DLT-based Tokens Classification towards Accounting Regulation

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Abstract: Distributed Ledger Technologies (DLT) are distributed, secured and immutable ledgers that allow technology to intermediate and empower new ecosystem-based business models. DLT-based tokens digitally represent a wide variety of assets from securities to commodities or merely as means of payment within a DLT network. However, DLT-tokens may (alternatively or jointly) grant digital access to a DLT platform, serve as incentivation system or as a right for future consumption of goods or services. The aim of this paper is to provide a first definition, classification and guidance for accounting treatment of the DLT-based tokens. The paper proposes four factors as determinants to classify digital tokens as payment tokens, utility tokens and security tokens. Factor number one is the existence of a legal right against a counterparty; second, the existence of value stability; third, the existence of intrinsic value; and forth, existence of investment risk for the token-holder. First, the analysis suggests that tokens failing to comply with the first and second condition classify as payment tokens. These payment tokens subdivide into stablecoins and cryptocurrencies if alternatively satisfy the third (value stability) or fourth condition (investment risk). Second, tokens that satisfy the first, second and third condition classify as utility tokens. And finally, tokens satisfying the first, third and fourth condition classify as security tokens. Furthermore, the paper provides with initial guidance for accounting treatment in each category

1 INTRODUCTION

Distributed Ledger Technology (DLT), is distributed system is a distributed, secured and immutable ledger that has allowed technology to intermediate and entrust transactions (Lemieux, 2016; Klaus, 2017; Smit, Buekens, & Plessis, 2016; Swan, 2017; Chen, 2018). It originally allowed Bitcoin to become a "peer-to-peer electronic cash system" (Nakamoto, 2008) and since then hundreds of new projects have emerged that use blockchains in a variety new and innovative ways. Business implementation of DLT such as Blockchain, Tempo or Dag, are still at their early stage.

We are increasingly living in digital networks, spending an average of 11 hours a day on screens in the US with over half of that on internet connected devices, and growing 11% each year (Forbes, 2019). However, in the current model, most of the decision power and value of a network concentrates in one institution or company (e.g. Facebook, Amazon, Alibaba). DLTs are emerging as the new global digital infrastructure allowing the opportunity to create vastly different power structures (Ehrsam, 2017) McKnight et al. (2017). Distributed technologies represent an opportunity for regulators and policymakers to shape the development of disruptive innovation.

Token economies have been used for centuries and have evolved notably to systems used today. These incentives-based structures were created and sustained in a variety of cultures and as part of many institutions within those cultures. Governments used the influencing abilities of rewards to shape behaviors in battle and throughout society. Modern research peaked in the 1970s where there was substantial study surrounding psychiatry, clinical psychology, education, and mental health fields (Kazdin, 1977). Winkler (1972) suggest the similarities between token and national economies as "in both token economies and national economies, consumption schedules show that expenditures typically rises with income and that expenditure approximates a linear function of income over most income ranges". As digital economies develop, they are integrating the concept of token economy as the engine fuel. The Token-economics, however go one step further as it refers to the system of incentives based on digital tokens that reinforce and build desirable behaviours the in a DLT-based ecosystem. Completing

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consensus in a DLT platform requires for example miners to provide validation service for transactions. Token-economics is the mechanism to incentivize miners to provide better service on the network.

Academic research on this field is almost inexistent, and we lack the basic definition for DLT-based tokens, description of their characteristics and functionalities, classification determinants and how these features affect the rights and protection of token-holders. Growing in this body of research will largely contribute to accounting and financial literature.

A token can represent the development of a network, secure unforgeable coupons, and even token systems with no ties to conventional value at all, used as point systems for incentivization. Given the wide variety of tokens and token-sale set-ups, it is not possible to generalize. Circumstances must be considered in each individual case. The technical layer, purpose, underlying asset, functionality and legal status of the tokens determines their classification (Euler, 2018). Regulation and accounting treatment should depend on the properties and rights that each token entitles based on ifs functionality and intrinsic nature.

The Swiss Financial Market Supervisory Authority (FINMA) has provided initial guidelines to classify and regulate digital tokens. FINMA's classification of tokens into payment, securities and utilities is becoming widely accepted among early regulators and techno-practitioners around the world. Based on the legal status, tokens may act as means of payment (payment tokens), as means to exchange value in an ecosystem providing access to products, services, or incentives (utility tokens) or as means to represent financial assets such as participations in companies entitled of earnings streams, such as dividends or interest payments (security tokens).

First, payment tokens act as store of value and medium of exchange. Currently, these payment tokens are not regarded as legal tender; however, they act as means of payment. Second, security tokens provide token-holders rights to a share of specific revenue stream, such as dividends (equity tokens) or interests (debt tokens), and which value derives from an external, tradable asset, and they are subject to federal securities regulations. If a company meets all the regulatory obligations, the security token classification creates the potential for a wide variety of applications, the most promising of which is the ability to issue tokens that represent shares of company stock. Third, utility tokens accredits token-holders future access to the products or services in the issuing network or ecosystem. Some of these tokens also grant purchasers the right to access a given technology or to participate in an organization providing governance rights, such as the right to vote. The defining characteristic of a utility token is a token not designed as an investment or a source of funding; if properly structured, this feature exempts utility tokens from federal laws governing securities. By creating utility tokens, a company can sell 'digital coupons' for the developing service. For example, Filecoin, raised $257 million by selling tokens that will provide users with access to its decentralized cloud storage platform. Note that utility token creators usually refer to these crowdsales as token generation events (TGEs) or token distribution events (TDEs) to avoid the appearance that they are engaging in a securities offering. The confusion however arises when these tokens can be traded in the exchangers and provide with relevant capital gains or losses to the token holders due to the high volatility of the token prices in the secondary markets. In practice, these TGEs or TDEs can be perceived as a mean to circumvent securities governing regulations reducing the quality of investor's rights.

