

Tackling the risks in crypto: choosing among bans, containment and regulation

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Abstract

The recent high-profile failures of a number of crypto firms have re-ignited the debate on the appropriate policy response to address the risks in crypto. The “shadow financial” functions enabled by crypto markets share many of the vulnerabilities of traditional finance and risks are often exacerbated by specific features of crypto. Authorities may consider different, and not mutually exclusive, lines of action to tackle the risks in crypto. These include (i) bans, which could tackle specific aspects of the crypto ecosystem, (ii) containment so that the real economy is insulated from crypto risks, and (iii) the regulation of the crypto sector. The paper highlights the pros and cons of the different approaches and proposes a framework to choose when bans, containment and regulation are most appropriate. In any case, central banks and public authorities could also work to make traditional financial more attractive, thereby allowing responsible innovation to thrive.

Keywords: cryptoassets, blockchain, distributed ledger technology, regulation.

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1. Introduction

After the failure of several major crypto firms in 2022, addressing the risks from crypto markets has become a more pressing policy issue. Cryptoasset markets have gone through booms and busts before, and so far, the busts have not led to wider contagion nor threatened the stability of the traditional financial system or the real economy. Yet the scale and prominence of recent failures heighten the urgency of addressing these risks before crypto markets become systemic.

The crypto ecosystem and the “shadow financial” functions it engages in, through centralised financial entities (CeFi) and decentralised finance (DeFi) protocols, share many of the vulnerabilities that are familiar from traditional finance (TradFi). But several factors exacerbate the standard risks. These relate to high leverage, liquidity and maturity mismatches and substantial information asymmetries. Policy responses should consider how to address these sources of risk appropriately, given the borderless nature of crypto.

In this paper, we contextualise the growth of crypto markets since their inception in 2008, and summarise the lessons from the 2022 turmoil. On this basis, we then outline three – non-mutually exclusive – lines of action that public authorities can take to address the risks in crypto: bans, containment and regulation, as well as their pros and cons. We then describe a complementary policy to address inefficiencies in TradFi and curb the demand for crypto. We also present a taxonomy of how authorities could employ a combination of bans, containment and regulation to harness the innovative aspects of crypto markets while at the same time ensuring that the risks they pose are appropriately mitigated.

We argue that bans should be used sparingly, that is, only when the harm caused by the behaviour of economic agents is suffered by other individuals, or when the harm is judged to be so severe that this should trump autonomy considerations. In the latter case, authorities may prefer banning only specific activities that curb participation in crypto markets – for instance advertising, or the use of credit – rather than crypto markets themselves. Containment should be part of interventions that focus on firms that, while playing an important role in the traditional financial system, do not engage with crypto as part of their core business model. The primary objective would be to ensure that such institutions can withstand any losses that may stem from crypto markets or that they keep providing their services if the crypto technology on which they are based suffers from malfunctions. Finally, regulation should be used in those areas that mimic economic functions that are currently regulated, such as many of the products developed in decentralised finance (DeFi), or to ensure that crypto markets are not used for the purposes of money laundering or terrorist financing. In any of these cases, one specific option we describe is to encourage sound innovation building on the provision of digital central bank money as the backbone of the financial system.

The rest of this paper is structured as follows. Section 2 briefly describes the evolution of crypto markets from their inception in 2008, and Section 3 discusses the vulnerabilities of crypto in the context of the 2022 turmoil. Section 4 discusses three high level lines of action that public authorities can take to tackle the risks of crypto, Section 5 presents a taxonomy of how authorities could combine such lines of action, and Section 6 concludes.

2. Crypto markets: from niche to mainstream

The birth of crypto markets can be traced back to the publication of the Bitcoin whitepaper in 2008 (Nakamoto, 2008). In that paper, by a person or group of people writing under a pseudonym, the author(s) argue that an electronic payment system based on cryptographic proof can replace the

trust that underpins transactions in TradFi. Following the publication of the whitepaper, the first block of the Bitcoin blockchain, referred to as the *genesis block* was mined on 3 January 2009.

The creation of Bitcoin was seen as a response to the considerable damage that was being caused by the great financial crisis of 2008. It highlighted the substantial distrust towards TradFi of large swathes of the general public around that time and since. The genesis block famously contains the embedded text “The Times 03/Jan/2009 Chancellor on brink of second bailout for banks” (Davis, 2011), a reference to a headline that the Times of London published on the same day, describing the efforts of the British government to prop up its banking system.

Following the mining of the genesis block, for a few years the crypto market, which at the time consisted exclusively of Bitcoin, remained considerably niche; a pastime for a limited number of enthusiasts. The most notable transaction involving Bitcoin in its early period was one that captured the imagination of the crypto community ever since. On 22 May 2010, a programmer purchased two pizzas in exchange for 10,000 bitcoin. From today’s vantage point we now know that Bitcoin Pizza Day, as it is now known, did not spur the use of Bitcoin as a widely adopted means of payment. Rather, it embedded the ethos of the initial cryptocurrency community. The transaction took place, following an agreement that was finalised on an internet forum,¹ between two parties that were using their own private keys to access their Bitcoin wallets, used a decentralised blockchain network, and it did not rely on any centralised intermediary to transfer the funds. Had things stayed that way, it is unlikely that the international regulatory community would have taken much notice. Crypto would have remained a relatively obscure area at the intersection of payments and computer science and regulators would have kept their attention on the deficiencies of TradFi.

But things did change substantially since then. A number of centralised entities – Bitcoin exchanges that allowed people to exchange Bitcoin for fiat money – started to emerge, contributing to the rising price of Bitcoin and attracting new participants. The most successful exchange in the initial phases of crypto was Mt. Gox, which launched in 2010 and at its peak in 2014 was handling the majority of Bitcoin transactions around the world. Setting the scene for events that would happen again in a similar fashion in the future within the crypto ecosystem, Mt. Gox declared bankruptcy in 2014, following a hack that resulted in the theft of more than \$400m worth of Bitcoin. But while the community suffered, and the price of Bitcoin collapsed as a result of the bankruptcy, the number of entities in crypto market still continued to grow.

