally volatile and unstable in value within the markets they are exchanged in (see figure 2) (Iwamura et al., 2017: 4; Makrichoriti & Moratis, 2016: 2). As a result, crypto-currency exhibits drastic deflationary price instability which means *no* government can even attempt to have a built-in automatic monetary policy rule allowing them to control money supply (Ametrano, 2014: 1). The implications of this are substantial. If governments are not able to control the supply of money, they are not able to use monetary and fiscal policy to affect output levels during booms or recessions in the economy, in order to mitigate economic crisis (Jones, 2014: 239). Subsequently, crypto-currencies pose a great risk of systemic breakdown of government's ability to manage, regulate and redistribute money within its borders. Coupled with the fact that it is expensive, timely and difficult to supply crypto-currencies at this stage, a government and other regulatory bodies would still struggle to control supply even if it somehow managed to account for the volatility and instability in crypto-currency. The risk of market panic and liquidity provision is thus firmly present.

Furthermore, there is a problem concerning the fact that crypto-currencies are not backed by any third party or government in terms of value. This manifest in the demand for crypto-currencies where demand is generated by inexperienced individuals not acquainted with market sentiments or 'average' fluctuations within markets (Nian & Chuen, 2015: 241). In other words, demand is generated by financially inexperienced individuals who are not aware of the low liquidity of crypto-currencies and as a result, market behaviour is influenced by sentiment which also causes extreme volatility in price (ibid). When there is no regulator guaranteeing the value of a currency, then the market reacts to every 'signal' of every individual buying or selling crypto-currency. It is argued, that crypto-currencies have the potential of forming 'price-bubbles' within global markets, posing great risks of another financial crisis that cannot be predicted or mitigated by governments; a clear systemic risk (Iwamura et al., 2014: 5).

Subsequently, crypto-currencies pose numerous systemic risks to regulatory authorities around the world. Current economic theory requires fiat currency, with stable supply and the ability to enforce tax law as well as monetary and fiscal policies, in order to ensure stable economies. However, crypto-currencies represent a great risk to financial stability in this regard. The next section explores how governments are reacting to this problem and illustrates that governments and other regulators are sufficiently aware of all the risks.

4. Regulatory Response.

4.1. Recommendations and Central Bank Involvement.

Crypto-currencies pose a threat of systemic breakdown of current government backed fiat currency exchange systems, due to their anonymity, volatility and decentralised nature (Bank for International Settlements, 2015: 9-10). It is imperative for governments and central banks across the globe, to engage in collaborative efforts to regulate existing- and develop their own versions of- crypto-currency, also known as Central Bank Crypto-Currencies (CBCC's) (Bech & Garratt, 2017: 55). Due to the truly international reach of crypto-currencies, only a multilateral agreement between regulators, central banks and international organisations such as the World Trade Organisation (WTO) can have the desired effect of centralising crypto-currencies, without doing away with the benefits associated with these new currencies (Danezis & Meiklejohn, 2016; Bech & Garratt, 2017: 61).

Recent tests in state issued crypto-currency by the Bank of England, the Federal Reserve, the Bank of Canada and the People's Bank of China, provide proof that governments and regulators are aware of the risks posed by crypto-currencies, hence the effort to centralise crypto-currencies in order to control money supply, manage inflation and sustain an independent monetary policy (Koning, 2016: 4-25). The South African Reserve Bank launched 'Project Khokha' in 2018, which aims to explore regulatory measures for crypto-currencies designed to combat the risks associated with crypto-currencies, but also attempts to assess the feasibility of blockchain technology for common transactional use and interbank clearing and settlements within South Africa (Writer, 2018).

Additionally, it is suggested that governments make existing crypto-currencies subject to laws pertaining to consumer protection, tax, information regulation etc., as to protect their citizens and avoid a wildfire spread of crypto-currency use, at least until a CBCC alternative presents itself (such as FedCoin or RSCoin which are in development) (Bech & Garratt, 2017: 61; Bank for International Settlements, 2015: 12).

5. Conclusion.

This essay explored the revolutionary challenge crypto-currency presents to the current financial government-backed currency system. It was established that modern day theories of economics cannot incorporate crypto-currencies into its definition of what constitutes a currency which makes legalising crypto-currencies a problem. Upon further examination of the characteristics of crypto-currencies, it was found that the anonymity, volatility, decentralised and denationalised properties they possessed along with their demand-and-supply dynamics, pose an inherent risk of systemic breakdown within financial regulatory systems. This is due to the nihilating effect crypto-currencies have upon monetary and fiscal policy tools available to governments and which are necessary to control inflation, money supply and maintain stable economies. At least four of the six systemic risks identified in this

essay, were found to be present in crypto-currencies, hence, it was recommended that governments and other regulatory bodies intervene, by developing Central Bank Crypto-Currencies and subjecting existing crypto-currencies to already existing regulations. Crypto-currencies pose a systemic risk for global monetary stability and governments are fully aware of this fact, hence the drive towards alternatives and intervention.

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7. Appendix

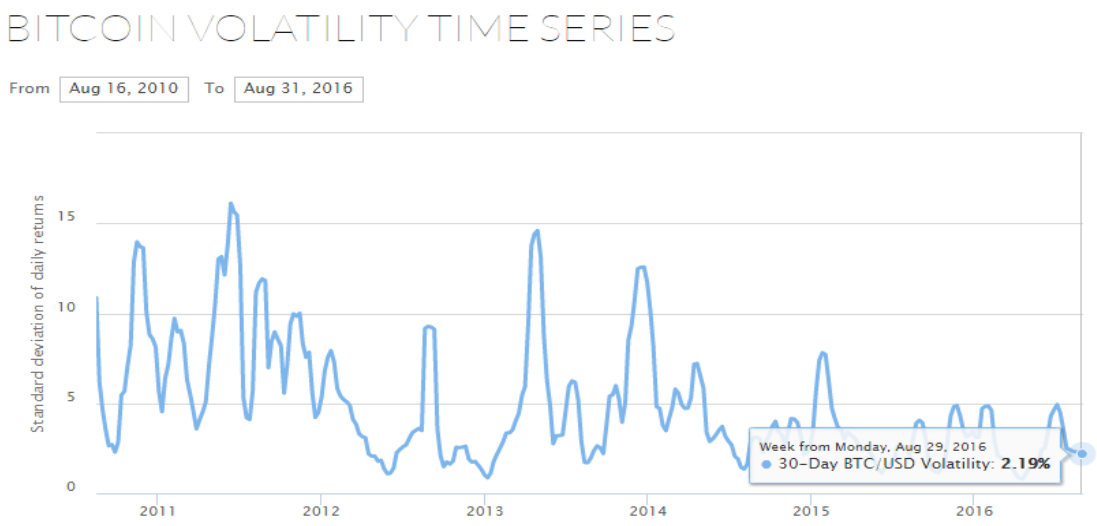
Figure 1: Growth rate of Bitcoin over time (capped at 21 million).

Table 1. The number of bitcoins in circulation

Date	The number of Bitcoins in circulation	The growth rate for the year%
January 2016	14.44 million.	+ 10%
January 2017	15.75 million.	+ 9.1%
January 2018	16.41 million.	+ 4.2%
January 2019	17.06 million.	+ 4.0%
January 2020	17.72 million.	+ 3.9%
January 2021	18.37 million.	+ 3.7%
January 2022	18.70 million.	+ 1.8%

Source: Vlasov, 2017: 221

Figure 2: Bitcoin/crypto-currency volatility over time.



Source: Young, 2016