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Basic principles for regulating crypto-assets

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Abstract

The proliferation of crypto-assets has triggered repeated calls for financial regulation. Regulatory concerns to date have focused mostly on investor protection, anti-money laundering and terrorist financing measures and potential transmission channels to financial stability risk. While the case for regulation appears weak at present amid the relatively small size of crypto-assets outstanding, the lack of a transparent and verifiable regulatory framework risks undermining an orderly expansion and integration of crypto-assets into existing financial institutions and markets to safeguard and enhance financial resilience. The present paper proposes a high level approach of 5 Cs of basic principles to guide crypto-asset regulation: 1) Constructive engagement; 2) Classification; 3) Consumer protection; 4) Cryptography and technology; and 5) Constancy.

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1. Introduction

The proliferation of new financial instruments associated with distributed ledger technologies has triggered repeated calls for financial regulation. Regulatory concerns to date have focused mostly on consumer protection, anti-money laundering and terrorist financing measures and potential transmission channels to financial stability risk. Recent regulatory announcements indicate a restrained approach attributable to a lack of perceived imminent systemic risks and insufficient consensus on adequate regulatory measures. However, the case for regulation is strong to allow for an orderly integration and expansion of the sector to safeguard and enhance financial resilience. At the same time, due consideration needs to be given to ensure regulation does not stifle desirable financial innovation.¹ The present paper proposes a high level approach of 5 Cs of basic principles to guide crypto-asset regulation: 1) Constructive engagement; 2) Classification; 3) Consumer protection; 4) Cryptography and technology; and 5) Constancy.

The new financial instruments or crypto-assets refer herein strictly to non-official instruments. They can be classified functionally into vouchers, currencies, securities and collective investment schemes. The classification of crypto-assets remains contested and language denominating crypto-assets unduly imprecise. The widely used term cryptocurrencies unfittingly conveys the notion of currency and the paper therefore uses the now commonly accepted term crypto-assets to cover economic and financial assets. The term crypto refers to reliance on cryptography to secure transactions that are however not exclusive to crypto-assets; it will be retained here merely due to the widespread use of the term. The considerations for financial regulation should naturally not be guided by the underlying technology, e.g. distributed ledger technology (DLT) or blockchain, but strictly by the functions the different instruments exhibit and apply to related actors and activities.

The case for regulating crypto-assets rests largely on the perceived benefits of a transparent and verifiable regulatory framework for the future development of the sector. The sector has illustrated considerable innovation with the introduction of DLT with applications in payments, value chain management, identity, crowd funding and other. Bitcoin especially has given rise to new considerations about the functions of money with possibly broader implication for international monetary relations. The new actors bring greater competition to the financial sector, in particular in payments, and offer new possibilities to foster financial deepening and inclusion. Regulation is needed to guide consumers and investors, discourage bad actors and avoid an unwarranted marginalisation of the sector.

The emergence of crypto-assets has contributed to prompting central banks to consider issuance of digital currencies (CBDC). CBDC may have to compete against crypto-assets to service the need for tokenised cash to conduct digital payments and settlements in peer-to-peer and delivery versus payment transactions. The growing importance of stable coins and utility settlement coins attest to the desire for stable digital units of account amid an incipient new ecosystem of tokenised assets and currencies.

The regulatory response to date has been mixed ranging from procrastination, to warnings to sanctions to comprehensive regulations depending on the jurisdiction. It has been concerned mostly with illicit transactions, consumer protection, market manipulation, capital flight and governance (Auer & Claessens, 2018; Balboa, 2017; BIS, 2015; de Filippi, 2014; ECB, 2018;

¹ The approach of smart regulation for crypto-currencies was reiterated as part of the Bali Fintech Agenda as a common IMF-World Bank position, see e.g. <https://www.cnbc.com/2018/10/11/imf-world-bank-annual-meetings-regulators-at-bali-fintech-agenda.html>

Financial Stability Board, 2018; Morris, 2017; Wildau, 2017).² Regulatory actions include outright bans in China and South Korea, several initiatives in the European Union under anti-money laundering regulations and warnings about the risks of initial coin offerings, some regulatory guidance from U.S. court rulings to special regulatory regimes (sandboxes), regulatory approvals of cryptocurrency exchanges in Japan and adoption of bitcoin futures contracts in the U.S.³ In Malta and Switzerland relatively comprehensive guidelines were established for initial coin offerings (ICOs).

History offers some valuable guidance on possible approaches to crypto-asset regulation. Crypto-assets can be seen as the paper currencies of the twenty-first century. Regulatory concerns raised with crypto-assets are similar in several respects to alarms voiced during the nineteenth century about the proliferation of paper currencies. In Europe, regulation was aimed at an orderly organisation of paper currencies and integration into the financial system leading to the adoption of common rules and establishment of central banks.

The paper provides a brief overview of the development of crypto-assets in the second section with a brief focus on the main crypto-assets. The third section offers a short summary of regulatory history of paper currencies. The fourth section outlines the proposed basic regulatory principles. The fifth section describes existing approaches to crypto-asset regulation with a focus on different countries. The sixth section describes elements of a certification framework as a regulatory approach for crypto-assets. The last section proposes some concluding remarks.

² While some regulators see no significant impact, others are more concerned. Governor of the central bank of Austria Ewald Nowotny was quoted saying "Simply because of the scale, it is certainly increasingly necessary to discuss whether and in what form regulations are needed here," Reuters (2017b). ECB Executive Board member Benoît Coeuré was quoted attesting that cryptocurrencies are limited to speculative funds and individuals "but it is not inherently a macroeconomic risk," Reuters (2017a).

³ See e.g. Sulleyman (2018) on China, Kim and Kim (2018) on South Korea, Musaddique (2017) on the U.K., Bundesanstalt für Finanzdienstleistungsaufsicht (2017) on initial coin offerings. Japan in September 2017 approved 11 operators of cryptocurrency exchanges, See (Wada & Sano, 2017). Chicago-based derivatives exchanges Cboe and CME launched bitcoin futures contracts on 10 and 17 December 2017, respectively.

2. Crypto-assets

Recent market developments of crypto-assets have been well documented (White, 2015; Frisby, 2014; OMFIF & London and Oxford Group, 2018; Vigna & Casey, 2015). The aggregate valuation of crypto-assets was US\$129 billion at end December 2018 (0.2 percent of world GDP). The total market capitalisation fell from a high of US\$580 billion or 15 percent of currency in circulation of the U.S., Euro Area and Japan combined to 3 percent in December (Figure 1). The fluctuation in market capitalisation can be attributed largely to significant valuation corrections of crypto-assets with the price of bitcoin declining from a high of US\$19,500 in mid-December 2017 to US\$3,840 towards end-2018 (Figure 2). At end-2018, there were 2073 coins and tokens in circulation compared with 845 at end 2017. Valuation concentration has remained high with the ten largest coins representing 85 percent of total market capitalisation and the 20 largest 90 percent. The average market capitalisation of a crypto-asset excluding the 20 largest is US\$7 million.

