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THE BRIGHT AND THE DARK SIDE OF VIRTUAL CURRENCIES RECENT DEVELOPMENT IN REGULATORY FRAMEWORK

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ABSTRACT

The scope of this article is to examine the positive (bright) and negative (dark) aspects of virtual currencies by critically assessing the relevant literature. In addition, the findings from the bright and dark side are the groundwork for the discussion of how crime prevention units and financial supervisors addressed to specific issues with virtual money. On the bright side, virtual currencies can provide a reasonable level of privacy but are not fully anonymous. Second, the academic discussion about the price stability of Bitcoins is split into two opposing groups. Critics find that the decentralised feature of virtual currencies is a significant disadvantage of the technology because it seriously reduces the flexibility to respond to economic shocks. In contrast, supporters argue that centralised operations by monetary authorities are actually inducting financial instability. Third, virtual currencies charge in overall less fees for payments and achieve similar processing speed compared to electronic payment systems. On the dark side, virtual currencies mainly operate outside the banking system and do not endanger the global financial stability at this stage of development. Second, technical improvements in the technology could increase consumer protection similar to established payment services. Finally, the lack of physical contact provides more options for money laundering and tax evasion than traditional ways do. In conclusion, the global legislation is still hesitant to implement a robust regulatory framework. As such, the effect of the recent legislation by crime prevention units and financial supervisors remains toothless.

KEYWORDS

Virtual currencies, Bitcoins, anonymous, decentralised feature, regulatory framework

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1. INTRODUCTION

In a short period of time, virtual money has developed into a viable payment medium and is enjoying increasing popularity. The technology represents the emergence of a new form of currency but contains many essential differences to traditional money. Proponents of the technology argue that the decentralised feature and the anonymity of virtual currencies can provide an efficient infrastructure for the transfer of money. Furthermore, the capability to make payments for physical goods and services at any time and to conduct international transfers at low fees attracted large corporations and increased the appetite to continue expanding the use of virtual currencies. In contrast, some are concerned about consumer's protection, security threats and illegal issues. In effect, virtual currencies have been linked to numerous types of crimes (e.g. money laundering, tax evasion or theft) mainly because of its anonymous characteristics.

At the same time, the development of effective regulatory to prevent the creation of "Wild West" conditions and to combat crimes is still at an early stage. In fact, virtual currencies operate outside of the regulated banking and financial system. In addition, virtual money has global reach and operates through different jurisdictions. As a result, activities of virtual currencies are difficult to monitor and to regulate.

Innovation in this pace of development is also questioned in academic literature. Many studies have been written on the merits and demerits, drawbacks and advantages of virtual currencies. In fact, the discussion on the concept is often divided into two opposing groups. First, the followers of the technology who question the old (or traditional) banking system and hail virtual currencies as the future of money. Second, the critics of the technology who warn about the potential to disrupt the established banking system and the elimination of third party validation.

The present paper is answering the following questions related to both the bright and the dark side of virtual currencies:

1) What is the discussion behind the perceived benefits of virtual currencies?
2) What are the encountered issues related to the use of virtual currencies?

The insights about the bright and dark aspects of virtual currencies is the groundwork to answer the following question:

3) How problematic issues with virtual currencies have been addressed by crime prevention units and financial supervisors?

This paper is structured as follows: In chapter 2, the term virtual currencies is defined and relevant background details with the past development stages are presented and described. Chapter 3 is divided in two parts: 1) First, specific benefits such as anonymity and privacy, quantity of money with price stability and transaction speed and cost is critically discussed. Second, the chapter depicts the problematic issues of virtual currencies such as system vulnerability, consumer protection and anonymity in terms of money laundering and tax evasion. In chapter 4, the recent development is discussed and its implications for crime prevention units (e.g. anti-money laundry authorities) and financial supervisors. In conclusion, the findings from the research are summarised and the answers to the questions of the project are provided.

2. DEFINITION AND RELEVANT BACKGROUND

The field of interest is wide-ranging and filled with confusing terms. As a result, the overlapping terminology and potential sources of confusion needs to be addressed. This chapter defines the concept of virtual currencies, the technical aspects of the innovation and the relevant background information to understand the following discussion.

The European Central Bank (ECB) has defined virtual currencies in their policy schemes in October 2012. The ECB money matrix is shown in the following figure:

Figure 1: The money matrix based on the European Central Bank (ECB)

		Money format	
		Physical	*Digital*
Legal Status	*Unregulated*	Certain types of local currencies	**Virtual currency**
	Regulated	Banknotes and coins	E-Money Commercial bank money (deposits)

Source: Based on the ECB (2012).