Since then, new blockchains with different features and characteristics were born. A milestone in this context was the development of the Ethereum blockchain in 2015 which allowed developers to build applications on top of its blockchain through the use of computer code (so called ‘smart contracts’).² Ethereum’s functionality went beyond simple transfers between users as in the Bitcoin network; it allowed users to transfer funds contingent on pre-specified conditions. Another game-changer was the development of so-called stablecoins that sought to do away with the very high volatility of Bitcoin and other cryptocurrencies. Such stablecoins (such as Tether and USDC) made it possible for the crypto ecosystem to develop a TradFi-based monetary anchor – primarily the US dollar. This in turn allowed households and investors to funnel additional money into the crypto ecosystem. At the same time, other centralised entities gained a stronger and stronger role in the crypto ecosystem, notably trading platforms such as Binance, Coinbase, Kraken and, until its demise in late 2022, FTX. And, the smart contract functionality of Ethereum opened up the development of an entirely new ecosystem of decentralised provision of crypto intermediation services,

¹ See <https://bitcointalk.org/index.php?topic=137.0>

² See [Home | ethereum.org](https://www.ethereum.org)

decentralised finance, or DeFi in short (Zetzsche et al (2020), Aramonte et al (2021), Makarov and Schoar (2022)).

As the above goes to show, the crypto ecosystem has seen considerable evolution over the past 15 years. And, notwithstanding a number of booms and busts, the ecosystem has not disappeared, suggesting it is here to stay. Moreover, there is by now a much higher potential for interconnections between crypto, TradFi and the real economy as institutional investors and households have increased their exposure to the sector. It is for this reason that regulatory authorities in a number of different jurisdictions have recently been very active in seeking to address risks domestically, and have increasingly coordinated policy across borders.³

3. Vulnerabilities in crypto markets and the 2022 turmoil

In this section we briefly review the events that gave rise to the turmoil in crypto markets in 2022. In particular, we highlight what lessons can be learnt from these events and then discuss the more general vulnerabilities of the crypto ecosystem that such events highlighted.

The events of 2022 and lessons learned

After peaking in late 2021, when cryptoasset prices, stablecoin volumes and DeFi activity reached all-time highs (Graph 1, left-hand panel), the crypto ecosystem faced significant turmoil in 2022. The decline started early in the year, but problems became particularly acute in May. It was then that a large stablecoin, TerraUSD (UST) – which relied on an algorithm to maintain its peg to the US dollar – collapsed, causing widespread contagion in crypto markets (Graph 1, centre panel). A period of relative calm followed, but crypto markets again saw serious stress in November 2022, when the crypto trading platform FTX – which was also involved in several other lines of business in crypto markets, notably via the affiliated hedge fund Alameda Capital – declared bankruptcy.

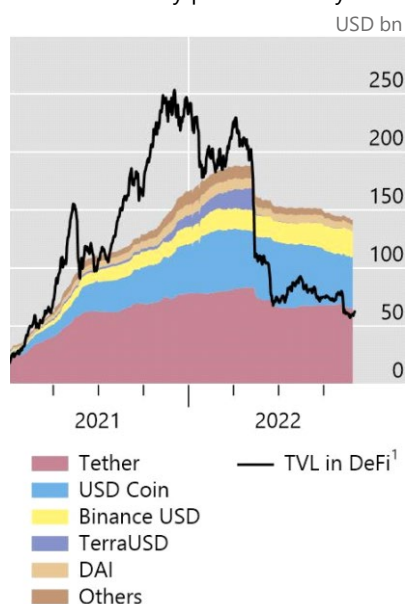
As described above, and despite repeated turmoil, the crypto ecosystem has survived and prices have often recovered from stress (Graph 1, right-hand panel). In this light, things seem no different this time: in the early months of 2023, amid a generalised risk-on phase in financial markets, crypto assets staged a substantial rally with the price of Bitcoin in mid-February 50% higher than at the bottom of the cycle.

Against this backdrop, there are strong reasons to doubt that crypto will simply fade away on its own. In particular, a substantial part of the crypto community firmly believes in the ideological pursuit of a decentralised system as an alternative to TradFi and are thus heavily committed to the ecosystem. In response to recent events, many proponents of crypto have also doubled down on their commitment by claiming that decentralisation and the underlying crypto technology are the solution rather than the problem. They argue that while CeFi entities like FTX were at the epicentre of the stress, DeFi protocols and underlying blockchains continued to function, concluding that only “true” DeFi can be resilient.⁴

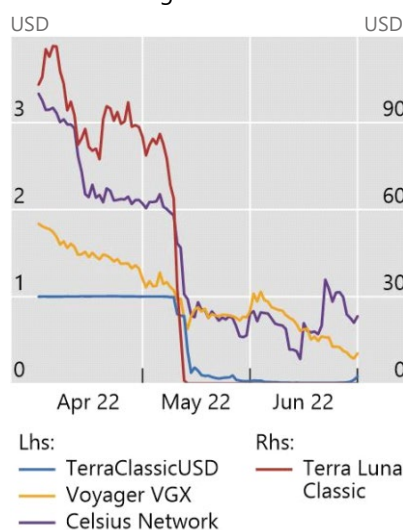
³ See for instance BCBS (2022), CPMI (2022), Deese et al (2023), FSB (2022), HKMA (2023) and HMT (2023).

⁴ See eg Cassatt (2022), Harvey (2022) and Schär (2022).

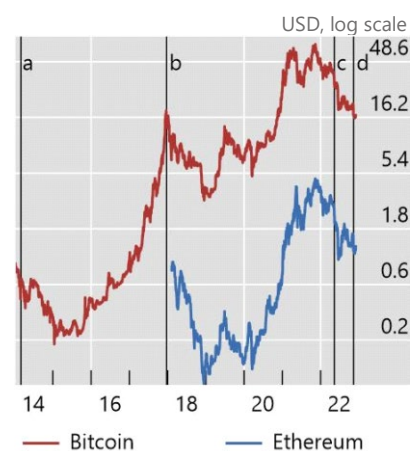
A. Stablecoin market capitalisation and DeFi activity peaked in May 2022



B. The collapse of TerraUSD led to broader contagion and turmoil



C. Cryptoassets have gone through booms and busts before



^a Bankruptcy of Mt Gox on 28 February 2014. ^b Bursting of ICO bubble on 22 December 2017. ^c TerraUSD implosion on 9 May 2022. ^d Bankruptcy of FTX on 11 November 2022.