Due to the lack of homogeneity, the status of tokens under regulatory framework is ambiguous. This paper contributes to define and classify DLT-based tokens, to be the first to identify four key aspects or determinants to classify tokens as payment, utility or security tokens; and to be the first to articulate the correspondent accounting treatment. This study suggests four factors as classifying determinants (see Table 1): (1) existence of a legal right against a counterparty; (2) existence of intrinsic value; (3) token-value stability; and (4) the existence of investment risk for the token-holder . We define the existence of a legal right against a counterparty (1) as a claim recognizable and enforceable at law against an entity on a given agreement. Intrinsic value (2) is defined as the value of the underlying project captured by a token, which is also what ensures that the price of the token grows alongside adoption/success of such underlying project. A token lacking utility will see its price supported only by speculation. Token-value stability (3) refers to a sufficiently stable value of the token to allow its use as means of payment or exchange of value within an ecosystem without significant gains or losses for the token-holder. Finally, investment risk (4) refers to the speculative nature of the token as the token holder is subject to uncertainty on expected profits (losses) from the effort of others, uncertainty on future performance, uncertainty on the possibility of exchanging the token for fiat money or promised goods or services.

Table 1: Determinants for token classification.

Proposed Determinants	Payment token		Utility token	Security token
	Crypto-currency	Stable coin		
Legal right against a counterparty	NO	NO	**YES**	**YES**
Intrinsic value	NO	NO	**YES**	**YES**
Token-value stability	NO	**YES**	**YES**	NO
Investment Risk	**YES**	NO	NO	**YES**

First, the lack of any legal right against a counterparty, absence of intrinsic value and lack of investment risk classifies a token as a payment token, enabling these tokens as store of value and as a means of payment. However, for payment tokens to perform as efficient means of payment volatility should be relatively low. We find certain highly volatile tokens, such as Bitcoin, which are not efficient means of payment. Although they can be use as such, high volatility disqualifies them to effectively perform, and introduces investment risk. We propose to divide payment tokens into two sub-categories, stablecoins and cryptocurrencies. Second, utility tokens provide legal rights for the holder against the DLT-network issuer; they have intrinsic value (due to its functionality) and value stability, which qualifies them as means of value exchange within a DLT ecosystem. Functionality is by definition the purpose of a utility token, investment risk should therefore be absent from these type of tokens. Finally, security tokens have contractual claims, have intrinsic and speculative value, waiving out value stability and introducing investment risk.

The above individual token classifications are not mutually exclusive. Security and utility tokens can also be classified as payment tokens (referred to as hybrid tokens). In these cases, the requirements are cumulative; in other words, the tokens are deemed both securities and means of payment.

2 DLT, BLOCKCHAIN AND IMPLICATIONS FOR BUSINESS ECOSYSTEMS

Blockchain has been referred to as a Distributed Ledger Technology where the terms have been used interchangeably, however, blockchain is a subset of DLTs that is under the umbrella of distributed databases. Distributed systems are a computing paradigm whereby two or more nodes work with each other in a coordinated fashion to achieve a common outcome. It is modelled in such a way that end users see it as a single logical platform. For example, Google's search engine is based on a large distributed system, but to a user, it looks like a single, coherent platform (Bashir, 2018). These systems are designed to be fault tolerant in case of the failure of some nodes where information is duplicated and stored in multiple physical locations. Furthermore, nodes on distributed systems have to validate information individually and create the entire transactions history independently to ensure honesty where trust is not considered. DLTs are based on Byzantine-fault tolerance (Lamport, Shostak, & Pease, 1982) where the system will still run and function regardless of the failure, dishonesty or the suspicion of malicious nodes. DLTs depends on transparency, replicating data across all the interconnected nodes to compare, validate and vote/agree to secure the accuracy of data and records

Transactions are stored in order by time in a single ledger on the blockchain. Having a transaction history has multiple benefits in terms of increased regulatory compliance and being able to recourse to the system to at any point in time. The use of digital signature makes it impossible for any “outsider” (i.e. hacker) of gaining access into the system. Moreover, the fundamental feature that makes this system attractive and stand out from other technologies is the immutability and trust lessness of this system, where data cannot be forged once it has been recorded on the ledger, nor fabricated. Miners cannot transfer assets or records without the consent (i.e. digital signature) of the owner/participant, manipulation or other nodes can detect fraud immediately.

Technologist and practitioners in general have entered the debate whether centralized platforms fit into the blockchain definition. This debate falls out of the scope of this paper and this is why we use the broader concept of DLT instead of blockchain.

DLTs could have serious implications for the future of business. From accounting to operations, the growing consensus among industry leaders and researchers is that blockchain and other similar DLTs are likely to affect every major area of society. The blockchain initially became very popular in finance where transparency, trust, and security in transactions are vital (Economist, 2015). This technology does not require (however may have) any intermediary such as a central bank to ensure trust and security in transactions (Buterin, 2013, Economist, 2015, Nakamoto, 2008) and are also more cost-efficient in micro-transactions compared to traditional mechanisms (Buterin, 2014b). Radiating trustworthiness through third parties is replaced by understanding the blockchain technology and seeing what the status of the transaction is. In other words, instead of trusting that a transaction will be conducted as agreed upon, now one can see the status of the transaction and knows what is going on. However, the DLTs does not only support financial transactions, they can support all kinds of tokens units of value. Digital assets such as shares, contracts, and stock options have been traded on the blockchain as well. Thus, all kinds of economic systems or more specifically, trading of property rights, benefit from such a trust-free, secure, and transparent transaction system (Beck, Stenum Czepluch, Lollike, & Malone, 2016).

The previous analysis suggests that DLTs (blockchain included) may grant more efficient to existing business structures and processes, however the most promising disruption may rise from the tokenization of value in the DLT-embedded structure of token economics.