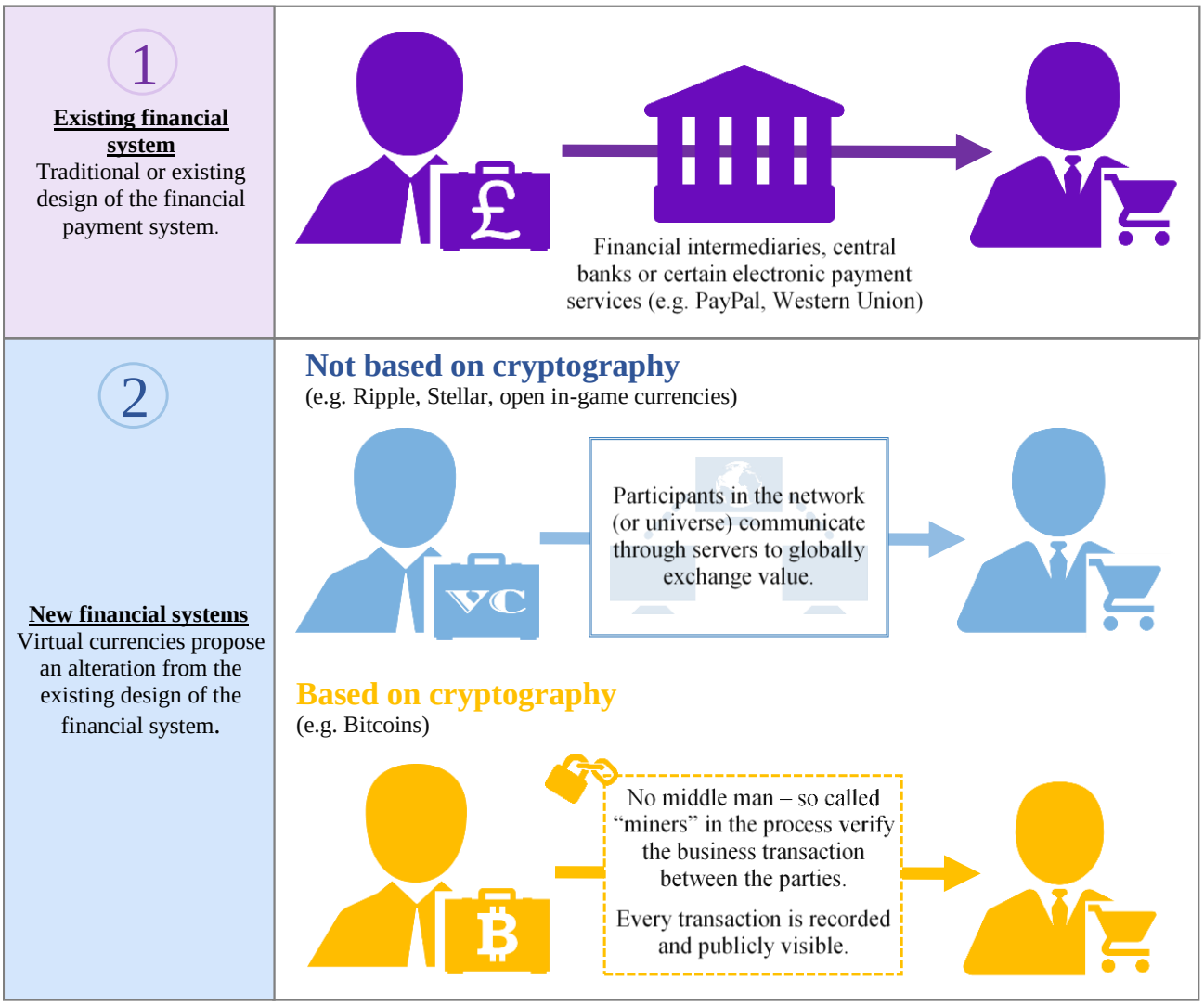
According to the ECB (2012), a virtual currency is "unregulated, digital money". In 2012, virtual currencies were mostly unregulated but policy makers caught up in the recent years. For the purpose of this project, the term "virtual currencies" is defined as follows:

"Virtual currencies are defined as digital money, which is issued by independent and decentralised entities, and propose an alteration from the traditional design of the financial system."

A virtual currency is a pure internet-based medium of exchange and exist not in tangible forms such as coins or banknotes (e.g. Pound Sterling or Euro). As a result, electronic payment systems which use national currencies are excluded. More precisely, e-commerce, online banking, credit and debit card systems or any other electronic ways to transfer money such as PayPal, Amazon Payments or Google Wallet are not considered. The independent and decentralised nature of virtual currencies refers to the issuer of money. For traditional currencies, central banks, monetary authorities or government entities are in charge for the supply of money. In contrast, virtual currencies get along without a central authority and usually the developer (respectively a mathematical algorithm) is responsible for the money supply. In addition, virtual currencies suggest a paradigm shift from the existing design of the financial system. As such, virtual currencies may be used to buy or sell real goods and services. For example, closed in-game currencies are not considered as a viable alternative for traditional currencies.

From a technical perspective, the essential feature of virtual transactions is the lack of a "middle-man". Traditional payment systems usually involve a trusted intermediary in the business process. In effect, the lack of a contributing third party permits anonymous transactions between the involved parties. In addition, it makes it a fast and low cost medium to facilitate payments at any time. The following figure illustrates the 1) traditional payment systems and 2) particular payment systems with virtual currencies.

Figure 2: Simple illustration of the payment process

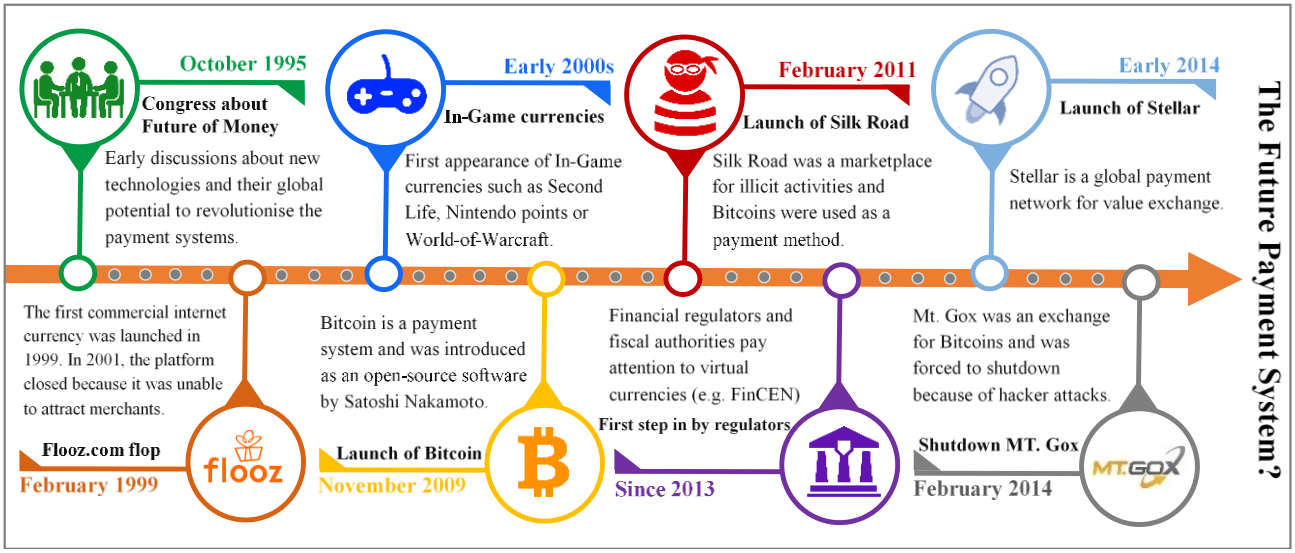


Source: Own illustration based on Stellar – how it works (2016) and Bitcoin – how it works (2016).