¹ TVL (total value locked) refers to the total dollar amount of assets that is staked across all DeFi protocols. It does not refer to transaction volumes or the market capitalisation of cryptocurrencies, but rather to the value of reserves that are “locked” into smart contracts. The TVL may vary depending upon the source and is subject to overestimation.

Sources: Bloomberg; CoinGecko; DefiLlama.

However, recent developments underscore that the decentralisation in crypto and DeFi markets is illusory (Aramonte et al (2021); BIS (2022)). The vision of crypto proponents is to do away with financial intermediaries, yet to function and achieve a meaningful scale, crypto markets rely heavily on centralised entities, for several reasons. First, the governance of DeFi protocols is often concentrated. The founding team of a new DeFi product often amasses a large amount of so-called governance tokens. And as these tokens are also tradable, any party can in theory acquire a controlling stake in a protocol. Second, as described in the previous section, centralised exchanges and stablecoins play a crucial role in crypto. If market participants want to invest in crypto, they initially convert funds into a stablecoin deposited on a crypto exchange. The stablecoin then serves to grease the wheels of the crypto system by allowing participants to move their funds across different applications and blockchains. Without such gateways, crypto would have to rely on users taking self-custody of their funds in digital wallets using private keys. While this would be more akin to how the system functioned in the initial stages of its development, mainstream adoption would be inconceivable under these conditions and crypto would not have grown as much as it did.

Vulnerabilities in crypto asset markets

As underlined by the collapses in 2022, crypto markets are not immune to the vulnerabilities that have been known in traditional finance for a long time. In fact, traditional finance is regulated precisely because experience over centuries has shown that financial markets are subject to

significant market failures, ie features that result in suboptimal outcomes which can in principle be improved upon with a policy intervention.⁵

Market failures can be characterised into two broad sets, namely information problems and externalities.⁶ Information problems arise either when the available information is not adequate for market participants or when one party to a transaction has access to a different set of information either before or after the transaction has been completed. Externalities are indirect costs or benefits that impact a party other than those involved in a transaction and in financial markets they can result in extremely severe outcomes where the process of intermediation grinds to a halt because the stability of the entire system is not guaranteed.

But rather than market failures themselves, regulators and practitioners tend to focus on their practical manifestations, which are often referred to as vulnerabilities. Conceptually, one could think of the interaction between the underlying market failures, the incentives of market participants and the structural characteristics of the market resulting in vulnerabilities. The main vulnerabilities in crypto are summarised in Graph 2.

For instance, Boissay et al (2022) highlight that crypto markets are subject to a key structural flaw. Existing distributed ledger technology inherently leads to congestion, as it requires high fees to remunerate and incentivise validators. This ultimately results in a fragmentation of the crypto system into a plethora of competing blockchains. This feature also implies a large degree of rent extraction by insiders, which cannot be the goal of an efficient monetary system.

But vulnerabilities⁷ are not limited to this structural flaw. They also include operational issues, non-mitigated liquidity and maturity mismatches, and excessive reliance on leverage, which we discuss in turn below. And indeed given the opacity of many of the projects in crypto, the relative novelty of the entire ecosystem and the difficulty in separating the chaff from the wheat, several business models in crypto exploited substantial information asymmetries and turned out to be outright Ponzi schemes.

Operational issues permeate many crypto entities and activities. First of all, governance arrangements are often opaque, reliant on easy-to-manipulate access to governance tokens and often make it very difficult for participants to monitor the efforts of developers once they handed in their monies, as developers are often anonymous. The extensive use of computer code to replace intermediaries gives rise to potential issues as smart contracts can be impossible to modify or stop once they are deployed on the blockchain. Given the complexity of the real world and the need for smart contracts to anticipate how the system may evolve the potential for irreversible coding errors is high. And given the ability of developers to build applications on top of each other, one error may percolate across the system in a number of ways that are very difficult to predict ex ante.

⁵ See Goodhart et al (1998) and Llewelyn (1999) for an in-depth discussion of the rationale for the regulation of financial markets.

⁶ Behavioural biases – ie departures from the assumption of consumer rationality – are sometimes categorised as an additional form of market failure (Erta et al 2013).

⁷ See FSB (2023) for a discussion of vulnerabilities specific to DeFi.



Source: authors' elaborations

Experience has also shown that these operational issues are compounded by the fact that many crypto intermediaries face severe deficiencies in risk management, ring-fencing of business lines and handling of customer funds. These issues came to the fore forcefully in the high-profile collapses of 2022.

Unmitigated liquidity and maturity mismatches stem from the different liquidity and maturity profile of liabilities and assets of relevant crypto entities and protocols. A typical example of this issue in crypto is represented by stablecoins. These may be unable to fulfil redemption requests at par if they cannot quickly sell the assets they hold for their full face value (see Arner et al 2020 for a discussion). But similar issues are present in more novel areas of crypto which allow users to borrow and lend their cryptocurrencies and are thus subject to the same vulnerabilities (Aramonte et al, 2022). Some crypto lending platforms invest the cryptocurrencies they get from users (which they refer to as deposits) in less liquid assets, at times using the borrowers' collateral to borrow and invest more. If the market experiences periods of stress the platform may struggle to return the original deposits to investors.

Such behaviour is linked to another vulnerability that is pervasive in crypto, namely the extensive use of leverage which is embedded in many crypto platforms. Given the pseudonymous nature of crypto protocols, any lending activity relies on the extensive use of collateral. But as many crypto assets are very volatile, the value of such collateral can fluctuate substantially and, if it breaks some pre-determined thresholds would need to be sold. In TradFi, the decision to sell collateral would be taken by humans that can assess market conditions before initiating a sale, and even in these cases there are many examples of collateral chains having a destabilising effect. But in many crypto protocols, especially those in DeFi, these decisions are taken autonomously by smart contracts that, in turn, could have large destabilising effects on the system as a whole that are difficult to predict in advance given that the contract would liquidate the collateral irrespective of market conditions.

The pseudonymous (or anonymous) nature of crypto can represent an additional vulnerability for modern societies. And while Bitcoin was explicitly set up to allow the anonymous transfer of value, modern cryptocurrencies can allow the transfer of large amounts of money with negative effects on the ability of authorities to monitor if transactions are happening as the results of criminal activities to launder money, evade taxes or have the potential to finance terrorism.