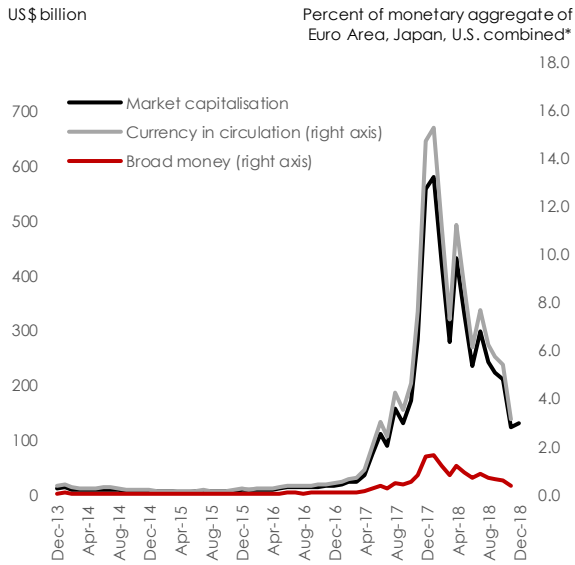
Bitcoin has remained the dominant crypto-asset. The high correlation between crypto-asset prices implies that bitcoin serves as a good proxy for broader crypto-assets market developments. The bitcoin blockchain allocation and trading volume similarly are indicative of broader developments and related activities.

The bitcoin mining network, maintaining the bitcoin blockchain, illustrates the geographical diversification of crypto-assets. There are about 10300 nodes—a computer with a programme that validates transactions and blocks—at end-July. About a quarter of all nodes are located in the U.S. followed by Germany (Figure 3).

The bitcoin trading volume by national currency shows the significant impact of changes in regulation and supervisory oversight. It offers a proxy for the distribution of bitcoin trading by country. The average monthly trading volume peaked during 2016 and collapsed subsequently with the regulatory restrictions imposed by the Chinese authorities in February and November 2017. China was through 2016 the largest bitcoin trader with more than 95 percent on average of all bitcoin trades made against renminbi. The decline in renminbi trading volume led to a significant increase in the share of dollar trades representing in 2018 on average 70 percent of the trading volume (Figure 4).

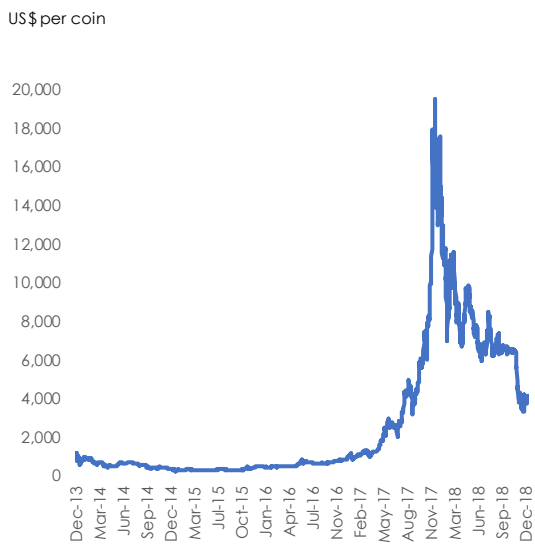
Total ICOs stood at US\$21.5 billion in 2018. ICOs have increased from US\$0.09 billion in 2016 and US\$6.0 billion in 2017 (Figure 5). There were 43 ICOs in 2016, 209 in 2017 and 1072 in 2018. The largest ICO was blockchain software EOS in 2018 of US\$4.2 billion followed by messaging service Telegram in 2018 of US\$1.7 billion including private pre-sales.

Figure 1. Market capitalisation



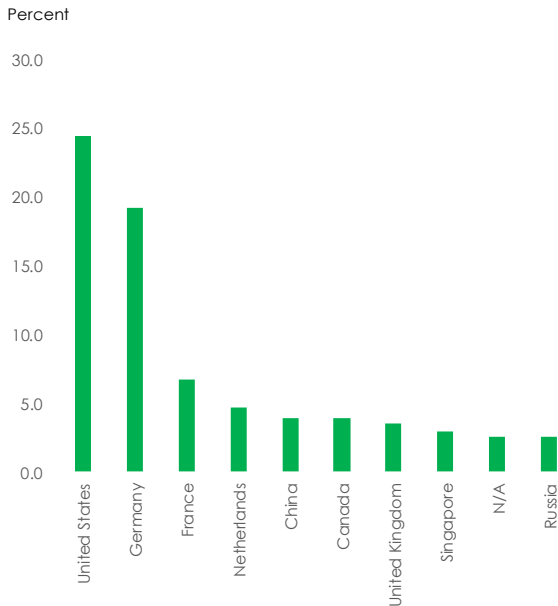
Source: Bank of Japan, Coinmarketcap.com, ECB, Federal Reserve, IMF. Data not seasonally adjusted. For Japan average monthly amounts.

Figure 2. Bitcoin price



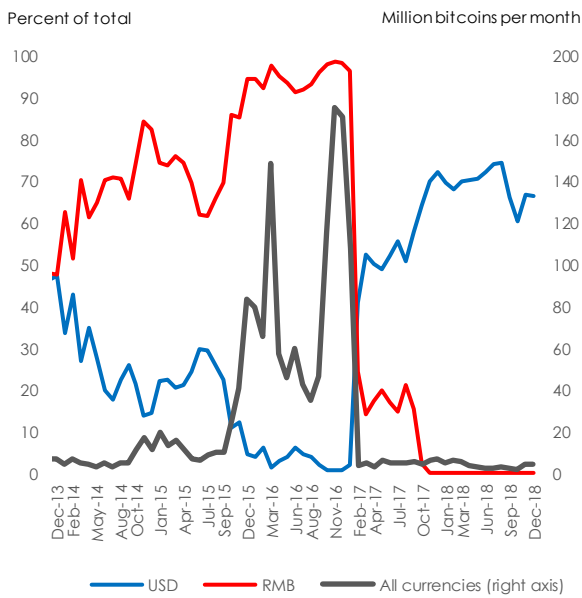
Source: Coinmarketcap.com.

Figure 3. Bitcoin nodes



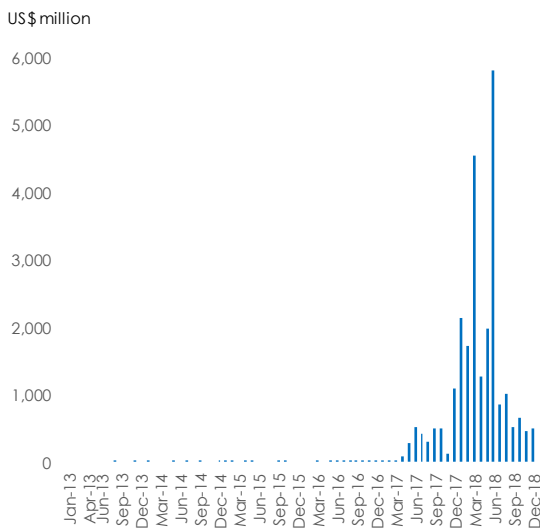
Source: Bitnodes.earn.com, 8 January 2019. Total number of reachable nodes: 10333. 10 largest countries by number of reachable nodes.