A variety of virtual currencies is in circulation such as Ripple, Stellar, online game currencies or cryptocurrencies. The majority of virtual currencies are based on cryptography and Bitcoins are the most prominent one (Turpin, 2014). Online game currencies are known to be the predecessors of cryptocurrencies but are mainly used to facilitate in-game transactions (Kim, 2015). In other words, currencies in multiplayer online games are usually not developed to conduct transactions for real goods and services. According to Richter et al. (2015), the number of virtual currencies is increasing continuously and this gives a positive outlook for a new payment system.

The following illustration serves as an overview for the discussion part and illustrates the key events in the development and the encountered issues of virtual currencies:

Figure 3: Timeline of virtual money



Source: Own illustration based on various sources.

Discussions and hearings on the future of money took already place in the 1990s (e.g. congressional hearing on the future money, October 1995). However, the first attempts of creating internet currencies were not successful (e.g. flooz.com or e-gold). According to Satran and Writer (2013), early internet currencies mostly failed to reach a broad audience and to attract large firms. The term "virtual money" was first mentioned in online games and it was used as a payment medium to upgrade game characters. Such game currencies were used for in-game purposes and were not designed to leave the game universe. In the past few years, virtual currencies gained traction and found a path to the real world. The first exchange platforms were launched in 2009 (mostly based on the cryptography) in which virtual money can be bought, exchanged or used to buy and sell real goods and services. After an unspectacular launch, the first troubles began shortly afterwards. For example, virtual currencies have been used as a payment medium for online black market Silk Road. Such cases cast a shady light on virtual money and increased the mistrust in the technology. As a result, regulators around the world are critically eyeing the development and reforming the legislation. Nevertheless, virtual currencies are still ubiquitous and reject to fail. As such, the topic generates interest in the academic literature and makes it a noteworthy field to review.

3. DISCUSSION ABOUT THE BRIGHT AND THE DARK SIDE

This chapter refers to the defined question 1 and 2 and outlines the perceived pro-arguments (bright side) and con-arguments (dark side) of virtual currencies:

1) What is the discussion behind the perceived benefits of virtual currencies?
2) What are the encountered issues related to the use of virtual currencies?

Each discussion is structured as follows: First, the argument is briefly explained. Second, the arguments of both camps are presented. Third, a summary of the findings is presented. In conclusion, a personal statement is made.

3.1 The Bright Side of virtual currencies

Based on its unique nature, virtual currencies appear to offer some potential benefits. The list of perceived advantages is long and many of them are hotly debated in the literature. As a result, the paper focuses on three arguments which seem to achieve the most attention from academics, namely the anonymity aspect in terms of privacy, the decentralised nature and its influence on the price stability, and the transaction speed and costs.

3.1.1. Argument 1: The anonymous nature as privacy enabler

The argument focuses on the perceived anonymity of virtual currencies and its implication on privacy interest of their customers. Privacy and the ability to keep some things entirely to yourself is strongly correlated to the anonymous character of virtual currencies. Especially virtual money is known to be untraceable and anonymous be-

cause there is no contributing third party in the online transaction. However, some argue that virtual currencies are actually not truly anonymous and the lack of traceability is an illusion.

Online privacy is an important feature especially for payment systems based on cryptography. Some users wish to stay anonymous for legitimate privacy concerns. For example, a patient may prefer to not disclose private information about payments (respectively health issues) to a party other than the medical centre. As a result, the lack of an intermediary allows the parties to remain nearly anonymous. In other words, it works like an internet-based exchange of cash. According to He et al. (2016), holders of virtual money are referred as "pseudoanonym". The term pseudoanonym refers to the identity in the internet and holders of pseudonyms do not reveal information about their true name in the real world. From a practical aspect, every user needs an account to execute online transactions, which functions like a virtual wallet. By opening an account, the user receives an explicit identification string (or address), which is not assignable to the user's real world identity. As a result, virtual currencies are known as privacy enablers because of a high level of anonymity. In contrast, some argue that true anonymity is difficult to achieve since every transaction is recorded, publicly available and linked to users of virtual currencies (Saxena et al., 2014). The purpose is to provide incentives to users to verify their transactions and to improve transparency about the business process. In addition, certain providers of virtual wallets assure a strong privacy for their consumers, but simultaneously claim that their technology is not anonymous. Even more, some exchange platforms (e.g. Bitcoin) recommend to their consumers to hide their addresses with appropriate tools. According to Trautman (2014), such "anonymiser tools" are a safe way to veil account information and to ensure privacy in the World Wide Web. In addition, users may enhance their privacy by manually creating a variety of "virtual wallets" for different purposes. Both allow users to isolate their transactions and to erase the trace of the initial source. However, Androulaki et al. (2013) argue that the current settings adopted by certain platform providers are not enough to protect the privacy of their customers. The authors find that even if privacy-seeking customers are manually creating new addresses, behaviour-based techniques can track the source by 40%.

In summary, virtual currencies are known as privacy enabler because it is difficult to trace users back to their real-world identity. In fact, holders of virtual currencies are able to use pseudonyms to disclose information about their true name in the real world. Nonetheless, every transaction is publicly available and linked to the individual parties. The use of anonymiser software or the creation of a variety of virtual wallets can improve privacy interests. At this stage, virtual currencies can provide a reasonable level of privacy but are not fully anonymous. In my opinion, the anonymity feature is a very critical aspect because it can be used for legit and illicit purposes. An increase in interference by third parties such as supervisors or exchange providers may result in a convergence with the existing payment systems. As a result, the benefits from the anonymous nature such as privacy interests could diminish in the future. In fact, the right mixture of anonymity seems to be a balancing act.

3.1.2. Argument 2: The decentralised nature and its effect on price stability

The global adoption of virtual currencies depends on its price volatility. A difficulty is to discuss the subject on a general standpoint because a wide range of virtual currencies with different setups exist. Thus, the focus of this argument is on cryptocurrencies, especially Bitcoins. In the following figure, the change in value of Bitcoins from 2010 to 2016 is illustrated:

Figure 4: Bitcoin Price from 2010 to 2016

Source: Own illustration based on the data from CoinDesk (2016).

The following discussion is structured in two stages to provide additional insight about the price stability: First, the potential causes for the observed price instability of Bitcoins (as displayed in the figure) and its problematic nature for being a future money is explained. Second, the technical backgrounds of the money supply and its influence on price stability is critically assessed.