Finally, crypto may also present a fundamental threat to the monetary sovereignty of states that are less macroeconomically stable. The availability of stablecoins, in particular, may create issues of *cryptoisation*, ie. the substitution of local currencies with crypto-based ones (IMF, 2021). During periods of macroeconomic instability and depreciating exchange rates domestic holders of fiat currencies have the incentive to shift their holdings into more stable currencies putting additional pressure on the domestic currency itself. Such a behaviour may result in the loss of monetary sovereignty for domestic monetary authorities as well as the crowding out of funding for local financial institutions, with long term consequences for the overall stability of the monetary and financial system of these countries. On the other hand, such a threat may well act as a disciplining force on authorities in these countries to avoid the macroeconomic instability that would trigger the need to use such stablecoins in the first place.

Taken together, these characteristics of crypto markets strongly undermine investor protection and market integrity (FSB (2018, 2022); BIS (2022)). But despite these deficiencies, the 2022 turmoil has shown that the sector has not grown large enough or sufficiently interconnected with TradFi to threaten financial stability. That said, this could change if retail or institutional investor interest does not abate. Interconnections with the real economy and TradFi could also increase should crypto become less self-referential, in particular if asset tokenisation makes inroads. All this means that proactively tackling the risks in crypto through an effective policy mix is important at the current juncture.

4. Options for addressing the risks in crypto

Addressing the risks posed by crypto should have the same objectives that have underpinned the approach to TradFi for decades. Typically, these are to: (i) appropriately protect consumers and investors; (ii) preserve market integrity against fraud, manipulation, money laundering and the financing of terrorism; and (iii) safeguard financial stability.⁸

⁸ Investor protection relates to rules that seek to ensure that firms treat consumers fairly and sell them only products and services that are appropriate (eg matched to investors' risk-bearing capacity). Market integrity is achieved through the use of rules that specify how these markets should function, eg to avoid manipulative practices as well as by applying know-

For central banks, an important additional consideration is to preserve the integrity of the monetary system.⁹ As mentioned above, for many EMEs, the issue of monetary sovereignty associated with cryptoisation is an additional rationale to intervene in crypto markets as they could not only impinge on monetary sovereignty but also divert resources away from the real economy.

Going back to the brief history of crypto we highlighted in Section 2, and following Aquilina, Frost and Schimpf (2023b) one could think about three potential lines of action that public policy could pursue – ban, contain and regulate.

One, admittedly quite draconian, option would be to **ban** crypto activities themselves, for instance authorities could make the operation of a blockchain illegal. A de facto ban could also be effected by removing the oxygen that is feeding the fire of crypto, by acting on the centralised entities – exchanges and stablecoins – that funnel money from TradFi and the real economy into the crypto ecosystem. This approach has been taken by Chinese authorities in 2021.¹⁰

A second option would be to isolate crypto from TradFi and the real economy. This would require building a firewall around crypto by imposing constraints on entities that operate within TradFi. This would **contain** the risks within the crypto ecosystem and avoid that these spreads outside its borders. This is the approach that has arguably been taken to insulate the banking sector by the BCBS (2022). It does so by imposing very high capital requirements on banks for their exposures to particular types of crypto assets that are especially risky such as unbacked cryptoassets and stablecoins with ineffective stabilisation mechanisms, while being more lenient on others, so that risks are mitigated but responsible innovation is not hindered.

The third option would be to **regulate**. This would treat crypto in a manner akin to TradFi and bring it inside the regulatory perimeter. This could be done by either creating a new crypto-specific regulator, or by giving powers to existing ones. The latter approach, for instance, is the one suggested by the UK government (HMT, 2023).

These lines of action are also visualised in Graph 2. It is important to note that they are not mutually exclusive and could be selectively combined to mitigate the risks emanating from crypto activities. A crucial element to be considered when selecting which options to pursue is the ability to enforce any rule that is introduced, including ensuring that the resources needed to do so are on hand.

Ban

An extreme option is banning crypto activities in their entirety, while a less extreme one would be to ban crypto activities in a targeted manner. The pros and cons of the banning option are easy to assess at an abstract level. In terms of pros, and assuming that a ban is effective, any potential harm to the financial system would be eliminated and investors would not incur any losses due to misconduct on the part of crypto service providers. For EMEs that perceive crypto as a threat to monetary sovereignty that threat would also be removed. The main downside is that any useful innovation from crypto would be lost or delayed.

Implementing this option would face the challenge of enforcement. For decentralised crypto activities, their borderless nature makes enforcement difficult. The ban would be more effective for

your-customer (KYC) and anti-money laundering (AML) regulations.

⁹ This means the preservation of the public good nature of central bank money from the encroachment of private initiatives that could undermine it (BIS (2022)).

¹⁰ See [Notice on Further Preventing and Resolving the Risks of Virtual Currency Trading and Speculation \(pbc.gov.cn\)](https://www.pbc.gov.cn/eng/202109/15/101101.htm).

the activities of centralised intermediaries, but the activity could still move to jurisdictions that do not impose the ban and investors may find ways to evade it.¹¹ In addition, evasion may lead to “waterbed effects”, whereby investors seek out similar activities not explicitly covered by existing rules or subject to less oversight. Finally, many societies tend to protect the right of individuals to choose as long as they do not harm others, and tend to use outright bans sparingly.

Contain

The second option is to isolate TradFi from crypto, so that it remains more of a niche activity. This could be done first and foremost by limiting the flow of funds into and out of it and by limiting other connections with TradFi. At the same time, containment would seek to curb any linkages with the real economy (eg as means of payment for goods and services, or in response to the tokenisation of real-world assets).¹²