Figure 4. Bitcoin trading volume



Source: Bitcoinity.org.

Figure 5. Initial coin offerings



Source: Coinschedule.com.

Crypto-assets comprise a variety of different tokens and coins. Crypto-assets can be distinguished by the underlying technology and functionality. Technology includes altcoins based on bitcoin-derived blockchains or native blockchains, mining and non-minable instruments, the verification process comprises proof of work and proof of stake. The blockchain may be permissioned, whereby access is restricted, or permission-less, whereby access is open.

The functions of crypto-assets include vouchers, collective investment schemes, securities and currencies: Vouchers or coupons or utility tokens are normally tokens like ether that are representations of claims on any assets, e.g. network related services, music, game, file storages or other services confined to a specific blockchain or network; securities or security tokens like EOS convey a valuation gain or stake in the underlying issuer of the token and may but must not allocate voting rights; currencies are normally digital coins like bitcoin that serve as media of exchange and exhibit some general though not universal acceptance. Coins that are backed by other assets or currencies, also referred to as stable coins, like tether exhibit collective investment scheme features. Stable coins are among the most rapidly development instrument type with more than 120 stable coins projects.⁴ ICOs issue mostly vouchers or security tokens.

Bitcoin

Electronic cash that is issued by a decentralised network of nodes on the bitcoin blockchain according to a set issuing schedule. The blockchain records and validates all bitcoin transactions. Bitcoin serves as convertible medium of exchange but does not constitute a counterpart liability or financial claim. Its value is a function of perceived demand for bitcoins relative to other media of exchange.

Ethereum

Decentralised network to substitute centralised network servers and clouds that currently maintain the internet to decentralise data control and offer the possibility of decentralised applications (DApps) to allow smart contracts to execute

⁴ See e.g. Financial Times (2018).

specific codes (amid concerns for large data concentration through dominant internet-related companies). Ethereum runs its own programmable blockchain that also serves to house other applications. The Ethereum network uses ether token to pay for computational resources whereby tokens act like a voucher for computational resources and where the cost is proportional to the computational power needed. Ether can be considered an inside currency or non-convertible medium of exchange. Ether does not have a fixed issuance ceiling and the amount of ether being put into circulation is unknown. Ether's value is tied to the use of the Ethereum blockchain.

EOS

Software to build a blockchain architecture (operating system) to hold and scale DApps (as a competitor to Ethereum). The EOS tokens (on blockchain that adopts EOS.IO software) fulfil functions of value creation and rewards. The valuation is set to increase with the computational resources required by the network: *"This model naturally leverages rising token values to increase network performance."*⁵ The embedded "worker proposal system" conveys some voting power to EOS token holders to decide on the network development. The valuation incentives and voting provisions are considered here essential security features.

Tether

Stable coin backed by fiat currencies to conduct digital payments and serve as store of value. Tether constitutes a fund that holds fiat currencies equal in value to the number of tethers in circulation based on a proof of reserves concept. Tether acts as centralised custodian and reserves are held by Hong Kong based Tether Ltd. Tether performs like a collective investment scheme.

⁵ [EOS.IO Technical white paper](#), 16 March 2018.

Table 1. Main crypto-assets

Rank	Issuer	Token	Classification	Market capitalisation (US\$ billion)	Circulation (number of coins)	Maximum supply (number of coins)	Description
				30-Dec-18	30-Dec-18		
1	Bitcoin	BTC	Currency	67.0	17,452,046	21,000,000	Electronic cash. Original crypto-instrument based on a blockchain-based application
2	Ripple	XRP	Voucher	14.9	40,794,121,066	100,000,000,000	Token for processing and sending payments used by banks and other payment providers including for cross-border transactions
3	Ether	ETH	Voucher	14.2	104,090,778	Unlimited	Token to be used on Ethereum's decentralised platform for blockchain applications running smart contracts on a customised built blockchain. Offers possibility to issue own crypto-currencies.
4	Bitcoin Cash	BCH	Currency	2.9	17,538,382	21,000,000	Electronic cash. Hard fork of Bitcoin (all Bitcoin holders as of block 478558 are also owner of Bitcoin Cash)
5	EOS	EOS	Security	2.4	906,245,118	1,000,000,000	Token for blockchain technology focused on scalability and smart contracts based on a proprietary blockchain
6	Stellar	XLM	Voucher	2.3	19,160,772,996	104,125,061,584	Token for cross-border payments with focus on low-cost money transfers using the Stellar network
7	Tether	USDT	Collective investment scheme	1.9	1,858,164,808	3,080,109,502	Electronic cash based and backed by national currencies
8	Litecoin	LTC	Currency	1.9	59,790,354	84,000,000	Electronic cash. Based on the Bitcoin blockchain
9	Bitcoin SV	BSV		1.6	17,537,422	21,000,000	Electronic cash. Hard fork of Bitcoin Cash
10	TRON	TRX	Voucher	1.3	66,632,808,835	99,000,000,000	Token for blockchain-based applications to power smart contracts and interact with Tron network
11	Cardano	ADA	Voucher	1.1	25,927,070,538	45,000,000,000	Token for smart contract blockchain platform
12	IOTA	MIOTA	Voucher	1.0	2,779,530,283	2,779,530,283	Token for distributed ledger applications based on Tangle to build internet-of-things (connecting internet enabled devices)
13	Monero	XMR	Currency	0.8	16,682,713	* 22,640,658	Electronic cash with focus on anonymity
14	Binance Coin	BNB	Currency	0.8	130,799,308	192,443,301	Electronic cash to pay for transactions on Binance exchange
15	Dash	DASH	Currency	0.7	8,533,465	18,900,000	Electronic cash
16	NEM	XEM	Voucher	0.6	8,999,999,999	8,999,999,999	Token for NEM smart asset system for customised blockchain applications
17	Ethereum Classic	ETC	Voucher	0.6	107,139,503	Unlimited	Token for transactions on blockchain. Hard fork from Ethereum after disagreements after hacking attack in June 2016
18	NEO	NEO	Voucher	0.5	65,000,000	100,000,000	Token for blockchain-based applications to pay for transactions and to be used towards developing new projects
19	Maker	MKR	Collective investment scheme	0.3	728,228	1,000,000	Electronic cash (Dai stable coin) pegged to the U.S. dollar based on a continuous adjustment mechanism to maintain value stable
20	Zcash	ZEC	Currency	0.3	5,560,539	21,000,000	Electronic cash ensuring privacy in transactions amid a zero-knowledge proofs

Source: Conmarketcap.com; token websites. 30 Dec 2018.