According to Simonite (2013), the wild ride in price of Bitcoins in 2013 was due to speculators in the market. In fact, the exchange rate fluctuated strongly from 125.49 per Bitcoin in October 2013 to its all-time peak of 1147.25 per Bitcoin in December 2013. The author justified its statement that Bitcoins were actually not used to buy commodities or services and the rise was only triggered by speculative gains. In effect, the impact of currency speculator in the Bitcoin universe tends to be unambiguous. Although the volatility decreased in the past three years and the price per Bitcoins seems to be more stable, some researcher raise concerns about this dormant state. Investors might be waiting until the value rebounds in the future. In effect, Ron and Shamir (2013) find strong evidence that the majority of coins are divorced from the financial flow and investors in virtual currency markets hold Bitcoins primarily as an investment asset. The authors examined the hoarding behaviour of Bitcoin users and found that around 45% of users are active and move coins between accounts whereas the residual 55% are entirely idle. In doing so, the authors excluded those users who experimented with the technology in the early stage or lost their keys to the virtual wallets to achieve a more realistic estimation. The relative illiquidity diminishes the appeal as a new financial payment system and its potential as future money.

For the second section, it is important to consider the mechanical aspect of the money supply to draw conclusions about the price stability. National currencies usually apply a floating exchange rate. As such, central banks can interfere in the currency market by buying or selling their domestic currencies. In contrast, cryptocurrencies are decentralised and are not pegged to national currencies. As a result, Bitcoins act widely independent and are not influence by monetary regimes. Based on Meiklejohn et al (2013), the supply of Bitcoins is determined by a mathematical algorithm with a maximum number of 21 million coins, so called deflationary economic model. For example, when coins are removed from circulation, the remaining Bitcoins will gain in value. Consequently, as the value of Bitcoins increases, the number of coins needed to purchase a certain commodity decreases. Some argue that the observed fluctuation in value is a weakness of the system itself. According to Polasik et al. (2015), the capped Bitcoin supply seriously reduces the flexibility to respond to economic shocks. The inability to adjust the monetary flow mechanism makes it difficult to counter volatility of unemployment and inflation rates, which can result in a recession. The authors further discuss drawbacks of replacing national currencies by one global currency. A takeover by Bitcoins would erode the benefits from monetary seigniorage, which is the difference be-

tween the face value of the currency and the cost of creating money. The loss of profit from printing money may result in fiscal distress for governments. In effect, Bitcoins would effectively end the monopoly of national central banks to print money and its perception as liquidity provider of last resort.

In contrast, proponents argue that the decentralisation feature is a strength of cryptocurrencies and the rescue operations by monetary authorities is a malfunctioning of existing financial structures. Prominent academics argue that central banks in their role as lender of last resort are actually inducting financial instability by amplifying banks to expand their credit to an unbearable level (e.g. Ludwig von Mises, 1953). In addition, recent empirical work by Hayes (2016) finds that the modern economic environment became too complex and the aspect of human fallibility is causing increasing problems for central banking. The author argues that a simple rule-based framework on the cryptography approach could be beneficial in a complex world and would be a rational and robust substitute to the predominant monetary policy.

In summary, some academics argue that the decentralised characteristics and the capped money supply of virtual currencies such as Bitcoins is a serious disadvantage of the technology. The inability to regulate the money supply by a central authority seriously reduces the flexibility to respond to economic pressure. In contrast, some researchers argue that the rescue operations by monetary authorities is a malfunctioning of the old system. As such, central monetary authorities are inducting financial instability with their influence on the money supply. According to me, the innovation has not progressed beyond the experimental stage. As such, the lack of adoption by the general public makes it difficult to draw conclusions about the future price stability. However, the general acceptance of money as a medium of exchange relies on confidence of the community. I personally doubt that virtual currencies can achieve the same confidence as national currencies without any central authority as safety backup. In other words, it is difficult to imagine that individuals can fully trust a system based on a mathematical algorithm instead of an authorised entity. In addition, the aspect about the capped money supply is another critical element. In my opinion, the limitation to take action in times of economic pressure makes it a blunt sword. The next economic crisis is undeniable and the inability to regulate the money supply makes it a more vulnerable system.

3.1.3. Argument 3: Benefits from transaction speed and costs

The following argument examines the benefits of virtual currencies in terms of speed and costs. In effect, the lack of intermediaries makes it a fast moving, low cost alternative to facilitate online transactions. However, a variety of convenient substitutes such as Paypal, Amazon Payments and Google Wallet are available. In contrast to virtual currencies, such electronic payment systems use traditional units of currency (or fiat money) in the retail transaction and operate usually as trusted intermediary to enable the transfer of money. According to Polasik et al. (2015), electronic payment services are substitutes to virtual currencies and an available alternative to the traditional use of money.

Some argue that the comparative advantage of virtual currencies is diminished, since retail payment providers advanced their checkout procedure and refined the payment process. In effect, Polasik et al. (2015) argue that user-friendly improvements such as an easy-to-use interface had an essential influence on the usage and the processing speed of electronic payment systems. In contrast, virtual currencies based on the cryptography are often criticised for being too technical and too complex for the general public. The BIS (Bank for International Settlements, 2015) further state that established payment systems achieve a similar processing speed even for large-value transactions. Another aspect is the fee structure, which depends on the type of transaction and on the electronic payment provider. Paypal for example charges no cost for the membership and for transferring money through their services. But if a member wishes to receive money, the fee is 3.4% plus 20 pence per transaction whereas any currency conversion and cross-border payment fees are no included (Paypal - fee structure, 2016). In contrast, the transfer of virtual money (or data) between users is in theory without incurring transaction fees. However, Kim (2015) put forward that virtual currencies such as Bitcoins requires small fees to prevent congestion in data networking by many small transactions. The author further argues in terms of indirect fees such as costs to run and maintain the exchange platform. Moreover, holders of virtual currencies need to consider also conversion costs, if they wish to convert to a national currency (BIS, 2015). As a result, the transfer of virtual currencies is not associated with zero costs.