3 TOKEN DEFINITION AND CLASSIFICATION

Definition of DLT-based token is not trivial. Most research has focused on the definition of Bitcoin, or Blockchain (Fosso Wamba, Kala Kamdjoug, Epie Bawack, & Keogh, 2018), with a lack of consensus in its definition. The extended definition of digital tokens is even more scant. Pakrou and Amir (2016) define Bitcoin as ‘a virtual and crypto-currency based on a peer-to-peer network, digital signatures and zero knowledge proof that allows the users to do irreversible money transfer without any intermediate’. Furthermore, Meiklejohn et al. (2016) define Bitcoin as ‘a purely online virtual currency, unbacked by either physical commodities or sovereign obligation; instead, it relies on a combination of cryptographic protection and a peer-to-peer protocol for witnessing settlements’. Macedo’s (2018) wider approach defines a token as a crypto-economic unit of account that represents or interacts with an underlying value-generating asset. A token’s value is made up of its intrinsic value and its speculative value. The intrinsic value is the percentage of the token’s value that derives from demand for the underlying asset. The speculative value is the percentage of the value of the token that derives from demand due to an expectation of future price increases. A token’s intrinsic value is dependent on two factors: the value created by the underlying asset and the percentage of this value that is captured by the token. The token economic model is what determines the latter — how much of the value created by the platform is captured by the token. However, DLT-based tokens are broader than this definition. Tokens may simply provide access to a specific application or business platform and essentially function like an alternative password alternatively, the tokens may include any form of a relative right against a third party. The relative right might be a (legal) right to use the token generator’s goods or services, a right to receive a financial payment, a right to receive an asset or a bundle of shareholder’s right, or provides technical ownership rights in assets (MME Legal | Tax | Compliance, 2018).

Following these definitions, this paper suggests a broader definition for tokens, **as a crypto-economic unit of account based on a DLT network that represents or interacts with an underlying value-generating right.** The value transfer can range from simple payments to property, financial assets, or any type of right or obligation likely to be tokenized and transferred through a DLT network.

Bitcoin, and bitcoin protocol (Nakamoto, 2008) was the birth of Blockchain technology. The primary use of tokens in the bitcoin protocol was as a means of compensating parties for the consensus mechanism. As now, in some public blockchains, a valid hash for a block must have a predefined number of leading zeroes, which can only be generated through a computationally power consumer guessing game called proof of work. The process involves scanning for a value that when hashed, (such as with SHA-256), the hash begins with a number of zero bits. The average work required is exponential in the number of zero bits required and can be verified by executing a single hash. In simple words, Proof of work is an expensive computation done by all miners to compete to find a number that, when added to the block of transactions, causes this block to hash to a code with certain rare properties. Finding such a rare number is hard (based on the cryptographic features of the hash function used in this process) however verifying its validity is relatively easy. Miners engage in this game in exchange of tokens. However, the use of the token goes further than a reward system in the bitcoin protocol, it serves as the unifying purpose of the whole network. The network exists to create and transfer these tokens after they are forged from the computer hardware and the electricity needed to facilitate bitcoin transactions. The Bitcoin token serves as a rough approximation of the expected value and total support for the bitcoin network as a whole.

The more miners that choose to support the network, the harder and more expensive it becomes to create a Bitcoin, thus providing a basis for a Bitcoin's value, as mining costs and time impact demand and supply, thus value (Xu, y otros, 2016). Bitcoin was the first cryptocurrency, and the system on which its tokens work serves only for this type of tokens.

After Bitcoin, the universe of digital tokens increased. With the introduction of Ethereum in 2015 came the concept of SC. The Ethereum blockchain not only provided the infrastructure for transacting primitive digital tokens, but also provided the capability for easily creating and autonomously managing other digital tokens of value over the open public network without trusted intermediaries. Ethereum and similar, can be considered a second-generation blockchain. These platforms like Bitcoin, enable its members to store information in a tamper resistant, highly resilient, and non-repudiable manner and have a native protocol token ether that reward miners for generating valid blocks for the Ethereum blockchain. Ethereum, however, intends to implement a more energy efficient protocol of consensus then proof of work, called proof of stake (announced for implementation in January 2020). Moreover, Ethereum goes one-step further implementing 'smart' contracts capable of being self-executed and self-enforced autonomously and automatically, without intermediaries or mediators. SC are 'scripts' (computer codes) written with programming languages whereby the terms of the contract are sentences and commands emulating the logic of contractual clauses which enables anyone on the network to execute actions. Ethereum requires that users of the network seeking to execute a SC pay miners a fee (called 'gas') for each computational step in the SC. These fees are necessary for Ethereum to run SC programs because, without them, members of the network could choke the network with spurious requests that would prevent SCs from executing. The token, therefore, serves as a form of 'crypto fuel' needed for the network to operate. We can program the creation of a token and associate its effects with (1) the creation of new tokens or (2) specific rights and obligations raised due to then SCs. Using this concept of SCs, which are effectively applications running on top a decentralized network, tokens can be created and allocated to users, and made to be easily tradable.

Initially, classification of tokens was unclear and the process of issuing any type of token and distributing them to users was called Initial Coin Offering (ICO). Later, as most of the tokens offered were classify by financial authorities as securities a new term emerged, Security Token Offering, or an STO. An STO is the proper term to refer to a token crowd sale, in which consumers purchase blockchain-based crypto tokens. Whereas ICO remains in use, it is a dubious term referring to the sale of tokens, with no clear distinction on the legal nature of the underlying tokens, on the other hand, STOs make clear reference to the sale of digital securities. Tokens may be issued similarly to the issuance of financial instruments. A security or financial instrument is a contract, which represents an asset to the holder and a liability to the issuer. The stocks, bonds, loans, derivatives (options, swaps, futures ...) or even money are financial instruments and tokens analogous to these instruments are already being issued daily on the internet and they are being financed ('bought') mostly with Bitcoin and Ether. However, tokens may be created to seed network effects tokenizing values such as the user's reputation within a system (e.g. augur reference), an incentive to increase storage space (e.g. Filecoin) or use tokens for on-chain voting as a decision mechanism. Most applications or SCs operate with tokens as means of governance. For example, the decision-making process may rely on having token holders vote according to the amount of owned tokens (Ruiz, 2017), tokens such as Ethers, ICONs or EOS may provide access to enhanced functionality infrastructure. Thus, a token can fulfil either one, or several of the following functions: (1) A digital currency, (2) a digital right within a blockchain ecosystem and (3) a digital security.