* Estimated for 2050 based on existing halving projections, see e.g. https://www.reddit.com/r/Monero/comments/7j5a1y/what_is_the_max_circulating_supply_of_monero/.

3. Regulatory history

Crypto-assets can be seen as the paper currencies of the twenty-first century. The proliferation of paper money during the nineteenth century attracted considerable scrutiny. For example in Germany, period commentators were dismayed by the perceived flood of paper money and argued to issue regulation to reign in on the excessive circulation.⁶ At the same time, paper money brought considerable benefits to facilitate exchange amid rapid industrialisation. The regulatory approach

⁶ See e.g. Simon (1884) with reference to the creation of a German central bank: "Der Hauptzweck des Bankgesetzes sollte es sein, das Banknotenwesen zu regeln, insbesondere den übermäßigen Banknotenumlauf einzuschränken. [...] Der ganze deutsche Markt, insbesondere der Kleinverkehr, wurde mit [...] papierenden Zahlungsmitteln überschwemmt."

chosen was prudent to support innovation in money, mostly preserving existing institutions, while establishing common rules and transparency for monetary issuance.

The regulation comprised regulation at instrument and institutional levels. The former refers mostly to specie-backing of bank notes. The latter is based on the foundations of modern central banking systems that were mostly laid during the nineteenth century to support prudent bank note management.⁷ By the early twentieth century, there was widespread acceptance of the gold standard and centralised central banking systems with the exception notably of the Federal Reserve system in the United States.⁸

The specie-standards during the nineteenth century, mostly silver and gold, prescribed minimum bank note reserve requirements and unconditional bank note convertibility into specie. Reserve requirements differed whereby note issuing banks were obligated to maintain a certain minimum ratio of specie to paper notes in circulation, e.g. 33 percent in Germany, 40 percent in the U.S., 100 percent in England.⁹ The regulation to maintain a certain reserve ratio was often established through legislation, e.g. the 1844 Bank Charter Act in England that prescribed net issuance of bank notes only against gold; the 1875 Bank Act (Bankgesetz) in Germany that established the right of unconditional convertibility of bank notes into gold. Prudential and disclosure requirements were set to allow the public to assess the ability of the note-issuing institution to ensure note convertibility. In countries where multiple banks of issue remained, common note issuance rules were aimed to produce a level-playing field. The bank notes were not necessarily legal tender.¹⁰

Central banking evolved from some form of decentralised note issuance at national level amid contesting arguments in favour or against monopolisation of bank note issuance.¹¹ The emergence of single central banking systems followed in large part the example of the Bank of England. The 1844 Bank Charter Act established a separate department for note issuance (Issue Department) at the Bank of England and granted de facto a note issuance monopoly to the bank.¹² The act preserved the provincial banks of issue (country banks) but under stricter regulatory and disclosure requirements and geographically limited operations. Similarly in Germany, the mixed system under the 1875 Bankgesetz adopted elements of a single and multiple central banks system with a dominant institution at federal level (Reichsbank) and smaller institutions at regional level (Privatnotenbanken). Several Privatnotenbanken found the new regulatory requirements too onerous and abandoned their note issuing activities. Sole bank note issuance rights were granted to e.g. in 1848, the Bank of France; in 1882, the Bank of Japan; in 1888, the Bank of Portugal; in 1897 the State Bank of the Russian Empire; in 1907 the Swiss National Bank.¹³ Multiple central banks systems remained through the early twentieth century e.g. in Canada, Mexico and

⁷ Smith (1936) argues that the modern functions of central banks were mostly derived as secondary functions from the note issuance monopolies.

⁸ See e.g. Smith (1936, p. 3): "In the present century [20th] centralised central banking systems have come to be regarded as the usual concomitant, if not one of the conditions of the attainment of an advanced stage of economic development."

⁹ For the Bank of England, it is 100 percent for amounts exceeding GBP 14 million.

¹⁰ E.g., the Reichsbank bank notes became legal tender in 1909 and the Reichsbank assumed sole note issuance rights in 1935; bank notes issued by the 3 authorised Scottish banks of issue are not legal tender though generally accepted throughout the U.K. In Scotland and Northern Ireland only Royal Mint coins are legal tender.

¹¹ Goodhart (1988) contends that early central banks e.g. in Germany have been founded to unify "a somewhat chaotic system of note issue, to centralise, manage and protect the metallic reserve of the country and to facilitate and improve the payments system. In any case, prior to 1900, most economic analysis of the role of central banks concentrated on the issue of whether the note issue should be centralised, and, if and when centralised, now controlled by the central banks."

Similarly Smith (1936) argues that nineteenth century writers confronted the problem of note issuance with the following question: "Is it preferable that the note issue should be in the hands of one single bank, or at any rate a definitely limited number of banks specially authorised to undertake it [...] or is it preferable that there should be as many banks of issue as find it profitable to enter the note-issuing business?" James (1997) also highlights that in general in the debate about central banking, "the issue at stake [...] was the extent to which monetary power should be federalised, decentralised or dissipated among private actors, such as commercial banks."

¹² On the 1844 Act see Horsefield (1944).

¹³ See e.g. Conant et al. (1910) on the assumption of note issuance monopolies.

Scotland (de Kock, 1974; Smith, 1936).¹⁴

4. Basic regulatory principles

The global financial crisis has brought a considerable extension of regulation in finance including many previously unregulated areas accompanied by reforms in micro and macro-prudential regulation and increasing levels of consumer protection. The concern for financial stability amid severe apprehensions about the functioning of markets has shaped regulation and in many instances brought a new fundamental and more protective and intrusive approach to financial regulation accompanied by an intellectual and philosophical shift (Andenas & Chiu, 2014). The intransparent and volatile nature of crypto-assets and association with illicit transactions has therefore attracted particular scrutiny towards regulation.

The regulation of crypto-assets should be closely aligned with provisions of comparable financial entities, activities and instruments (Brunnermeier et al., 2009, Goodhart et al., 1998). Regulators' main concerns in relation to crypto-assets refer mostly to consumer and investor protection, money laundering and terrorism financing and the potential impact on financial stability (Financial Stability Board, 2018). Firms conducting investment services and activities in financial crypto-assets should be subject to financial regulation and supervisions; crypto-assets that qualify as financial assets should similarly be subject to financial regulation (FMA, 2018). The regulation needs to encompass provisions for clients, financial crime and market abuse in addition to other institutional and standards measures.