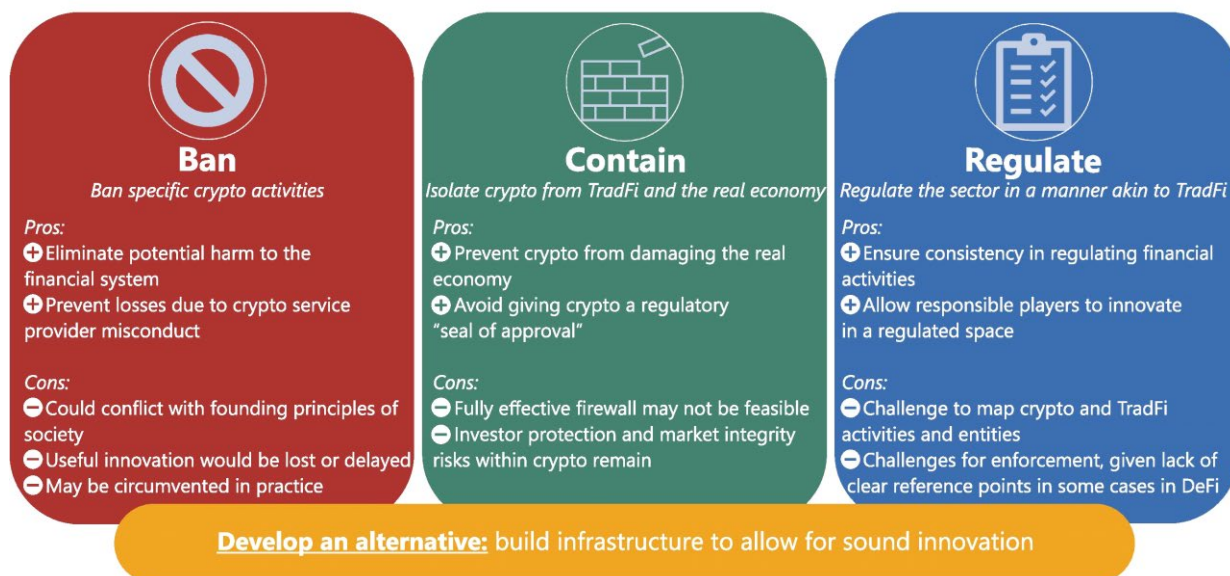
There are several possible justifications for this approach. As with bans, it is a reasonable response if crypto is seen as not solving any practical real-world problem (Allen (2022)). It would also make sense if it is believed that crypto would fade away with containment (Cecchetti and Schoenholtz (2022)). If this option is successfully pursued, problems stemming from and propagating within the crypto markets would not damage TradFi. Importantly, this option would avoid giving crypto a “seal of approval”, which might encourage its growth.

That said, the containment approach also has two main drawbacks. First, a firewall may not be fully effective in practice. For example, containment may introduce complexity and lead to attempts to “game the system”. It may be feasible to prevent banks becoming a conduit for crypto activity¹³ (in line with the approach pursued by the Basel Committee on Banking Supervision (BCBS, 2022)), but entities with less constrained investment mandates could try to circumvent the contained, take outsized bets and indirectly threaten their prime broker financiers. Second, if flows of new investor money were to be channelled into the system such that crypto growth resumes, then – even if financial stability risks for TradFi remained contained – concerns with investor protection and market integrity would still need to be addressed. Without doing so, the reputation of supervisory agencies could be tarnished by shocks. Moreover, as history suggests, investors may still demand compensation ex post following harm. Tricky political economy issues would then come to the fore.

¹¹ Indeed, a recent report by Chainalysis (2022) shows that crypto usage in China rose in 2022, notwithstanding the ban on crypto activity that was imposed in late 2021.

¹² To be sure, the dividing line between this option and bans is not always clear. For instance, banning certain narrow aspects (eg advertising or exchange-traded futures contracts based on a cryptocurrency) would also limit the linkages to TradFi. That said, the underlying philosophy behind the two options is quite different.

¹³ And potentially some asset managers, in line with the decision of the US SEC not to approve any exchange-traded funds based on spot Bitcoin markets.



Source: Authors' elaborations.

Regulate

This approach would treat activities in crypto asset markets in a similar way to TradFi, applying the same principles and tools. To pursue this approach, authorities could start from a "functional" approach and identify the key economic functions performed by crypto activities and then assess how regulation could impact these.

This is in fact the approach advocated by Merton (1995) in a seminal paper dealing with the assessment of innovation in financial markets. In the paper, Merton identifies six functions of the financial system: (1) clearing and settlement of payments; (2) pooling of funds to undertake large scale enterprises; (3) transfer of resources through time and space; (4) manage uncertainty and control risks; (5) provide price information to coordinate decentralised decision-making; and (6) deal with incentive problems.

In practice, following Merton's approach would require mapping activities performed in crypto markets to TradFi and then using similar guiding principles to regulate crypto, combining activity and entity-based approaches.¹⁴ This approach would ensure consistency in regulating financial activities – whether performed by crypto players or TradFi – and help to promote the policy goals at the core of existing regulatory frameworks. Moreover, it would allow responsible actors to innovate with regulatory compliance and oversight.

One familiar challenge of this approach is to establish an appropriate mapping between activities and entities in crypto and their TradFi counterparts together with the corresponding legal underpinnings. Various regulators are considering, for example, whether stablecoins could be

¹⁴ Aquilina et al (2023a) propose a way forward along these lines specifically for DeFi. Given the characteristics of crypto markets, some of the aspects of regulation and supervision can even be embedded in the code that underpins crypto applications (Auer (2022)). Borio et al (2022) provide a framework for activity vs entity-based approaches.

licensed and regulated as banks, payment systems or non-banks (eg non-bank payment service providers). Another challenge is enforcement.

For regulation to work, another hurdle would be to identify the entities suited as entry points for regulation. This is more difficult in crypto, as in some cases they lack clear reference points, whether these be firms or individuals. Indeed, some crypto proponents argue that the task is impossible. That said, a useful starting point could be the entities (and persons) exerting de facto control of a DeFi protocol. In CeFi, of course, the problem is easier, given the more traditional nature of entities such as stablecoins and platforms. For instance, HMT (2023) suggests that issuers of stablecoins or of other cryptoassets whether they are based in the UK or sell to UK customers will be subject to UK rules. The FATF (2021) identifies virtual asset service providers (VASPs) and requires members to impose constraints on them for the purposes of anti-money laundering. Yet even when entities can be identified, they may be less amenable to standard regulatory and supervisory tools, at least initially. As recent events have shown, some entities lack the basic accounting, corporate governance, compliance and control functions that are a prerequisite to participating in TradFi.¹⁵

Depending on the targeted features of the crypto world and the relative efficacy of each measure, either as stand-alone measures or in combination, authorities could combine specific bans, containment and regulation. By way of illustration, individual jurisdictions could ban energy-intensive proof-of-work or the distribution of algorithmic stablecoins. Some intermediaries that bridge TradFi and crypto could be brought under regulation. Other parts of crypto could be isolated as part of a containment strategy. We expand on how such an approach could be carried out in the Section 5.