It is relevant for analysts, regulators and investors to clearly separate and differentiate functionality and rights when referring to tokens. As stated, we can classify tokens into three main groups, *payment tokens*, *security tokens* and *utility tokens*.

3.1 Payment Tokens

There are several attempts to define *Payment tokens* across recent literature. Tu and Meredith (2015) define Bitcoin, the as 'a medium of exchange that is electronically created and stored, and lacks the backing of a government authority, central bank, or a commodity like gold'. Sklaroff (2017) defines it as ''a cryptocurrency built using distributed ledger technology (DLT) protocols to enable participants to create, store, and exchange money itself''. FinCEN has stated that a '*virtual currency is an exchange mechanism that exists in electronic form and acts like currency in some environments (such as electronic transactions)*'. However, payment tokens do not have the attributes of legal tender in any jurisdiction (Fisher & Kaplinsky, 2013; Goodwin Procter, 2014).

Governmental institutions across countries have officially accepted that virtual currencies such as Bitcoin can be a 'legal means of exchange'. Examples of *Payment tokens* are Bitcoin (BTC) with is a purely transactional currency, Zcash (ZEC), Monero (XMR) or Litcoin (LTC). Christopher (2014) describes the main characteristics of these tokens as: (1) they act as a store of value and medium of exchange; (2) no central authority issuance; (3) currently they are not considered legal tender; (4) they have no legal counterparty and (5) they are not regulated under money laws although they have to comply with KYC/AML rules. Interestingly, already in 2013, the US Department of Treasury issued an interpretive guidance to address the applicability of AML rules to persons creating, obtaining, distributing, exchanging, accepting, or transmitting virtual currency. The guidance provided information to help taxpayers determine whether their activities with virtual currencies classify them as a money services business, which are types of nonbank financial institutions that are regulated by the Bank Secrecy Act (BSA).

Currently, *Payment tokens* are an inefficient medium of exchange due first to technological limitations on the trading and validation process which affect the daily volume of transactions that are significantly lower than traditional currencies. Second, high volatility makes it impossible for users to rely on the virtual currencies as a means of maintaining value. In 2013, the volatility of Bitcoin was substantially higher than both currency and stock volatility (Swartz, 2014). The value of a token has two components, the speculative value and the intrinsic value. The intrinsic value of a token is a mechanism through which the value of the token can be realistically evaluated. By linking it with the value of the legal tender, it is possible to give intrinsic value to tokens. Recently Facebook has released the Libra White Paper. Libra is backed by real world assets. This reserve of assets is a collection of low-volatility assets, including cash and government securities from stable and reputable central banks, giving a security of rewards to users (The Libra Blockchain, 2019). These types of DLT-based tokens are called *stablecoins*. *Stablecoins* may be divided into two main stability mechanism categories: algorithmic and asset backed. A recent report from Blockcahin.com (The State of Stablecoins, 2019) finds that 54% of asset-backed *stablecoins*, utilize on-chain collaterals (i.e., digital currencies like ether) and 46% use off-chain collaterals (i.e., US dollars held in escrow). US dollar is the most common stability benchmark or 'peg' and is utilized by 66% of *stablecoins*; other benchmarks include other fiat currencies (e.g., euro, yen), commodities (e.g., gold), and inflation (e.g., G10 average country inflation). Other requirements to maintain value stability is to work with a competitive group of exchanges and other liquidity providers, to secure that users can be able to sell the *stablecoin* at or close to the expected value at any time. This provides the coin intrinsic value reducing volatility and protects the coin against the speculative swings of other cryptocurrencies.

Payment token's volatility has prevented them to be used as medium of exchange for short-term use. Therefore, pegging them to commodities facilitates their use as global currency regardless of being issued by a central bank. *Stablecoins* might be the initial solution to incentivize trust in payment tokens as means of payment as the gold standard provided trust in the 19th and beginning of the 20th century. USD coin (USDC) is an example of a *stablecoin* that is a digital token built on the bitcoin blockchain fully backed by fiat currency, the US Dollar. USDC enables fiat currencies existence on the public blockchain in a tokenized form that adheres to governmental laws and regulations. The conversion rate of USDC to fiat currency is 1:1 making it equivalent to the underlying currency it represents and redeemable for cash that equals of the value the underlying assets holds. USDC and similar, act as bridge to satisfy the crypto world to creating a more stable currency, this does, however, raise the question of the continuous need for trust as it still relying on a centralized financial system to guarantee their stability and coexistence on the platform.

Technologists have open an interesting debate whether *stablecoins* (such as Theter) fall into de definition of cryptocurrency, like Bitcoin. The relevant difference between both cryptocurrencies and *stablecoins* is volatility. Previous analysis suggests that both are payment tokens, however Bitcoin's high volatility affects its effectiveness as means of exchange. This article suggests opening a sub-division within the payment tokens as cryptocurrencies, for high volatility payment tokens, and *stablecoins* for tokens which anchor their value to avoid undesired volatility.

In general terms, the two determinants that discriminates *payment tokens* from *utility* and *security tokens* are: (1) absence of counterpart; and (3) absence of intrinsic value. We propose the following definition for *payment tokens*: ***Payment tokens*** **a crypto-economic unit of account, with no legal counterparty, and no intrinsic value which acts as means of exchange, unit of account and store of value providing access to an underlying**

DLT platform. *Payment tokens* subdivide in two subcategories depending on (2) value stability and (4) investment risk.