Regulatory initiatives have been taken at multilateral and national levels. Possible regulatory approaches have remained mostly at the consultative stage only with the exception of Malta and Switzerland. In July 2018, the FSB published a broad framework limited to monitoring developments of crypto-assets.¹⁵ Other standard-setting bodies are reviewing their regulatory approaches including the Committee on Payments and Market Infrastructures (CPMI) of the Bank for International Settlements (BIS) with a focus on central bank digital currencies (CBDC), the International Organisation of Securities Commissions (IOSCO) on ICOs and securities attributes of crypto-assets, the Basel Committee on Banking Supervision (BCBS) on banks' exposure to crypto-assets, the Financial Action Task Force (FATF) on anti-money laundering and anti-terrorism financing provisions.¹⁶ National authorities pursue similar efforts in parallel.¹⁷

The regulatory principles should rest on the notion of equal contribution based on "same services, same risks, same rules and same supervision" and constrain regulatory arbitrage.¹⁸ The principles imply that to ensure integrity of the financial system the same risks should attract the same rules and that regulation should be neutral regarding technological developments and business models.

¹⁴ The Bank of Canada initiated operations in 1935. For Scotland, the U.K. 2009 Banking Act subordinated strictly bank note issuance by Scottish institutions to U.K. Treasury and Bank of England oversight. The U.K. 2009 Banking Act specifies that Scottish bank notes are issued under provisions of a currency board (backing assets) and can be exchanged at 1:1 for Bank of England notes.

¹⁵ Financial Stability Board, Crypto-assets, report to the G20 on work by the FSB and standard-setting bodies, 16 July 2018.

¹⁶ See also (FATF, 2014).

¹⁷ The U.K. Parliament launched on 19 September 2018 a parliamentary inquiry on the role of digital currencies in the U.K.

¹⁸ See e.g. [European Banking Federation](#) in response to the EBA's consultation on the creation of an inclusive ecosystem where all actors are subject to similar rules.

See also Luiz Awazu Pereira da Silva, [Panel remarks at CV meeting of central bank governors of CEMLA](#), 5 June 2018: "The rapid growth of fintech poses several challenges for central banks in the design and implementation of regulations. In general, there are two approaches to regulating fintech firms: *risk-based* and *size-based*. First, risk-based regulation is based on the motto of "same risk, same regulation", under which fintech companies should be regulated on the basis of the risks they pose. However, identifying and classifying these risks is often challenging. Second, sized-based regulation is founded on the assumption that smaller fintech firms are less likely to present systemic risks."

The notion of legality of crypto-assets needs to be advertised clearly. Crypto-assets are legal in many jurisdictions unless provisions for outright bans exist.

The proposed 5 Cs of basic principles for crypto-asset regulation comprise:

- 1) Constructive engagement: The crypto-asset universe has been associated with fraud and undue exuberance.¹⁹ Many crypto-asset projects have resulted in failure and significant losses for investors and fraud has been widespread.²⁰ However, many projects have yielded positive results and offered true technological innovations.²¹

Regulation should not be unduly biased by bad actors but maintain a constructive approach to seek an orderly integration of crypto-assets into existing financial arrangements. While crypto-assets can be used in illegal transactions, the principle that the use of physical cash in illicit transactions does not attract a criminal liability for the issuer should equally apply to crypto-assets.

- 2) Classification: Crypto-assets can be classified functionally into crypto-vouchers, crypto-currencies, crypto-securities and crypto-collective investment schemes. The classification of crypto-assets remains contested and language denominating crypto-assets unduly imprecise. The term crypto instrument is being proposed herein as the widely used terms cryptocurrencies and crypto-assets unfittingly convey the notion of currency and financial assets, respectively, that many crypto-assets do not meet.

Existing classifications of crypto-assets vary but do normally not distinguish between different crypto-assets.²² The CFTC considers crypto-assets to be commodities. For tax purposes, the U.S. Inland Revenue Service (IRS) qualifies crypto-assets as property.²³ The IMF considers bitcoins to be a non-financial asset.²⁴ BaFin denotes bitcoins as unit of account.²⁵

The classification serves to identify whether the different crypto-assets should be subject to financial regulation at the instrument level. Vouchers or coupons or utility tokens are normally representations of claims on assets or services issued on a network to receive services from that network. Many exhibit features akin to air miles or gift vouchers and should not per se attract financial regulation. Security tokens that convey a valuation gain or property stake in the underlying issuer of the token and may but must not allocate voting rights should be classified as securities and regulated as such. Currency tokens or digital currencies that serve as media of exchange should not attract financial regulation at instrument level. Tokens that are backed by other assets or currencies, such as stable coins, exhibit collective investment schemes features and should be regulated as such. The regulation of ICOs should equally be guided by the classification of the token issued through the ICO.

The proposed regulatory treatment of crypto-currencies, such as bitcoin, is aligned with the treatment of foreign currencies. The notion of currency is used here in the broadest sense for means of payments that convey some

¹⁹ Head of the BIS Agustin Carstens: "cryptocurrencies are, in a nutshell, a bubble, a Ponzi scheme and an environmental disaster [...]" (BIS, 2018).

²⁰ A very large proportion of ICOs is estimated to have resulted in total losses for investors and have been associated with outright fraud.

²¹ See with regard to payments e.g. Accenture et al. (2018) and Accenture et al. (2017).

²² Malta and Switzerland offer a more detailed classification (see below).

²³ IRS, [Virtual currency guidance: Virtual currency is treated as property for U.S. federal tax purposes](#), 25 March 2014.

²⁴ International Monetary Fund (2016), p. 60.

²⁵ See footnote 51.

though not necessarily universal acceptance for settlement of debt.²⁶

The notion of legal tender has been related to the use of crypto-currencies as media of exchange. The legal tender status is normally conferred to fiat currencies issued by an official entity, typically a central bank, and will unlikely be conveyed to crypto-currencies.²⁷ The notion of legal tender implies an obligation by merchants or official authorities to accept a currency for settlement of debts but does not stipulate an obligation to accept currency for payment.²⁸ Currencies can be used extensively without being legal tender.²⁹ Currencies are generally seen as a social institution where acceptance is reached of what constitutes money by social consensus.³⁰

Issuers of crypto-securities and entities conducting collective investment schemes normally automatically qualify for financial regulation. Regulatory exemptions can be applied for certain activities and individuals. In the U.S., SEC regulation D allows firms to sell securities without having to register with the SEC to afford smaller firms capital market access for offerings normally not exceeding US\$5 million.³¹ Regulation D rests on the notion of accredited investors that meet certain set requirements including net worth and having specific knowledge and experience in financial undertakings. In the U.K., the AIM stock market is intended for smaller companies and offers a lighter regulatory regime than the main market.³²

The classification does not preclude that crypto-vouchers like ether may also be used as means of payment to acquire other crypto-assets or be exchanged into fiat currencies.

- 3) Consumer and investor protection: The regulation of crypto-asset-related activities should be subject to the principle of conducting any financial businesses. These include general principles of integrity, financial prudence, orderly market conduct, transparency, protection of clients' assets and avoidance of conflict of interest. Where crypto-asset issuers or crypto-asset exchanges take client monies common fiduciary responsibilities apply including in particular anti-money laundering and anti-terrorism financing provisions. For exchanges, this also includes provisions for orderly price discovery, strict segregation of client monies and formation and avoidance of collusion and front-running.