Develop an alternative

As described in Section 2, Bitcoin and its crypto peers were originally created after the 2008 financial crisis with a sentiment of distrust for TradFi being a non-negligible impetus. While full decentralisation proved to be elusive, given the emergence of a number of centralised entities, cryptocurrencies are still based on the premise that the validation of transactions should not rely on trusting a centralised entity.

However, many of the defining features of crypto that represent genuine innovation and can benefit consumers and societies are not dependent on such a radical departure from the existing financial system. On the contrary, a system based on a solid anchor provided by existing financial institutions may represent a better base to enable innovation and contribute to a more efficient monetary system. Indeed, central banks are uniquely placed to do this, as they sit at the core of the monetary and financial system and their task is to provide the trust that underpins it.

One important area where central bank could focus could be improving the quality and reducing the costs of payments. One option is to introduce retail fast payment systems, such as the Unified Payment Interface (UPI) in India, Pix in Brazil, the upcoming FedNow system in the United States or initiatives such as the Single Euro Payments Area (SEPA).

Another option would be to issue central bank digital currencies (CBDCs) that meet the needs of citizens in society. If properly designed and implemented, such initiatives could support sound private sector innovation. They could help reduce the cost of payments, enhance financial inclusion, bolster the integrity of the system and promote user control over data and privacy. The innovation that is present in certain areas of crypto could be harnessed to improve the way in which services

¹⁵ Of course, if regulation is introduced in the crypto sector, some of these functions will be a prerequisite for operating legally.

are provided in TradFi. In the process, these initiatives could support and leverage new technical capabilities, notably programmability, composability and tokenisation, thereby increasing the efficiency of TradFi (BIS (2022)).

A clear advantage of CBDCs compared to decentralised cryptocurrencies is that by doing away with decentralisation and anonymisation they can make the system much more scalable, hence solving the structural flaw of crypto mentioned above. For cryptocurrencies, the need to maintain the incentives for miners or validators to continue in their task is to limit the capacity of the blockchain so that fees accruing to them can remain high enough. If rewards are not high enough, given the lack of reputational risk associated with anonymity, validators would have an incentive to cheat and steal funds (Budish, 2022). As CBDCs would not need to rely on economic incentives for validators to maintain the network, they could result in a system that is sufficiently large to be useful as a means of payment. In addition, given that central banks form part of the government sector, CBDCs would ultimately be underpinned by the taxation power of sovereigns.

Wholesale CBDCs could allow participants that have access to them to settle transactions only when some specific conditions have been met thanks to the use of smart contracts. This could enable payment vs payment (PvP) and delivery vs payment (DvP) so that payments and delivery of a security are made only all at the same time or not at all, thereby increasing substantially the speed of settlement and reducing counterparty risk. And while central bank reserves are only available to banks, wholesale CBDCs could be available to a much wider range of intermediaries given that counterparty risk would be removed.

Retail CBDCs in turn could make central bank digital money available to households and business, in a manner similar to existing fast payment system but with additional advantages, especially for financial inclusion. Rather than relying on the intermediation of banks to provide payment services, retail CBDCs could allow direct access to the network, a feature that is particularly important in many emerging economies.¹⁶

Such developments could provide substantial benefits to society. And, in a nutshell, by embedding the useful innovation produced by crypto developers within the solid foundations that can be provided by central banks, many of the risks associated with crypto may be substantially reduced. In turn this would also substantially reduce the need to ban, contain or regulate the crypto ecosystem in the first place. As the overall demand for crypto may shrink as a result, the need to spend societal resources on the pursuit of banning, containing or regulating the crypto ecosystem would be reduced.

5. How to decide which tools to use? A proposed taxonomy

In the previous sections of this paper, we discussed the development of, and the potential risks associated with the current use of blockchains and cryptocurrency. We have then described three potential lines of action in terms of (i) the potential ban of crypto activities, (ii) the containment of crypto and its separation from TradFi and the real economy, and (iii) the regulation of crypto. To assist authorities in managing these risks and decide which of the three approaches may be justified, this section proposes some guiding principles that authorities could consider when deciding how to proceed with respect to the introduction of bans, appropriate containment measures, or

¹⁶ There are also some shortcomings associated with retail CBDCs. For instance, they could make bank deposits more flighty as retail depositors flock to CBDC in times of stress.

regulation. Based on information collected by the Atlantic Council, we also report which jurisdictions have taken which approach as of February 2022.¹⁷

The main thrust of our suggestions can be summarised as follows: Bans should be used sparingly and only when harms are reflected on agents that do not participate in crypto activities or when they are deemed to be of extremely high magnitude. Containment should be part of interventions that focus not on crypto entities themselves, but on entities that are exposed to it, to make sure that they can withstand any losses caused by spillovers or outages taking place in the crypto ecosystem. Finally, regulation should be used for those areas that mimic economic functions that are currently regulated.

Ban

Many modern liberal societies generally avoid banning specific behaviours when these do not result in the harming of agents that were not involved in such behaviour. As a general principle this should also apply to crypto to preserve the autonomy of individuals. Hence, only those activities that could result explicitly in the harming of third parties subject to bans.

One area where bans could be considered is when the substitution of national fiat currency by crypto, so-called cryptoisation (IMF, 2021) impinges on monetary sovereignty, with potential negative effects on the ability of societies to function properly. However, as discussed when assessing the pros and cons of different approaches it may be impossible for those countries where these risks are more relevant to enforce an effective ban. Their citizens may well find ways to access crypto in jurisdictions that do not impose a ban because the loss to monetary sovereignty does not apply to them and make the ban in those countries that do impose it counterproductive. By moving the activity completely outside of their borders, such jurisdictions would completely relinquish control.