3.1.1 Subcategory of Cryptocurrencies

Following these requirements, Yemark (2015) suggests that Bitcoin somewhat meets the first of these criteria, because a growing number of merchants, especially in online markets, appear willing to accept it as a form of payment. However, the worldwide commercial use of bitcoin remains minuscule, indicating that few people use it widely as a medium of exchange. Further the author argues that bitcoin performs poorly as a unit of account and as a store of value. Bitcoin requires merchants to quote the prices of common retail goods out to four or five decimal places with leading zeros, a practice rarely seen in consumer marketing and likely to confuse both sellers and buyers in the marketplace. Bitcoin exhibits very high time series volatility and trades for different prices on different exchanges without the possibility of arbitrage, and failing to provide the expected risk-free returns (Bordo & Levin, 2017). All of these characteristics tend to undermine bitcoin's usefulness as a unit of account. As a store of value, bitcoin faces great challenges due to rampant hacking attacks, thefts, and other security-related problems. Bitcoin's daily exchange rate with the U.S. dollar exhibits virtually zero correlation with the dollar's exchange rates against other prominent currencies such as the euro, yen, Swiss franc, or British pound, and also against gold. Therefore, bitcoin's value is almost completely untethered to that of other currencies, which makes its risk nearly impossible to hedge for businesses and customers and renders it more or less useless as a tool for risk management.

A report from the Bank of International Settlements (BIS, 2018) forewarns about the energy and scalability limitations of cryptocurrencies, which adds to the poor performance of cryptocurrencies on these functions. First, the enormous cost of generating decentralized trust. One would expect miners to compete to add new blocks to the ledger through the proof-of-work until their anticipated profits fall to zero. Individual facilities operated by miners can host computing power equivalent to that of millions of personal computers. The total electricity use of bitcoin mining equalled that of mid-sized economies such as Switzerland, and other cryptocurrencies also use ample electricity. Put in the simplest terms, the quest for decentralized trust has quickly become an environmental disaster. Second, cryptocurrencies simply do not scale like sovereign moneys. At the most basic level, to live up to their promise of decentralized trust cryptocurrencies require each and every user to download and verify the history of all transactions ever made, including amount paid, payer, payee and other details. With every transaction adding a few hundred bytes, the ledger grows substantially over time.

Although both constrains suggest of cryptocurrencies not fully adequate as an everyday means of payment, technology might eventually overcome both limitations. BIS highlights that the shortcomings of cryptocurrencies in this respect lie in the volatility of its value, which arises from the absence of a central issuer with a mandate to guarantee the currency's stability. Well run central banks succeed in stabilizing the domestic value of their sovereign currency by adjusting the supply of the means of payment in line with transaction demand. They do so at high frequency, in particular during times of market stress but also during normal times. This contrasts with a cryptocurrency, where generating some confidence in its value requires that supply be predetermined by a protocol. This prevents it from being supplied elastically. Therefore, any fluctuation in demand translates into changes in valuation. This means that cryptocurrencies' valuations are extremely volatile.

Despite the poor performance of cryptocurrencies as means of exchange, unit of account and store of value digital tokens such as Bitcoin, Bitcoin Cash, Litecoin, Monero or ZCash behave as such. Poor performance arises from three main factors, energy consumption, scalability and lack of value stability. However, historically technology has proven to overcome most of its limitations which would present lack of value stability as the main characteristic and drawback of these subset of *payment tokens*. I propose cryptocurrencies to be defined as simple mediums of exchange, characterized by the absence of (1) a legal right against a counterparty, lack of (2) value stability and lack of (3) intrinsic value and subject to (4) investment risk. Simply, I define a ***cryptocurrency* as a volatile payment token subject to investment risk.**

3.1.2 Subcategory of Stablecoins

A number "stablecoin" initiatives, backed by large technology or financial firms and built on DLT technology, are designed to address at least one of the traditional payment system challenges: access to all adult population to the payment system and cross-border retail payments. An example of such initiatives is Facebook's Libra. Although private digital forms of money have been around for decades, these new initiatives have access to large networks of existing users and customers, which suggests that they could be the first to have a truly global footprint. Similarly to *cryptocurrencies*, these initiatives raise formidable challenges across a broad range of policy domains. Of particular concern are the risks related to anti-money laundering and countering the financing of terrorism, as well as consumer and data protection, cyber resilience, fair competition and tax compliance. Partly in response to these concerns, a working group has been mandated by G7 finance ministers and central bank governors to examine global "stablecoins" in more detail.

If "stablecoins" become widely used, they could also give rise to issues related to monetary policy transmission and financial stability (Cœuré, 2019b). Where a "stablecoin" acts as a substitute for fiat currency, there may be the risk of the monetary sovereignty of countries being infringed. Furthermore, the transmission of monetary policy could be affected if "stablecoin"-denominated credit or overdraft extensions are provided. Finally, financial stability will be affected if the assets underlying "stablecoin" arrangements are not managed in a sufficiently safe and prudent manner to ensure that coin holders have confidence that their coins are redeemable at par, in good times and in bad.

From a legal point of view, many but not all stablecoins confer a contractual claim against the issuer on the underlying assets (so-called redemption claim) or confer direct ownership rights (FINMA, 16 February 2018). Value stability is granted as the token is linked to currencies, to commodities, to real state or to securities (FINMA, 16 February 2018).

Stablecoins linked to a single currency with a fixed exchange rate (e.g. 1 token = 1€) classify as *payment tokens* as they entitle no other legal right than the redemption claims against the issuer. *stablecoins* linked to a several currencies where there is a redemption claim dependent on price developments of the basket, classify as *payment tokens* as long as all opportunities and risks from the management of the underlying assets, (be they in the form of profits or losses, from interest, fluctuations in the value of financial instruments, counterparty or operational risks), must be borne by the issuer of the *stablecoin* (indicative of a bank deposit) and not the holder (indicative of a collective investment scheme), which classifies as *security token*.

Stablecoins are defined in this paper as tokens with stable value, which may or may not have legal rights against a counterparty. The absence of these legal rights classifies the stablecoin as *payment token*, whereas the existence of contractual claims classifies the *stablecoin* as *utility token or security token.*

Payment Stablecoins characterize by the absence of (1) a legal right against a counterparty, (2) value stability, lack of (3) intrinsic value and lack of (4) investment risk. Therefore we define ***stablecoins* as *stable payment tokens* not subject to investment risk**.