New contractual strictly rules-based arrangements e.g. smart contracts and decentralised autonomous organisations (DAOs) need to be scrutinised for their legal content and applicability (smart contracts must not be contracts). The verifiability of a contractual execution, similar to a derivatives contract, ought to guide the legal treatment to ensure adequate investor protection. Where execution results in ambiguous outcomes, new legislation

²⁶ International Monetary Fund (2009), Unit of account and currency conversion, 3.96, uses the term currency "to be understood in the broad sense (i.e., currency includes not only banknotes and coins but all means of payments issued by financial institutions in an economic territory." The definition in this paper is broader than the former IMF definition "in the broad sense" as currency must not be issued by financial institutions only. See also ECB, Virtual currency schemes—a further analysis, February 2015: "Virtual currency is also not money or currency from a legal perspective."

²⁷ International Monetary Fund (2009) specifies that domestic currency is that which is legal tender in the economy and issued by the monetary authority for that economy (Unit of account and currency conversion, 3.95). ECB president Mario Draghi was prompted to state that the "currency of the eurozone is the euro" and that no member state can introduce its own currency following indications by Estonia about the possibility to introduce a virtual currency; see ECB, [press conference](#), 7 September 2017. Similarly Bank of England governor Mark Carney stated that "only sterling is legal tender in the U.K. [setting] a very high bar competing forms of money to dislodge sterling," Bank of England, [The future of money](#), speech given by Mark Carney, 2 March 2018.

²⁸ E.g. several U.K and U.S. airlines no longer accept cash payments on board.

²⁹ As an example, the U.S. dollar is used extensively as medium of exchange in several dollarized countries but is not legal tender in those countries. See also above historical example bank notes in nineteenth century Germany that were not legal tender.

³⁰ See e.g. Tobin (2008) on money as a social institution and public good.

³¹ See [Regulation D offerings](#).

³² See [AIM](#).

may be required.

Legal certainty in transactions is essential. The legality of claims and liabilities related to crypto-assets need not differ from ordinary financial and other contractual arrangements. Where claims are directed against a permissionless network, they may not be enforceable.

- 4) Cryptography and technology: Regulation should be based strictly on the functions of crypto-assets and not be guided by the underlying technology. The application of cryptography is not limited to crypto-assets. DLT, of which blockchain is one approach, applied to many crypto-assets should itself not give rise to financial regulation and should not constitute a common factor from a financial regulation viewpoint.
- 5) Constancy: The regulation of crypto-assets and related activities should be transparent, stable and predictable. Uncertainty as to the regulatory framework may unduly deter an orderly integration of the sector.

5. Regulatory practices

The regulation of crypto-assets spans a variety of approaches in different countries. Regulation encompasses outright bans, to mostly unregulated toleration, to comprehensive regulation.³³

Japan

Registration and licensing regime. Registration of “virtual currency exchange operators” introduced in 2017 through amendment of the Payment Services Act of 2016. The Act defines “virtual currencies” and stipulates set requirements and registration for conducting business in virtual currencies as virtual currency exchange services to ensure among other customer protection. 16 exchanges have been registered in Japan under the Act.³⁴ ICOs in Japan are subject to financial regulation only to the extent that tokens sold at ICOs exhibit securities-like properties.

United States

No explicit federal regulatory provisions for crypto-asset spot transactions; state licensing regimes. Several enforcement actions, regulator opinions and court cases indicate applied regulatory provisions and approaches. In March 2013, the Financial Crime Enforcement Network (FinCEN) issued a guidance note outlining that an administrator or exchanger of “virtual currencies” are money services businesses (MSB) and are obligated to obtain registration, licensing and compliance with anti-money laundering laws.³⁵ FinCEN distinguishes between centralised virtual currencies and decentralised crypto-assets. The administrator of centralised crypto-assets is deemed a money transmitter to the extent that it allows transfers of value between persons or from one location to another. A person that creates units of convertible crypto-assets is a money transmitter if that person is engaged in the transmission to another location and the transmission between persons. In July 2017, FinCEN imposed a

³³ For a comprehensive survey of regulation of crypto-assets, see e.g. Law Library of Congress (2018).

³⁴ The exchanges in Japan former a new [Japan Virtual Currency Exchange Association](#).

³⁵ See FinCEN application of FinCEN’s regulations to persons administering, exchange or using virtual currencies at <https://www.fincen.gov/resources/statutes-regulations/guidance/application-fincens-regulations-persons-administering>. FinCEN alleged that BTC-e was not registered and did not have an anti-money laundering compliance policy or know your customer procedure in place. Provisions for MSB do not distinguish between real currencies and convertible virtual currencies.

civil money penalty against a crypto-asset exchange for violating U.S. anti-money laundering provisions and seized its website.³⁶

Regulators issued various statements on crypto-assets to define regulatory competences. In 2015, the Commodities and Futures Trading Commission (CFTC) classified bitcoin and other crypto instruments as commodities and assumed oversight when a crypto-asset is used in a derivatives contract or when fraud or manipulation involve a virtual currency in interstate commerce.³⁷ The cash markets in crypto-assets are not under the jurisdiction of the CFTC. In 2017, the SEC issued a statement highlighting that through 2017 no ICO has been registered with the SEC and warning that *"merely calling a token a 'utility' token [...] does not prevent the token from being a security [and that] token [...] that emphasize the potential for profits [...] contain the hallmarks of a security under U.S. law."*³⁸ In June 2018, the Securities and Exchange Commission (SEC) indicated that Ethereum is not a security.³⁹ In July 2018, the SEC concluded its investigation into tokens issued by a DAO—that initiated a crowdfunding via a token sales on the Ethereum blockchain in May 2016 and was subject to a hacking attack—that its token were securities and that lack of registration with the SEC violated the securities law.⁴⁰

U.S. Courts have issued several rulings on crypto-assets. In 2015, in response to the CFTC, the U.S. District Court Eastern District of New York clarified that while bitcoin and other virtual currencies met the definition of commodities, the CFTC does not have regulatory jurisdiction under the Commodity Exchange Act over markets and platforms conducting cash or spot transactions in crypto-assets and that currently U.S. law does not provide any U.S. Federal regulator with regulatory oversight over spot transactions in crypto-assets operated in the U.S. or abroad.⁴¹ In March 2018, the U.S. District Court Eastern District of New York granted a preliminary injunction to the CFTC to exercise enforcement power over fraud related to crypto-assets and denied a defendant's lack of jurisdiction motion.⁴² In May 2018, in a pending U.S. district court criminal case of the SEC and Department of Justice proceedings were initiated to rule whether an ICO violated the U.S. securities law.⁴³

The state of New York initiated in 2015 a specific crypto-asset license (BitLicense). The BitLicense requires exchange operators to operate in New York including specific compliance obligations. There are twelve BitLicenses issued including to Coinbase, Ripple and money transmitter Square. New York may reform the BitLicense regime to ease the perceived high regulatory burden.⁴⁴

The futures exchanges CBOE and CME launched bitcoin futures in December 2017. The introduction of bitcoin to the regulated derivatives market implies full regulation for bitcoin futures contracts.