A second area where bans could be justified is crypto activities, that require a substantial amount of energy to be carried out (e.g. due to the reliance on computationally intensive proof-of-work validation) and that can therefore have significant environmental impact. In early 2022, the European Commission proposed to introduce such a ban in the EU, but the proposal was ultimately rejected by the European Parliament.¹⁸

But 'harm to others' is not the only situation in which bans are introduced in areas other than crypto. There are instances in which the potential harm to consumers is perceived to be so high that interventions to reduce the consumption of specific goods through the banning of specific activities are put in place to achieve this goal. A good example in this respect is the consumption of alcohol or tobacco products which can have considerable effects on health and hence the welfare of consumers. While these remain legal in most countries around the world their advertisement is subject to specific limitations. These usually are the prohibition to portray a positive lifestyle or to target publications or events attended by minors. In some cases, the advertisement of such products is illegal. Evidence shows however that, at least in the case of tobacco, only a total ban on advertising is likely to have a significant effect on consumption (Saffer and Chaloupka, 2000).

Another example is the regulation of gambling. For one, the use of credit cards for gambling purposes is often banned given that the combination of debt and gambling to seek out a solution has substantial effects on consumers (Swanton and Gainsbury, 2020). But gambling regulations in

¹⁷ See [Cryptocurrency Regulation Tracker - Atlantic Council](#)

¹⁸ See [Europe rejects proposal limiting PoW cryptos such as Bitcoin but sets draft rules for sustainability | Euronews](#)

general could be the inspiration for what to ban within crypto. In the UK for instance there are three principles on which gambling regulation is built on: (i) that crime should be kept out of gambling, (ii) that gambling should be conducted in a fair and open way, and (iii) that children and other vulnerable persons should be protected from harm or exploitation.¹⁹ In the EU, gambling is regulated by each member state and being licensed in one member does not give access to the entire EU market. However, member states can impose restrictions for reasons of public order, public security or public health and need to be imposed for 'overriding reasons in the public interest'. Given its higher potential for consumer harm, online gambling is regulated more strictly than other types (Vlaemminck and Robbe, 2022).

A similar approach could be taken to crypto, potentially focusing the intervention on those consumers that are more vulnerable in a manner akin to the banning of tobacco advertisement directly to minors. There is high potential for a subset of vulnerable consumers to be enticed by the advertised returns (Auer et al, 2022) without having the necessary knowledge to assess the risk associated with their involvement.

Three jurisdictions have indeed implemented total bans on crypto activities so far: China, Saudi Arabia and Pakistan. In 2021, China issued a notice clarifying that virtual currency-related activities are illegal financial activities and that the provision of related services to residents of China is also illegal. Saudi Arabia and Pakistan issued bans in 2017 and 2018 respectively, but have more recently set up committees to develop specific regulation for crypto activities.

Contain

The rationale to contain crypto is to make sure that any of the risks it may generate do not spill over to core parts of TradFi and the real economy and, most importantly, do not threaten their stability. But the objective to preserve the stability of TradFi and have an economy that is resilient to shocks is not just relevant with respect to crypto activities.

Hence the guiding light of this approach should in general not be different from the one used by supervisory and regulatory authorities to ensure the soundness of financial institutions with exposure to any risky asset class. Financial institutions, and especially banks given the crucial role they perform in the intermediation of financial flows, should have adequate processes in place to determine the risks they are exposed to if they choose to engage in crypto-asset related intermediation activities. These may entail direct losses if the price of these assets move, but also potential claims on their balance sheets that are determined by such moves such as eg. the need to post collateral or raise cash at short notice. The regime should be proportionate, and specific requirements may well vary, depending on the type of exact cryptoasset exposures of the banks.

A similar rationale should also be applied to firms outside of the financial system that may rely on crypto to carry out their activities. For the sake of argument, if blockchain technology were to be used by airlines to manage their bookings, or by energy companies to manage their customers' accounts, appropriate constraints should be put on such companies to make sure that they could still provide their services if the blockchain they use were subject to outages. More widely, all firms using crypto-related services, should be prepared to face the cybersecurity risk associated with crypto.

Overall, therefore, making sure that TradFi and the real economy are well prepared to tackle problems that may arise because of their involvement with crypto assets, is not really an alternative

¹⁹ See [Social responsibility – UK Gambling Commission](#)

to the introduction of selective bans or the bringing of crypto inside the regulatory perimeter. Instead, it should be seen as a solid first step that should be pursued by authorities regardless of the choices they will be making with respect to bans or regulation.

Many jurisdictions and international organisations have indeed taken this approach already. The BCBS standards on capital requirements for crypto exposures have already been mentioned, but a number of jurisdictions – such as Argentina, India, Indonesia and Mexico – have substantially restricted the ability of financial institutions to provide services related to crypto activities.²⁰

Regulate

There are a number of areas where the rationale to ban does not apply but where containment alone would still leave a number of participants in the crypto ecosystem without any regulatory protections. This may imply that the stability of the crypto ecosystem itself – rather than the stability of TradFi – may be at risk. In such cases, given that regulatory authorities have market integrity and investor protection objectives, it would make sense for certain crypto activities to be regulated in a manner akin to other activities that do not rely on crypto technology.

In the crypto world, there are some activities that closely resemble TradFi in terms of the functions they seek to mimic. For these activities, authorities can rely on decades of experience in their regulation and the economic rationale underpinning the regulation of TradFi applies as well. DeFi fits within this set (Aquilina, Frost and Schimpf, 2023a). Indeed, there are specific features of DeFi, such as the reliance on smart contracts and the absence of a single entity that is unambiguously carrying out an activity that imply that authorities will need to be creative in setting up a regulatory structure for DeFi and the exact methods to regulate the sector may well differ. But the underlying guiding principles will still be the same as for TradFi.

To approach regulation of the provision of financial services in DeFi, the main starting point for regulators would be to analyse in detail the functions performed by DeFi and map these functions to specific activities and entities in TradFi. Then authorities should assess which ones in DeFi may already be captured by existing rules and, in this case, make sure these are followed. If the activities require amended rules, then these should be developed accordingly and then appropriately enforced. This will require adequate resourcing for regulatory authorities, and in some cases new legal powers and enforcement practices given diffused accountability in the DeFi space. For instance, HMT (2023) suggests that a new regulated activity of “establishing or operating a protocol” could be introduced in law. The Financial Action Task Force (FATF, 2022) in turn highlighted that standards could apply to persons who maintain control or sufficient influence over a DeFi protocol.

Another area of crypto where regulatory action is urgent is the prevention of financial crime and more specifically anti-money laundering (AML) and counter terrorist financing (CTF) interventions. Standards in this area have already been introduced. The FATF (2021) updated their guidelines on virtual asset service providers. Recognising that crypto activities can facilitate the laundering of money and potentially terrorist financing, the recommendations require jurisdictions to impose registration or licensing requirements on a number of entities involved in the crypto ecosystem. Such requirements include customer due diligence and the reporting of suspicious transactions.