3.2 Utility Tokens (Digital Right)

A token can be created to define the value per unit of service provided within a DLT platform. For example, in a supply-chain management system, the tokens can be assigned to be the value of the total network divided by the total supply. It can also be used to transfer data and amount ubiquitously across the network. Hence, tracking, shipping details and product details etc. can be recorded on the DLT platform and updated continuously. They may act as the internal network currency, which not necessarily attempts to be a means of payment, it normally grants owners the right to actively contribute to the system (versus the passive investors' role) and does not have security features. These tokens can be compared to API keys used to access an online service. FINMA defines *utility tokens* as they intend to provide digital access to an application or service based on blockchain. The purchase of a *utility token* gives a user ability to gain access to an ecosystem. The tokens, as API's, may operate as service keys, providing access to platforms infrastructure and main functions. For example, when you buy an API key from Amazon Web Services for dollars, you can redeem that API key for time on Amazon's cloud. The purchase of a token like Ether (ETH) is similar, in that you can redeem ETH for compute time on the decentralized Ethereum compute network. This redemption value gives tokens inherent utility (Srinivasan, May 27, 2017). Specifically, tokens either have a certain use case in the protocol (i.e. Steemit's token, Steem Dollar, used to stake in order to be able to work for the network) or otherwise serve as medium of exchange in the project's ecosystem (i.e. Powerledger's POWR token used to buy and sell energy on the platform). An example of a medium of exchange token is casino chips which are used as currency which can only be used to pay for gambling at the casino. Store credit such as Sainsbury's nectar points is another example of a utility token which can only be used to pay for goods at Sainsbury's. Moreover, these tokens are built-in transactional value. Holders can transfer them to another party or trade them on the appropriate token exchanges or inside the system. This mechanism in its core helps increase the whole value of the service and provides tokens with potential market liquidity and inherent utility. These types of tokens have been called *utility tokens.*

Since a *utility token* represents utility or currency in the protocol, token valuation must be based on the supply and demand for that particular protocol. However, this alone is not enough. Unlike an equity, a token does not entitle its owner to any legal ownership of the underlying protocol and the protocol itself may not even generate cash flow. Macedo (2018) suggest that *utility token'*s value depends on the degree of correlation between demand for the protocol and demand for the token itself. The token value depends on its own demand and supply, which may or may not be linked to the demand of the protocol. As demand of the protocol increases, value of the company increases and the value of the equity increases. If demand of the platform and demand of the token are correlated the value of the token increases, if they are not correlated, the value will not likely increase.

Two questions arise from the previous analysis: (1) how investors capitalize the increase of the company's value, and (2) how this increase has no relevant impact on the *utility token* volatility. The two-fold approach suggests the existence of investors and users, and consequently two different tokens. Investors purchase tokens as means of funding the platform and to obtain a return, while protocol users purchase tokens to secure utility. Investor's tokens are different from user's tokens. These tokens grant different rights from *utility tokens*. They may provide ownership, stream of cash flows, or other rights similar to equity-like instruments. The tokens hold by investors, which capture the increase of decrease in the platform's value are classified as *security tokens* and the relationship structure between the value of the ecosystem, the utility token and the security token is the token economy.

Regulation therefore faces the challenge as to determine whether a token is a security following security-governing law or not. The Debevoise & Plimpton report (December 5 2016) proposes an analysis of the individual facts and circumstances of each relevant token to appropriately determine whether it would constitute a security and fall under the securities laws or a utility token. They understand that *utility tokens* entitle one or more of the following rights: (1) to program, develop or create features for the system or to 'mine' things that are embedded in the system; (2) to access or license the system; (3) to contribute labour or effort to the system; (4) to use the system and its outputs; (5) to sell the products of the system; and (6) to vote on additions to or deletions from the system in terms of features and functionality.

Alternatively, we may draw the line between *security* and *utility tokens* by means of the Howey test. The test considers that an investment contract, consequently a security, is 'a contract, transaction or scheme whereby [1] there is an investment of money; [2] there is an expectation of profit; [3] in a common enterprise; and [4] is led to expect profits solely from the efforts of the promoter or a third party.' Rohr and Wright (2017) analyse the compliance of these four conditions. While the first condition is likely fulfilled, the other three are muddled. The distinction between consumption and profit in *utility tokens* often becomes complex. Although public may purchase tokens due to its functionality and consumption potential, the speculative potential most likely plays also a role in purchasing decision. It might be unclear a priori the intentions of purchasers as they might be unsure whether they will consume the product or service or trade the token in the exchanger. This will depend whether the price exceeds the value of the consumption. We may expect that a token can be considered a security if the expectation of profit dominates any expectation of consumption. In the same context, the CNMV, the SEC and other financial supervisors are aware of the difficulty of defining and distinguishing *utility tokens* from regulated securities. These institutions have attempted to stablish certain regulatory framework. The CNMV (February 8, 2018) considers that a large part of the tokens should be treated as negotiable securities.

'As factors to assess if a token is considered a security, the following are considered relevant:

- *A token would be considered a security if attributes rights or expectations of participation in the potential revaluation or profitability of businesses or projects or, in general, that present or grant rights equivalent or similar to those of the shares, obligations or other financial instruments.*
- *A 'functional' token, that is granting access to services or products, would be considered security if carries an explicit or implicit expectation for the purchaser to benefit from the token revaluation, has any revenue associated or recognizes its liquidity or possible trading in an equivalent or similar market to the regulated securities market.'*

The threefold approach suggests that developers must first stablish the *utility token* functionality, and second the value of the token should not be linked to speculation. *Utility tokens* should have a strong and clear connection to some established form of value (intrinsic value) to ensure price stability, thus provide clearer basis to the project's value. They should behave as *stablecoins*. Functionality and traditional anchors should become the link between the DLT-based tokens and a widely recognized and established form of value. Whilst the true usefulness (and therefore 'justifiable' long term value) of a token remains uncertain, these functionality aspects are especially important. *Utility token* purchasers must only intend to use the token on the functional level limiting undesired speculative intentions. This 'long-term justifiable' value of the *utility token* needs to be detailed in the technical description and business model of the Whitepaper.