Euro Area

No Euro Area common regulatory provisions; warnings by regulators. In February 2018, the E.U. launched the E.U.

³⁶ See FinCEN fines Canton Business Corporation (BTC-e) virtual currency exchange US\$110 million for facilitating Ransomware, dark net drug sales at <https://www.fincen.gov/news/news-releases/fincen-fines-btc-e-virtual-currency-exchange-110-million-facilitating-ransomware>.

³⁷ LabCFTC, [A CFTC primer on virtual currencies](#), CFTC, 17 October 2017.

³⁸ SEC, [Statement on cryptocurrencies and initial coin offerings](#), public statement, SEC chairman Jac Clayton, 11 December 2017.

³⁹ Lucas Mearian, [SEC official says Ethereum is not a security, freeing it from oversight](#), Computerworld, 14 June 2018.

⁴⁰ SEC, [SEC issues investigative report concluding DAO tokens were securities](#), press release 2017-131, 25 July 2017.

⁴¹ See United States District Court Eastern District of New York, Commodities Futures Trading Commission (plaintiff) against Patrick McDonnell and CabbageTech Corp (defendants), Memorandum and Order 18-CV-361, 6 March 2018.

⁴² Idem.

⁴³ Deborah Meshulam and Benjamin Klein, How one New York court is shaping the future of cryptocurrency regulation, DLA Piper, 17 May 2018.

⁴⁴ Colin Harper, [New York legislator proposes BitLicense alternative for cryptocurrency users](#), Bitcoinmagazine.com, 13 March 2018.

blockchain observatory and forum that reports on opportunities and challenges of crypto-assets and is scheduled to prepare a blueprint for best practices on regulatory sandboxes to create a controlled environment for fintech start-ups and seeks common regulation on crowdfunding.⁴⁵

The European Supervisory Authorities (ESAs) for securities (ESMA), banking (EBA) and insurance and pensions (EIOPA) issued in February 2018 a pan-E.U. warning to consumers regarding the risks of virtual currencies amid highly risky and unregulated products highlighting that crypto-assets are not subject to regulatory protection and that exchanges dealing in crypto-assets are not covered by E.U. legislation.⁴⁶ E.U. directives on e-money and payments may cover crypto-assets at present (see United Kingdom) but application remains uncertain.⁴⁷

In France, the French authorities seem set to make France a major centre for ICOs by facilitating supporting regulation.⁴⁸ French Financial Market Authority (AMF) published in February 2018 the responses to the public consultation on ICOs.⁴⁹ In November 2018, it issued a report on the role of ICOs in France, adopting a taxonomy for crypto-assets and offering a supportive conclusion amid the notion of “democratisation” of finance.⁵⁰

In Germany, German regulator BaFin outlines that mining or using crypto-assets as substitutes for cash in exchange transactions does not require authorisation.⁵¹ Mining pools may require authorisation if they offer shares as proceeds from mining on a commercial basis. The commercial handling of crypto-assets may trigger an authorisation requirement under German legislation. Where exchanges of crypto-assets are similar to broking services authorisation is required.

In Malta, the virtual financial assets act of October 2018 represents a comprehensive framework to guide ICOs and may represent the first such regulation for crypto-assets. The act specifies that assets using DLT, denominated as virtual financial assets (VFA) are subject to the act unless they are electronic money, financial instruments or a virtual token, where a virtual token is deemed a virtual token if it has no utility outside the DLT network in which it was issued. The law specifies that financial instruments or electronic money are subject to other laws. The act lays out specific requirements for the issuance of crypto-assets and ICOs amid strict disclosure requirements and induces a specific licensing regime. The act specifies a competent authority that determines whether a DLT constitutes a VFA.

United Kingdom

No regulatory provisions; warnings by regulators. In October 2018, the U.K. authorities concluded that further consultation is required to assess the regulatory integration of crypto-assets.⁵² Crypto-asset exchange Coinbase obtained an e-money license and therefore complies with the operational aspects of an e-money operator.⁵³ In June

⁴⁵ European Commission, Fintech: Commission takes action for a more competitive and innovative financial market, [press release](#), 8 March 2018.

⁴⁶ European Supervisory Authorities, [ESAs warn consumers of risks in buying virtual currencies](#), 12 February 2018.

⁴⁷ See e.g. European Parliament, [Virtual currencies](#), briefing, March 2016. See e-money at [Directive 2009/11/EC of the European Parliament and of the Council](#) and payments directive at [Directive \(EU\) 2015/2366 of the European Parliament and of the Council](#).

⁴⁸ French finance minister Bruno Le Maire was quoted saying that “France has every interest in becoming the first major financial centre to propose an ad-hoc legislative framework for companies making an initial coin offering.” Reuters, [France to create legal framework for cryptocurrency offerings](#), 22 March 2018.

⁴⁹ AMF, [news release](#), 22 February 2018.

⁵⁰ See AMF (2018).

⁵¹ See German Federal Financial Supervisory Authority (BaFin), [Virtual currencies](#).

⁵² U.K. [cryptoassets taskforce report](#), 29 October 2018

⁵³ See Techcrunch, [Coinbase gets e-money license in the U.K.](#), 14 March 2018.

2018, U.K. regulator FCA issued a statement warning banks when handling crypto-assets amid associated criminal activities.⁵⁴

China

Ban on crypto-asset dealings. In February 2017, China's large exchanges phased out zero fee trade amid pressure from the People's Bank of China to curb speculation.⁵⁵ In September 2017, China banned ICOs and closed domestic exchanges that offered fiat-currency to crypto-asset dealings.⁵⁶ Incipient indications suggest that Chinese authorities are revisiting the ban and contemplate introduction of a regulatory framework for crypto-assets.⁵⁷

South Korea

New stricter regulation of exchanges and restrictions on trading account registration. Repeated security breaches are also expected to become subject to stricter security requirements.⁵⁸ Large Korean banks offer accounts to crypto-asset investors. In July 2017, the authorities approved the use of bitcoin for international transfers. In January 2018, the authorities banned anonymous trading accounts but are set to introduce bank-like regulation of crypto-asset exchanges.⁵⁹

Switzerland

The federal financial regulator FINMA published in February 2018 guidelines for ICO to enhance transparency and set minimum disclosure standards.⁶⁰ The guidelines affirm that financial market law and regulation are not applicable to all ICOs and that the applicability of financial regulation rests on a case-by-case basis. FINMA's regulatory principles are based on the functions and transferability of tokens distinguishing between payment tokens, utility tokens and asset tokens. FINMA specifically advertises that it does not treat payment tokens as securities and will treat asset token under existing securities regulation. The guidelines specify that the issuance of tokens does normally not constitute a claim for repayment and therefore does not classify tokens as deposits that would normally attract the need for a banking license. The guidelines also indicate that utility token should not be subject to anti-money laundering regulations if the token is limited to provided access rights to non-financial applications.