Nevertheless, virtual currencies charge relatively small fees in comparison to other payment technologies. According to PWC (PriceWaterhouseCoopers PWC, 2014), virtual currencies such as Bitcoins dominate payment providers such as Paypal or Square regarding fee structure. Especially in conducting low-value transactions, Bitcoins are advantageous over mainstream payment systems. In addition, Richter et al. (2015) further argue that cryptocurrencies may be beneficial for individuals with international operations. In the existing banking world, the fee structure is not always straightforward because financial transaction varies strongly on the amount and the internationality. This usually involves paying high fees to financial intermediaries. As a result, virtual currency payments offer attractive incentives for savings-conscious individuals or entities especially in cross-border trading.

In summary, virtual currencies charge indirect fees such as costs to run the exchange platform or conversion costs if users wish to convert to a national currency. However, in overall virtual currencies charge lower fees than established payment systems, especially for small-value transactions and cross-border trading. Regarding processing speed, electronic payment systems are able to achieve equal processing speed even for large-value transactions. Even more, established payment systems provide a better interface which has a considerable influence on the transaction process. Although, virtual money has the essential ingredients for being a globally accepted payment system, it could not overtake mainstream electronic payment systems or traditional currency yet. In my opinion, the majority of the public still does not understand the mechanism of virtual currencies and its potential to revolutionise the payment system. Some improvements in the usability (e.g. user-friendly interface) might help to build a wider and trust-based customer base.

3.2 The Dark Side of virtual currencies

In this chapter, three arguments on the critical development of virtual currencies are presented. These con-arguments refer to the controversial discussion on system vulnerability and its impact on the financial stability, the consumer protection from a technical perspective, and anonymity as an enabler for money laundering and tax evasion.

3.2.1. Argument 1: System vulnerability and impact on the financial stability

Some academics outline the threat of hacker attacks on decentralised virtual systems. Especially cryptocurrencies such as Bitcoins have a long track of troubles with hackers. The most prominent attack on virtual currencies was the collapse of Mt. Gox in 2014. Mt. Gox was a major exchange platform of Bitcoins and was handling 80 percent of all transactions at its peak (The Wall Street Journal, 2014). Apparently, hackers forced the exchange platform to shut down because $390 million worth of Bitcoins disappeared. For many critics, the case Mt. Gox is the ultimate proof of the system vulnerability and the reason why virtual money cannot work in the real world. However, proponents of the technology argue that virtual currencies are still in an experimental stage and will achieve more safety and soundness with a broader scope.

Some argue that virtual currency systems are especially vulnerable to attacks by criminals and experienced hackers are able to breach even sophisticated security systems. Based on the ECB (2015), hackers can target individuals by stealing the keys to their virtual wallets or system-wide by disrupting the underlying infrastructure. As a result, users of virtual currencies are forced to rely on the network because no trusted third party is available to mitigate risk. In effect, the interference by hackers is omnipresent and widely documented. Richter et al. (2015) highlight several attacks such as unauthorised access to accounts or theft of virtual money, in which criminals used security flaws in the system. Plassaras (2013) is further concerned about the implication of a wide-spread adoption of virtual currencies and the ability of regulators to ensure the safety and soundness of the financial system. The author believes that if virtual currencies continue to grow in influence and usage, they can constitute a threat to the global economic stability. In other words, the decentralised characteristic of virtual currencies makes it prone to speculative attacks on the reserves of national currencies. The author concludes that regulators need to be aware of the development of virtual currencies and they should start to prepare before future conflicts arise. In effect, the absence of regulatory authorities already led to large disturbances in the virtual world with millions of losses to illegal activities. According to the report of TCH (The Clearing House, 2014), certain disruptions may have been avoided if regulations about safety and soundness of virtual currencies were implemented prematurely.

In contrast, some argue that virtual currencies cannot endanger the financial system because they have a limited relationship to the real economy. According to Yusen (2015), virtual money does not fulfil all fundamental functions of real money at this stage. The researcher finds that virtual currencies do not satisfy the function as a payment medium and as a world currency. However, the author includes that virtual currencies can obtain these characteristics in the near future once the general public and legal authorities pay more attention to its development. Yermak (2014) discusses further challenges for virtual currencies being a real currency. Due to its present configuration (e.g. decentralised, not largely regulated and no third party), virtual currencies bypass the established banking network and operate outside the regulated financial system. As a consequence, virtual money suffers to reach a broad acceptance. The author believes that virtual currencies still act more like a speculative investment and they do not satisfy the criteria of being a serious alternative for real money. In effect, the relatively low number of transactions confirms this statement. According to the ECB (2015), the amount of Bitcoin transactions is estimated at 69'000 per day compared to 274 million online payments per day solely in the EU.

In the recent years, countless hacker attacks and various security loopholes cast a dark shadow on virtual currencies. As a result, financial safeguards around the world are improving the regulatory and law enforcement framework. Nevertheless, virtual money does not seriously threaten the financial stability because it does not affect the mainstream business at this stage of development. However, improvements in the system stability may have a positive impact on the usage of virtual currencies in the future, which increases the incentives for regulators to pay more attention to its development. Especially cryptocurrencies seem to attract hackers more than any other payment system. In effect, anyone with a connected device can potentially launch a hacker attack. However, the argument that virtual money is especially more vulnerable is difficult to be understood by me. It should be possible to advance the technology to increase the safety and stability of the payment system. As such, virtual currencies can overcome serious flaws of previous hacker attacks in the future and achieve a similar system security as existing payment systems.

3.2.2. Argument 2: Consumer protection from a technical perspective

The literature referring to consumer protection is a controversial subject of virtual currencies and correlates strongly with the lack of a middle man in the business process. Based on its widespread nature and its interference with other topics, it can be discussed from different angles. For example, the consumer protection in terms of the anonymous nature, the current safety regulation and legislation or the technical properties of the innovation. As a result, the argumentation of this dark-sided argument is approached from its technical nature in relation to other payment systems.

Some doubt that virtual money can become a trusted system, even if regulators achieve certain standards of consumer protection. The main issue put forward by critics is that virtual currencies are not backed by a middle-man in comparison to the majority of traditional payment systems. In the case of a complete system breakdown or hacker attacks, virtual money is commonly lost and getting it back is unlikely. According to the WSBI (World Savings and Retail Banking Institute, 2016), virtual money usually do not have any safety nets such as reimbursement guarantees. In other words, it is equivalent to losing your wallet in the real world. As a result, consumers of virtual money need to rely on the robustness of the system and are considerably exposed to fraudulent activities. In addition, Böhme et al. (2015) state that online transaction from virtual wallets are irreversible. In other words, every online payment is final and consumers are unable to cancel unintended or fraudulent transactions. In effect, cryptocurrencies such as Bitcoin do not provide an undo function in their algorithm. According to the authors, this technical characteristic increases the transaction risk for the users and is an advantage for traditional payment services with a payment reversibility function.