²⁰ It is interesting to note that, notwithstanding their attempts, Argentina, India and Indonesia are all in the top twenty countries for crypto adoption and China ranks tenth in one key index, despite the legal ban. See [2022 Global Cryptocurrency Adoption Index - Chainalysis](#).

With regards to the stability of the crypto ecosystem itself, an aspect that clearly merits regulation relates to stablecoins. They represent the means used by participants in the crypto ecosystem to transfer value and have the potential to replace more traditional mechanisms to transfer value across borders. While the exposure to stablecoins of financial institutions should be tackled within the activities discussed in the 'contain' approach, rules are needed so that stablecoins can fulfil their role within the crypto ecosystem itself. The crucial aspect is to make sure that stablecoins can keep their promise to allow investors to redeem at par even when market conditions are not favourable. This requires that the assets in which stablecoin issuers invest are of sufficiently high quality and that processes are in place to make sure that the exchange of stablecoins for fiat money can take place in all circumstances.

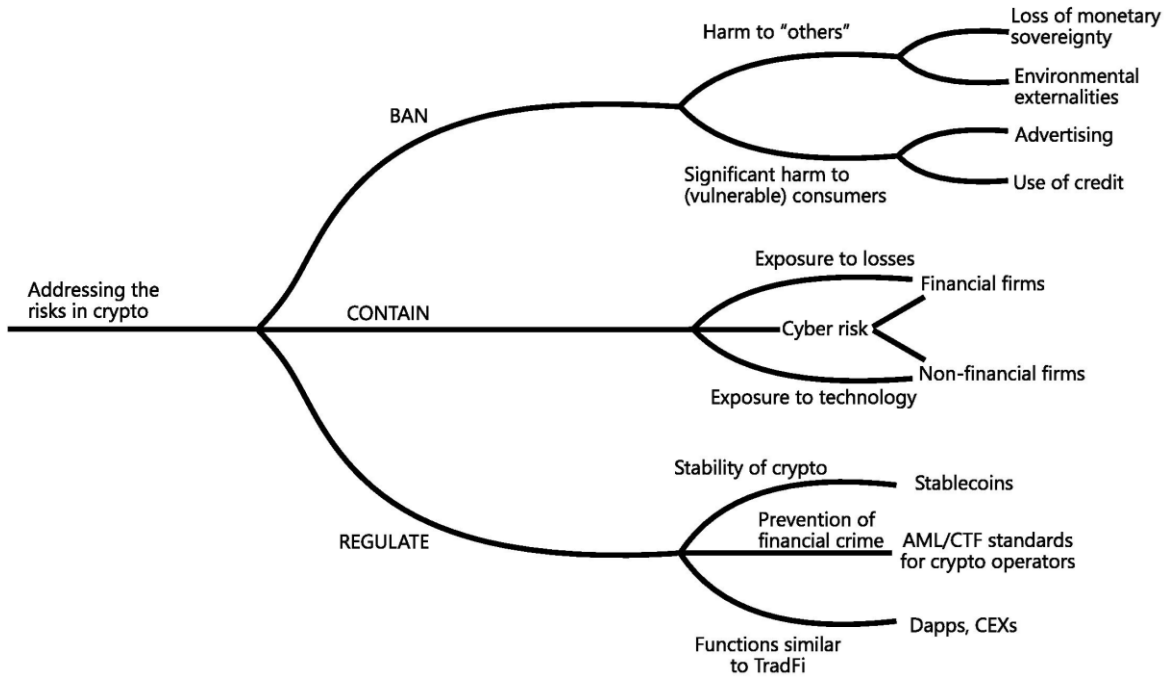
In recent months, a number of authorities have already highlighted their intention to bring crypto within the regulatory perimeter. The EU reached political agreement on the Markets in Crypto-Assets (MiCA) regulation in mid-2022 (Council of the EU, 2022), setting the scene for the comprehensive regulation of crypto. The UK announced in February 2023 the intention to expand the existing Financial Services and Markets Act to regulate crypto (HMT, 2023). Meanwhile, the US administration has highlighted the need for existing authorities to enforce regulations where these are already present (Deese et al, 2023).

A summary of our proposed approach

Our suggested approach, summarised in Graph 4 is that bans, containment and regulation, should be combined. Authorities could consider banning those activities that result in harm to parties that are not involved in crypto, or those activities that can result in seriously bad outcomes for consumers who may be exposed to them, and may be mis-understanding the underlying risks even if they are willingly participating. These bans however could target specific features to reduce their consumption, rather than an outright ban on the activities themselves. In this way, the freedom of consumers to choose is respected.

Containment should, in general, be part of the prudent management of traditional financial institutions and of non-financial firms that rely on crypto technology to operate. This is to ensure that they can keep functioning in the events of losses caused by exposure to crypto assets, outages caused by the technology malfunctioning or by cyberattacks.

Finally, regulation should be applied to those activities that seek to mimic products and services in TradFi and that are therefore subject to the same underlying rationale for regulation. Even in states of the world in which connections with TradFi and the real economy are minimised, consumer protection and market integrity considerations suggest that regulation would be appropriate in such cases.



Source: Authors' elaborations

6. Conclusions

Cryptoasset markets have experienced a remarkable series of booms and busts, often resulting in large losses for investors. While these failures have so far not spilled over to the traditional financial system or the real economy, there is no assurance that they will not do so in the future, as DeFi and TradFi become more intertwined. Authorities can now consider a variety of policy approaches and at the same time work to improve the existing monetary system in the public interest.

In this paper, we contextualise the growth of crypto markets since their inception in 2008, and summarise the lessons of the 2022 turmoil. On the basis of such contextualisation, we then outline three – non-mutually exclusive – lines of action that public authorities can take to address the risks in crypto: bans, containment and regulation, as well as their pros and cons. We then describe a complementary policy to address inefficiencies in TradFi and curb the demand for crypto. One specific option we describe is to encourage sound innovation with CBDCs.

We also present a taxonomy of how authorities could employ a combination of bans, containment and regulation to harness the innovative aspects of crypto markets while at the same time ensuring that the risks they pose are appropriately mitigated.

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