The Swiss Federal Council in December 2018 issued a report to integrate provisions for crypto-assets with existing Swiss legislation.⁶¹ The report recommends a select and targeted approach to address possible gaps in legislation and regulation highlighting the securities law, insolvency law and financial law. The report concludes that existing general principles of anti-money laundering regulation cover activities related to crypto-assets sufficiently. The report distinguishes between value token like bitcoin and tokens that represent a legal claim as securities.

⁵⁴ U.K. Financial Conduct Authority (FCA), [Cryptoassets and financial crimes](#) (Dear CEO letter), 11 June 2018.

⁵⁵ Bitcoin.com, [Bitcoin trading in Chinese yuan drops to one-third of market in 30 days](#), 8 February 2017.

⁵⁶ BBC News, [China bans initial coin offerings calling them 'illegal fundraising'](#), 5 September 2017.

⁵⁷ CCN, [China's largest state-run newspaper calls for cryptocurrency regulation](#), 10 June 2018.

⁵⁸ CCN, [Korea to hasten cryptocurrency regulation after hack of country's biggest exchange](#), 20 June 2018.

⁵⁹ BBC News, [South Korea bans anonymous cryptocurrency trade](#), 23 January 2018.

⁶⁰ See [FINMA](#).

⁶¹ Swiss Federal Council, [Legal framework for distributed ledger technology and blockchain in Switzerland](#), 14 December 2018.

6. Classification and certification

The certification of crypto-assets could represent the basis for classification. Certification should rest on a set of transparent and verifiable criteria to facilitate an unambiguous classification. Where crypto-assets cannot be unambiguously classified, the classification that attracts a more onerous regulation should be chosen. The certification could then be used by exchanges and other crypto-asset financial service providers to offer certification-based crypto-asset-related services. Consumer and investors would be able to select crypto-assets on the basis of a given certification.

Certification regimes or codes of conduct exist for various applications:

Virtual Commodity Association (VCA)

The VCA represents a recent project to form a self-regulatory organisation to issue guidance on best practices for crypto-assets.⁶² The objective is to form a basis for the future regulation of the sector and cooperation with existing regulatory bodies.

London Bullion Market Association (LBMA)

In the U.K., the London Bullion Market Association (LBMA) global precious metals code has been developed as reference to market participants when conducting business and covers key principles on ethics, governance, information share and business conduct to establish trust and common standards.⁶³ The code is directed at financial and non-financial institutions including in extraction, refining, transportation of gold, silver, platinum and palladium to establish a common set of practices. Participant members of the LBMA commit to implement the code proportionately to their business activities taking into account different levels of size and sophistication of market participants.

Bank for International Settlements (BIS)

The BIS issued a foreign exchange global code to uphold good practice in the foreign exchange market to set adequate standards for market behaviour on information sharing, risk management and settlement and is not meant to substitution for regulation.⁶⁴ The code recognises that “one size fits all” is not adequate amid the diversity of the market and covers most types of financial institutions including central banks.

Social Accountability International (SAI)

The non-government organisation SAI maintains the SA8000, a leading certification standard for corporations and organisations to uphold fair treatment of workers.⁶⁵ The standard defines minimum requirements for workplace conditions for factories and their suppliers chains subject to an independent audit of production facilities. The SA8000 covers child labour, health and safety, remuneration and other. There are 3728 facilities in 61 countries

⁶² See [VCA](#).

⁶³ London Bullion Market Association, [Global precious metals code](#), April 2018.

⁶⁴ See [BIS FX global code](#).

⁶⁵ [SAI](#). See also Rasche and Gilbert (2012) highlighting that while SA8000 can support socioeconomic development significantly larger scale adoption would be necessary against an estimated 790,000 companies in operation.

adherent to SA8000 covering nearly 2 million employees. Certification is performed by a qualified institution, a certification body, authorised by the independent Social Accountability Accreditation Services (SAAS) to ensure that certification is conducted impartially.⁶⁶ SAI is an example of the role of non-state actors to provide a code of conduct.

7. Conclusions

The paper proposes 5 Cs of basic principles to help guide financial regulation for crypto-assets. The introduction of regulation for crypto-assets is seen as desirable to endow the sector with greater certainty and predictability to facilitate its orderly integration with existing financial markets and institutions where applicable and support consumer and investor confidence. The principles are meant to encourage a constructive approach and support a differentiated treatment of crypto-assets based on their functionality. The aim of financial regulation should be to align activities and entities related to crypto-assets and crypto-assets as financial instruments with existing regulation to harmonise regulatory standards on a risk basis. Similarly, the naming convention of crypto-assets is essential to adapt regulatory language to regulatory objectives.

Crypto-assets that are financial assets or that are offered by firms as financial services and activities need to be subject to financial regulation. Many crypto-assets do not meet that definition. Crypto-vouchers should in principle be excluded from financial regulation unless offered by financial firms. Crypto-securities, crypto-collective investment schemes and derivatives of crypto-assets should be subject to existing financial regulation net of considerations for a possible exemption regime. Crypto-currencies, to harmonise with fiat currencies, should not per se attract regulation at instrument level. Currencies, collective investment schemes, securities and derivatives are all subject to financial crime and market abuse and other institutional and standards provisions. Crypto-assets that provide additional security through e.g. some form of collateralisation may attract some regulatory relief similar to provisions for conventional instruments.

The regulatory history related to nineteenth century bank note issuance provisions highlights how regulation should aim to set firm standards while facilitating financial integration. Instrument regulation is to ensure that there is a level playing field with comparable instruments to mitigate regulatory arbitrage. The nineteenth century illustrates how financial innovation can be harnessed and its advantages carefully balanced against the perceived cost of disruption.

The regulatory practice across countries continues to differ widely. Malta and Switzerland offer a rare comprehensive approach to crypto-asset regulation. Many other jurisdictions offer partial if any regulation. International standards setting entities have provided few or very limited guidance.

The proposed certification regime would allow to define common standards for crypto-assets taking into account their considerable variety. The certification regime would offer consumers and investors assurance that subscribed crypto-assets meet set standards. The certification could be voluntary but an independent audit could be performed to verify and validate the classification.

The co-existence of crypto-assets with conventional instruments should be uncontroversial. This should include the co-existence of fiat and crypto-currencies. History indicates that harmonisation and institutional innovation can be powerful forces for financial development.

⁶⁶ [SAAS](#).

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