Although these technical issues appear to be legitimate, adherents of virtual currencies argue that certain technological innovations can assure the consumer protection. Anderson (2014) states that certain technological improvements could provide security standards equivalent to current credit or debit cards holders. The author documents the technical capability to allow authorised payments for services based on cryptography. From a practical perspective, a trusted third party proceeds with the payment only if all involved parties approve the transaction. In other words, the intermediary reverses the online transaction in the case of a disagreement between the parties. However, the author includes that such multiple authorisations is not intended to capture all transactions (e.g. small-value payments) because it is not a standard feature of cryptocurrencies. In addition, the fundamental

benefits such as anonymity, transaction speed and low transaction cost are considerably diminished. Furthermore, several platforms introduced more attractive consumer conditions. For example, some providers of exchange platforms increased the consumer protection by providing a refund in certain cases (Consumer Financial Protection Bureau, 2014). Yet, this is not the norm and the majority of platforms deny any responsibility for unauthorised transactions from their private accounts.

In summary, some are concerned that virtual currencies can ensure the consumer protection and become an accepted system. The statement refers to the lack of a middle man, which usually provides a reimbursement guarantee. Another aspect is the irreversibility of transaction, which increases the transaction risk for the users. In contrast, technological improvements could provide security standards equivalent to traditional payment services. Furthermore, the virtual currencies based on cryptography are usually capable to allow authorised payments for services similar to established payment systems. It is not surprising that sophisticated innovations such as virtual currencies are facing challenges in terms of consumer protection. In my opinion, the main obstacle for virtual currencies in the future is to obtain a reasonable level of consumer protection without diminishing its pioneering benefits. If providers of virtual exchange platform are working constantly to ensure system security and consumer protection, it should be possible to attract a wider clientele.

3.2.3. Argument 3: Anonymity in terms of money laundering and tax evasion

Virtual money is basically not illicit and consumers usually conduct legal transactions. However, many financial supervisors went public and warned consumers about the possible risks such as fraud, theft of digital wallets or inadequate disclosures related to virtual money (e.g. European Banking Authority, 2013). Indeed, criminals also discovered the exceptional benefits from virtual currencies and misused it for their own interest. The list of illicit activities in the virtual economy is long: Drug dealing, terrorist financing, trading weapons or distributing child abuse material. According to Tropina (2014), criminals prefer virtual currencies as a payment medium because of the physical absence, the possibility to operate in different legal systems, the convenient usability, the speed of processing and the ability to implement automated transactions. Nonetheless, the most discussed issue in terms of criminal activities is that of the anonymous characteristics. As mentioned above, anonymity can be used for feasible purposes such as enabling privacy and for evil purposes such as illegal operations. The focus of this argument is on the dark nature of anonymity in the particular cases of money laundering and tax evasion.

According to Irwin et al. (2013), virtual money laundering has crucial benefits over money laundering in real-world. The lack of face-to-face contact and the difficulty to identify the individual parties reduces the possibility of detection by law enforcer. However, the high level of anonymity is related to an increase in complexity and time. In other words, money laundering in the virtual world is more sophisticated and time consuming than money laundering in the real world. Furthermore, the authors document that the level of effort increases exponentially with the sum of money. In practice, virtual money laundering in a large-scale involves spreading different amounts over multiple wallets (or addresses). Bronk et al. (2012) further state that there are many ways to ensure anonymity in the virtual economy. For example, by placing different amount of funds, using various exchange providers, operating internationally or by flagging transactions as non-monetary payments. In fact, even if online transactions are publicly visible, lawbreakers can lay a false trail to mask their true identity. In addition, the authors claim that by combining the anonymous nature of virtual currencies with privacy enhancing technologies (e.g. anonymiser software such as tor networks), the chances of exposure by law enforcement shrink even more.

From a fiscal perspective, taxation authorities are increasingly concerned about the anonymity aspect. In effect, the cyberspace tends to be especially attractive for tax avoidance. According to Gruber (2013), virtual currencies possess two characteristics of a traditional tax haven. Firstly, the technical capabilities to open an unlimited number of wallets, which enable to hide private information and stay anonymous. Secondly, the lack of a robust and clear legal framework which makes it ideal for tax fraud. Bal (2014) includes that current anti-tax evasion programs are inefficient since exchange platform of virtual money operate mainly independent. In other words, the lack of a sovereign jurisdiction which could provide private information about tax payers decreases the effectiveness to combat fiscal evasion dramatically. Marian (2013) agrees and states that governments still underestimate the urgency of the potential problems. The benefits of virtual anonymity could potentially lead to a shift from traditional to cyber tax evasion. The author believes that tax evaders, which use bank accounts in tax haven countries (so called offshore accounts), could switch in favour to virtual currencies.

In summary, the lack of face-to-face contact makes it a better tool for money laundering than money laundering in the real world. In effect, there are many ways for cybercriminals to hide their true identity by using specific software or by laying false trails through multiple accounts. In addition, some argue that the innovation, due to the lack of a robust and global legal framework, has the potential to a global shift from traditional to cyber tax evasion. In my opinion, the anonymous nature fuelled significantly the misuse of virtual currencies for illegal purposes. In fact, the web environment and the lack of a legal framework provides a suitable platform for illicit activities. However, money laundering and tax evasion are not a new phenomenon. I believe that with an accurate legislation in place, cyber money laundering or tax evasion could be considerably reduced. Simultaneously, it should be possible to maintain a reasonable level of privacy with a decrease in anonymity. In doing so, established payment systems could serve as a reference model to ensure privacy for legal purposes and to combat illegal activities.

4. RECENT DEVELOPMENTS IN THE REGULATORY FRAMEWORK

The insights about the bright and dark aspects of virtual currencies is the groundwork for the following discussion. Since virtual currencies provide both unique benefits and concerning drawback for the global community, policy makers are debating on how to approach this new technology. While certain legislation is scheduled, unsolved problems are still controversially debated. This chapter is framed with the following question:

3) How incurred issues with virtual currencies have been addressed by crime prevention units and financial supervisors?