On May 4, 2018, the Anguilla House of Assembly enacted the Anguilla Utility Token Offering Act, which provides for the first government approved registration process for issuers of utility token offerings. The Anguilla Utility Token Act or 'AUTO Act,' is designed to facilitate clearly defined utility tokens that do not have a feature of a security.

Firstly, a Utility Token is defined as any token that (a) does not, directly or indirectly, provide the holder(s), individually or collectively with other holder(s), any of the following contractual or legal rights (..) (b) has or will have in the future, upon launch of the issuer's Utility Token Platform, one or more Utility Token Features.

Secondly, Utility Token Features means the contractual right for a holder to utilize a token to –
(a) have access to, become a member of, or become a user of a Utility Token Platform developed and managed, or proposed in the issuer's white paper to be developed and managed, by the issuer,
(b) use as the sole or preferred (by economic discount, preferred access, preferred use or otherwise) purchase, lease or rental price for the products and/or services provided or proposed to be provided by or in the Utility Token Platform, or
(c) use as a means of voting on matters relating to the governance, management or operation of the Utility Token Platform developed and managed, or proposed in the issuer's white paper to be developed and managed, by the issuer;

This four-approach analysis suggests that a token classifies as *utility token* when following determinant factors concur: (1) existence of legal right against a counterparty, (2) token-value stability, (3) existence of intrinsic value and (4) absence of investment risk. A ***utility tokens* is defined as a crypto-economic unit of account with stable intrinsic value that records or performs a specific function on a DLT network, against legal counterparty, entailing no investment risk.**

3.3 Security Tokens

A security is a broad classification that refers to any kind of tradable asset. Through initial offerings, investors have access to a wide variety of *security tokens*, ranging from coins redeemable for precious metals to, tokens backed by real estate or equity-based tokens. The latter show equity-like features, such as decisions regarding the issue entity's dividends, ownership rights or profit shares. FINMA defines such tokens are defined as '*blockchain-based units' which represent 'participations in real physical underlying, companies, or earnings streams, or an entitlement to dividends or interest payments' and are 'standardized and suitable for mass standardized trading*'.

Following FINMA guidelines (11 September 2019), depending on the specific purpose and characteristics of the underlying right or asset, the token will classify as utility or security. First, where the underlying assets are a basket of currencies which are managed for the account and risk of the token holder (indicative of a collective investment scheme) or for the account and risk of the issuer (indicative of a deposit under banking law). For the former categorization to apply, all opportunities and risks from the management of the underlying assets, be they in the form of profits or losses, from interest, fluctuations in the value of financial instruments, counterparty or operational risks, must be borne by the holder of the token, the token classifies as security. Second, where a token is linked to commodities, the exact nature of the claim on the assets as well as the type of commodity (in particular whether "bank precious metals" or other commodities are involved) are of particular significance. Where the token merely evidences an ownership right of the token holder, it generally does not qualify as a security. However, where there is a contractual claim on other commodities, the token will generally qualify as a security and possibly as a derivative. Third, where the underlying assets are individual properties or a real estate portfolio, the normal third-party management of the real estate portfolio is in itself an indication of a collective investment scheme. Finally, a token that is linked to an individual security by way of a contractual right for delivery to the token holder would normally also constitute a security.

In the US, tokens would classify as securities when complying with the first requirement of the

Howey test. In order for a financial instrument to be classified a security and fall under the purview of the SEC, the instrument must meet these four criteria: whereby [1] there is an investment of money; [2] there is an expectation of profit; [3] in a common enterprise; and [4] is led to expect profits solely from the efforts of the promoter or a third party.' That former condition is most relevant. The key criteria to classify a token as relates to whether the token-holder may affect the existence of a profit or loss. Purchasers of tokens should be perceived as investors and the issuance of tokens as equity or liability for the company. Investors have an expectation of profit in a common enterprise and they are led to expect profits solely from the efforts of the issuer or a third party.

The European Securities and Markets Authority (ESMA), a European Union (EU) financial regulatory body and European Supervisory Authority located in Paris, issued in November 2017 a Statement on Initial Coin Offerings (ICOs), on the rules applicable to firms involved in ICOs. In this Statement, ESMA reminds firms involved in STOs of their obligations under EU regulations. The Statement informs that if '*…tokens qualify as financial instruments it is likely that the firms involved in initial offerings conduct regulated investment activities, such as placing, dealing in or advising on financial instruments or managing or marketing collective investment schemes. Moreover, they may be involved in offering transferable securities to the public. The key EU rules listed below are then likely to apply*'.

According to the financial market Spanish regulator (CNMV) a token should be considered a security: '(1) whenever the 'tokens' provide rights or expectations of participation in the potential business/projects revaluation or profitability or, whenever, they present or grant rights equivalent or similar to those of the shares, obligations or other financial instruments included in the article 2 of the TRLMV (2) whenever the tokens grant the purchaser the right to access services or receive goods or products, which are offered by referring, explicitly or implicitly, to the expectation of obtaining by the buyer or investor a benefit as a result of its revaluation or any remuneration associated with the instrument or mentioning its liquidity or possibility of trading in equivalent or similar markets to the securities markets subject to the regulation'.

The new generation of tokens can provide an array of financial rights to an investor such as equity, dividends, profit share rights, voting rights or buy-back rights. Often these tokens represent a right to an underlying asset such as a pool of real estate, cash flow, or holdings in another fund. The main difference to traditional securities lies in the fact that these rights are written into a SC and the tokens are traded on a blockchain-powered exchange.