The question is captured from two angles because the literature provides a wide-ranging spectrum of regulatory approaches. The first part refers to the anonymous nature in terms of money laundering. As mentioned in the previous chapter, criminals misused the anonymity feature for money laundering and crime prevention units are proposing approaches to conquer such illicit activities. The second part focuses on the classification of virtual currencies. A key issue for policy makers is the legal tender status and the implied controversial debate of whether virtual money fulfil all functions of real-world money.

4.1 Approaching the anonymous aspect in terms of money laundering

Raman (2013) argues that while the anonymous character of virtual currencies poses challenges for law enforcement, policy makers are able to introduce effective legislation. The exploitation by criminals can be addressed in a similar way as other payment systems – e.g. with an adequate anti-money laundering program and "know-your-customer (KYC)" controls. The KYC control is an authentication procedure, which would require account holders to register with their true identity (e.g. name, date of birth and home address). In fact, users of electronic payment systems such as Paypal and Google wallet need to verify their identity before processing online transactions (PayPal - KYC, 2016 and Google Wallet - KYC, 2016). In addition, several studies believe that the KYC approach is effective in conquering the dark-sided effects of anonymity (Irwin et al., 2014). In fact, the EU policy makers are currently reforming the anti-money laundering program, namely Anti-Money Laundering Directive (AMLD). The AMLD draft proposes users of virtual currencies to register in a database to enable the traceability to their identities in the real world. In other words, the addresses of their virtual wallets are linked to their real-world identity. From a practical perspective, the exchange platforms are required to make users register with their real-world details. A possible approach could be to request identity documents from their customers. In cases of suspected fraud or irregularities, legal authorities are able to conduct in-house inspections. The rationale behind the KYC approach is to help prevent the misuse of virtual currencies and to trace the trail of the source.

In conclusion, the KYC approach would effectively end the pseudo-anonymity as described in the chapter before. The interference by a third party has also serious privacy implications for holders of virtual currencies. In other words, it enables the access for government authorities to financial and other sensitive information. As such, the concerns about the potential erosion of privacy interests through government operations appears to be legit. However, the concerns of its potential to invade privacy stands in opposition to the benefits of preventing illegal activities. According to me, the KYC approach is the right tool to combat money laundering and to assure a reasonable level of privacy for legitimate users. Furthermore, the increase in government oversight could have a positive impact on the use for legal purposes. In overall, the proposed approach should decrease the shady reputation of virtual money.

4.2 Approaching the legal tender status

The second part is divided in two sections: First, a controversial debate about the classification of virtual money is conducted by taking into account the relevant literature. Second, the recent development about the legal tender status[i] is provided and its implications for virtual currencies. In fact, the legal tender status is strongly correlated to the question of whether virtual money is equivalent to real money.

The literature largely agrees that the term "money" needs to meet three functions (Mankiw, 2014): "A measure of unit, a medium of payment and a store of value". As a result, if a medium is capable to meet all functions, it would be regarded as money independent of its legal status. The following review refers to the crucial question whether virtual money fulfil the economic functions of traditional money. Some academics argue that virtual currencies do not function like real-world money and as such do not fulfil all characteristic for being a true alternative. In contrast, some studies highlight the comparative advantages of virtual money and its potential benefits in the future.

The FinCen (US Financial Crimes Enforcement Network FinCen, 2013) published a guideline about the legal tender status of virtual currencies in the United States of America. Based on the statement, virtual currencies do not possess all functions for being a real currency. While the guideline acknowledges virtual currencies as medium of exchange, it lacks certain characteristics for being a legally-backed currency. Yermak (2013) puts forward several obstacles of virtual currencies being a real currency. According to the study, a key weakness of Bitcoins is the disconnection from the banking system. This argument refers to the lack of a legal-backed deposit insurance for Bitcoins users. For example, in the event of insolvency of a virtual exchange platform, holders of Bitcoins do not get a comparable level of protection as deposit-takers of a bank. In other words, a statutory deposit insurance for users is mandatory to fulfil the function as store of value. Another obstacle to satisfy the function as medium of exchange is the limited ability to denominate consumer loans. The existing banking system is usually based on the fractional-reserve concept. The term "fractional-reserve" refers to the required portion a bank must hold as deposit (or vault cash). However, if a bank issues a loan it simultaneously creates new money. In fact, the amount of money which can be issued through loans depends on the monetary policy of the central bank (e.g. by setting an interest rate target). In contrast, the decentralised nature of virtual currencies indicate that each unit is unique and additional units cannot be created through loans. As such, every loan is linked to the effective supply of virtual money. According to Hanley (2013), the inability to create new money through loans limits the expansionary power of virtual currency for being a successful substitute of traditional money.

On the other side of literature, Cassar (2015) argues that virtual currencies have notable comparative advantages over traditional currencies. In his paper, the author has defined different attributes of traditional currencies and compared it with the features of virtual currencies such as Bitcoins. From a store-of-value aspect, Bitcoins could become a stable storage of value if solid and transparent regulations are implemented. According to the author's opinion, virtual currencies have to meet the characteristics to satisfy the function as medium of exchange and to be an appropriate alternative to traditional currency. Even more, the author believes that government and regulators will decide about the legal tender status of virtual currencies in the near future. McKinney et al. (2015) agrees and claims that virtual money is an equivalent or substitute to traditional currencies and fulfils similar functions to traditional money, in particular the function as medium of payment for goods and services. However, the authors are concerned about a shift from hard (e.g. physical coins and banknotes) to online transactions, since virtual currencies are growing in influence and simultaneously the confidence in legal-backed currencies suffered in the recent years. As a result, McKinney et al. (2015) believe that regulators and legal authorities need to develop the regulatory framework, before it reaches a critical turning point in the global economy. In other words, policy makers need to address the legal tender question of virtual currencies at this stage of development.

The Japanese financial authorities have passed the first milestone in regulating virtual currencies. According to Toobin (2016), the new jurisdiction brings more government oversight and inducts more stability in the virtual economy. The purpose is to stem the issues with money laundering and to improve the consumer protection. An important aspect of the jurisdiction is the classification of the legal status of virtual money. Although the first proposal suggested virtual money to be legal tender, the policy maker repealed the jurisdiction to "asset-like values". As a result, Bitcoins and other virtual currencies are legally defined as "object", which are useable for exchange purposes and to make payments for goods and services. In other words, a virtual currency is officially not money and as such not equivalent to traditional money.

Until today, virtual currencies seemed to have received more attention from crime prevention units rather than monetary regulators of financial systems. However, the recent developments in Japan or in the European Union are clear signals from policy makers around the world to breach into the virtual world. In my opinion, these actions are a positive sign for the future outlook of virtual money but they have also considerable limitations. It is likely that new legislation will stimulate the growth and will improve the trust in the virtual economy. Especially for legal purposes, the jurisdiction should have a positive effect on the growth. As such, even more conservative firms might consider to enter into the virtual economy. In contrast, virtual currencies are only recognised as "method of payment" by the Japanese government. As a result, the opportunity to officially align virtual currencies with established payment systems is missed. The reluctance of jurisdiction about the legal status might be a sign of uncertainty about the appropriate regulatory structure or governments simply hesitate because it challenges the monopoly of their own national currency. In addition, the majority of the global legislation is hesitant to regulate virtual currencies. In fact, the new legislation by the Japanese government is like a drop in the bucket. The key issue is that national policy makers are independent and do not work in the same direction. If criminals want to misuse virtual currencies for illicit activities, they can avoid strict regulations by exchanging money overseas. In overall, the effect of the recent development in legislation remains toothless.

5. CONCLUSION

In this chapter, the main findings from the research are presented.

5.1 What is the discussion behind the perceived benefits of virtual currencies?

The first benefit deals with the anonymous nature of virtual currencies as privacy enabler. The innovation allows to register with pseudonyms and to create multiple account to disclose personal information. However, every transaction between the parties is recorded and publicly available. Until today, virtual currencies can provide a reasonable level of privacy but are not fully anonymous.

The second bright-sided argument focuses on the decentralised feature and its influence on the price stability. Since the money supply of virtual currencies is predetermined by a mathematical algorithm, some academics argue that this characteristic considerably reduces the flexibility to respond to economic pressure. In contrast, the opposing group argues that rescue operations are a malfunction of the old system and monetary authorities are actually inducting financial instability.

Finally, the last bright-sided argument refers to the transaction speed and costs of the innovation. Virtual currencies do not charge zero costs because of indirect fees such as costs to run the exchange platform or conversion costs for the exchange into national currencies. Nevertheless, the innovation charges lower fees in comparison to electronic payment systems such as PayPal, in particular for small-value transactions or international trading. However, electronic payment systems achieve a similar processing speed even for large transaction compared to payments with virtual money.

5.2 What are the encountered problems related to the use of virtual currencies?

The first argument refers to the system's vulnerability and the impact on the financial stability. Some academics are concerned that a wide-spread adoption will affect the safety and soundness of the financial and economic stability. Indeed, several cases of hacker attacks on exchange platforms are widely reported. Nevertheless, virtual currencies operate mainly outside the real economy and do not seriously threaten the financial stability at this stage of development.

The second dark-sided argument refers to consumer protection from a technical angle. Since virtual currencies do not provide a middle man in the process, some academics do not believe that virtual currencies can ensure the consumer protection and become a trusted system. In addition, cryptocurrencies such as Bitcoin do not provide an irreversibility function in their payment process, which increases the transaction risk for users. However, technical improvements in the system could improve consumer protection similar to electronic payment services. For example, the technical capability to allow authorised payments similar to those of established payment systems (e.g. Paypal).

Lastly, the final dark-sided argument refers to the misuse of anonymity in the particular cases of money laundering and tax evasion. Some argue that the lack of physical contact makes it a better tool for money laundering and tax evasion. In fact, there are many technical possibilities for criminals to hide illicit activities such as the use of specific software for enabling anonymity or by laying false trails by opening various accounts. In addition, the lack of a robust and clear legal framework makes it a suitable platform for tax fraud at this stage of development.

5.3 How incurred issues with virtual currencies have been addressed by crime prevention units and financial supervisors?

The first part of the question refers to the approach to combat the misuse of the anonymous nature in the case of money laundering. Law enforcement and crime prevention units are proposing an adequate anti-money laundering program and "know-your-customer (KYC)" controls to combat such illicit activities. Similar to users of established electronic payment systems (e.g. Paypal or Google Wallet), holders of virtual money must register with their true identity. The proposed approach has also significant implications for privacy interests. Although the concerns about the potential disintegration of privacy appear to be legitimate, the increase in government oversight should also have a positive impact on the use of virtual currencies for legal purposes and on its shady reputation.

The second part focuses on 1) the discussion of whether virtual money fulfil all functions of traditional money and 2) its legal tender status. Academics are split into two groups about the functions of virtual money: Some academics argue that virtual money do not possess all characteristics for being a real alternative for traditional money, especially because of the disconnection from the existing banking system. The opposing group claims that virtual money satisfy all functions of money and policy makers must decide about the legal tender status in the near future. However, the recent development in Japan suggest that policymakers are still uncertain about the legal classification of virtual money. In fact, virtual money is still not considered as money by law. As a result, virtual currencies is still lagging behind established electronic payment systems on a legal basis. Nonetheless, the key issue is that national policy makers work mainly independent and any non-global legislation is largely inefficient. In overall, the impact of the recent legal development by crime prevention units and financial supervisors remains toothless.

6. FUTURE RESEARCH

Finally, a highly interesting and worth monitoring field for future research is how policy makers will face the challenges of system vulnerability. The decentralised characteristic of virtual currencies allows exchange platforms to operate largely independent. As a result, the crucial question is how financial supervisor should address to security flaws in the network or the potential disruption of the underlying infrastructure. In other words, how central authorities can assure the system stability to guarantee the safety and soundness of the innovation itself. It seems that academics paid less attention to the issue because virtual currencies do not seriously endanger the financial stability at this stage of development. Nevertheless, virtual currencies could breach into the financial mainstream with a wider customer base. As such, the potential implications could appear on the screen of financial supervisors and become an important subject in the regulatory agenda.

Endnotes

[i] The legal tender is a recognised medium of payment and generally issued by a central monetary authority (e.g. central bank). In other words, it is a declared medium of exchange by monetary law. Traditional currencies such as national currencies (e.g. US Dollar or Pound Sterling) are legal tender. In contrast, virtual currencies are usually not classified for legal tender status.

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