A relevant feature of *security tokens* is its higher dependence on the speculative value. Previous sections have explained that value of DLT-based tokens depends on the intrinsic and the speculative value. Equity-like tokens incorporate higher speculative value as the purpose of the token is to capture variation of value for investors return. Token economic models combine function-based tokens (*utility tokens*) and equity-like tokens (*security tokens*) as for the former to provide price stability for the network user, and the later to allow price volatility for the investor.

Previous analysis suggests ***security token*** **to be defined as a crypto-unit of account on a DLT platform with legal counterparty, intrinsic value and speculative value which incorporate risk in the expected cash flows associated with the token as it is being held.**

4 CONCLUSIONS

Over the last few years, the prevalence of digital currencies has increased. However, the emergence of the token-economy and the DLT-based tokens as disruptive elements of business models, have evidenced the urgent need to define, classify and regulate these digital tokens, which cove more than digital currencies. In this paper we provide initial guidance to define, classify and regulate digital tokens within the accounting sphere. Voices have raised urging to clearly distinguish the different natures and functionalities of crypto-assets. Not all tokens issued from a distributed ledger technology (DLT) are to be considered similarly. Julio Faura (8 Feb 2018), head of the blockchain development at Banco Santander urged '*... that it would be a good idea to clearly separate functionality from funding. Mixing those together ends up producing transaction costs that are artificially high, since access to functionality is subject to speculation. I always understood the role of ether as a mechanism to pay for the use of a network that implements a shared supercomputer, which is a truly amazing construct that can change the world for good. But its dual role as an access token and a currency to store value is making the construct expensive and difficult to use in practice* '.

Following the FINMA classification scheme, this paper provides a systematic and clear guidance to classify tokens into *payment tokens* (with the subcategories of *cryptocurrenies* and *stablecoins)*, *utility tokens* and *security tokens* as to reduce uncertainty on the financial and accounting regulatory framework. The previous analysis suggests four factors as basic criteria to classify the DLT-based tokens: (1) the existence of a legal right against a counterparty; (2) the existence of token-value stability; (3) the existence of intrinsic value; and (4) the existence of investment risk.

First, the lack of any legal right against a counterparty and the lack of intrinsic value classifies a token as a *payment token*, which solely serves as store of value and as a means of payment. Where *payment tokens* present value volatility and investment risk they classify as the subcategory of *cryptocurrencies*. Where *payment tokens* present value stability and non-investment risk, classify as the subcategory of *stablecoins*. Second, *utility tokens* provide a legal right for the holder against the DLT-network issuer, deliver value stability and intrinsic value. The intrinsic value arises from the functional nature of these tokens which are created to capture and exchange value across a DLT-based ecosystem. Value stability is key to allow the functionality treat to dominate any speculative incentives to profit from exchanger trading. Finally, *security tokens* present legal rights against a counterparty and intrinsic value which stems from the right, obligation or asset linked to the crypto-token. Unlike utility tokens, these security-like tokens lack price stability and the speculative value of the token competes with its functional intrinsic value. This suggests the presence of underlying expectations on gains which classifies the token as a security. These DLT-based tokens might have equity-like qualities, they might represent a liability or an asset, which could resemble traditional regulated securities. However, DLT-based tokens might be utility-like tokens, for example, tokens providing access to future consumption of goods or services, that fail to comply with conditions (2) existence of value stability or (4) absence of investment risk. Regulators need to acknowledge that underlying nature of the token is not sufficient condition to classify as utility, the existence of investment risk invalidates this classification and requires the token to follow the financial regulations. Consequently, utility-structured tokens may also qualify as securities thus the definition of *security token* becomes complex due to the broad scope of their nature. Future research is required to better understand the heterogeneous characteristics of *security tokens*.

REFERENCES

Bashir, I. (2018). Mastering Blockchain. UK: Packt Publishing Ltd.

Beck, R., Stenum Czepluch, J., Lollike, N., & Malone, S. (2016). Blockchain- the getaway to trust-free cryptographic transactions. Research Papers. 153. doi: htt://aisel.aisnet.org/ecis2016_rp/153

BIS. (2018). Cryptocurrencies: looking beyond the hype. Bank for International Settlements Annual Economic Report. https://www.bis.org/publ/arpdf/ar2018e5.htm

Bordo, M., & Levin, A. (2017). Central Bank Digital Currency and the Future of Monetary Policy. National Bureau of Economic Research. Retrieved from https://www.nber.org/papers/w23711.pdf

Brooks, S., Jurisevic, A., Spain, M., & Warwick, K. (2018). A decentralised payment network and stablecoin. Haven.

Catalini, C., & Gans, J. (2016). Some Simple Economics of the Blockchain. NBER Working Paper No. 22952. doi: https://ssrn.com/abstract=2874598

CNMV. (February 8, 2018). Considerations of the CNMV on "cryptocurrencies" and "ICOs" directed.

Debevoise & Plimpton. (December 5, 2016). Securities Law Analysis of Blockchain Tokens.

Ehrsam, F. (2017, November 17). Blockchain Governance: Programming our Future. Medium.

Financial Stability Board (FSB). (10 October 2018). Crypto-asset markets. Potential channels for future financial stability implications.

FINMA, S. F. (11 September 2019). Supplement to the guidelines for enquiries regarding the regulatory framework for initial coin offerings (ICOs).

FINMA, S. F. (16 February 2018). Guidelines for enquiries regarding the regulatory framework for initial coin offerings (ICO).

Forbes. (2019, Jan 24). How Much Time Americans Spend In Front Of Screens Will Terrify You. Forbes.

Klaus, I. (2017). Don and Alex Tapscott: Blockchain Revolution. New Global Studies, 11(1), 47-53.

Lemieux, V. L. (2016). Trusting records: is Blockchain technology the answer? Records Management Journal, 26(2), 110-139.

MME Legal|Tax|. (2018). Conceptual Framework for Legal and Risk Assessment of Crypto Tokens.

Pilkington, M. (2016). Blockchain Technology: Principles and Applications. (i. F. M., Ed.) Research Handbook on Digital Transformations, Edward Elgar.