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Crypto Assets as a Threat to Financial Market Stability

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Abstract:

Crypto assets' partial money-like use promotes toxic developments in the financial system. Even though crypto assets might be regarded as close substitutes to traditional money, we show that they lack important functions of money. Traditional fiat money requires several interacting institutions to stabilize its value and regulate its use. In our analysis, we elaborate on the risks associated with the difficulty of setting up regulatory institutions in the crypto sphere and the likelihood of periods of high volatility as well as their repercussions on the traditional financial system due to reciprocal integration. The shift of banking functions into the unregulated area of decentralized finance triggers a new quality of instability in the global financial system with an increasing probability of effects on the real economy. Regulation of crypto assets remains an urgent issue.

JEL codes: E42, G01, G23

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1 Introduction

The creation of Bitcoin in 2009 took place in the context of the financial crisis. An existential lack of confidence in the financial system, its actors and, regulators provided futile ground for crypto “money” promising an uncompromising, albeit technological, alternative to an apparent dysfunctional financial system. Against all odds, the crypto segment has grown and diversified since then, even though doubts about its “real” basis as well as the functionality of the underlying technological structure remain.

The latest act of a “normalization” of crypto was the approval of spot Bitcoin exchange-traded products by the US Securities and Exchange Commission (SEC) in early 2024. It was widely interpreted as a crucial step to raising the acceptance of Bitcoin in the established world of finance. The SEC’s rationale, however, was just following the principle of equal treatment regarding the approval of securities according to usual compliance standards, rather than endorsing Bitcoin as such. The SEC even issued a warning “about the myriad of risks associated with Bitcoin and products whose value is tied to crypto” (SEC 2024, no page).

Officially approving financial products based on Bitcoin is associated with increasing the acceptance of investments into crypto assets, as the regulations imply some protection for investors, such as e.g. full product disclosure and protection against manipulation by others. This fueled expectations to stabilize Bitcoin and the crypto market in general. It also reinforced the perception of crypto assets increasingly taking over money functions and becoming currencies.

Crypto assets have experienced an explosive increase in popularity since 2017 which has been dampened temporarily by strong value corrections in 2021 and 2022 (also as a reaction to a couple of scandals). In 2023, the market recovered and doubled its market capitalization by the end of the year compared with the end of 2022 (Statista 2024a). Even though the share of crypto market capitalization concerning the global financial system is small, there is increasing public interest in its development. All pertinent international organizations (such as the International Monetary Fund, the Bank for International Settlement or the European Central Bank, ECB) published crypto market analyses (e.g. IMF 2021, BIS 2021, ECB 2022), recognizing that crypto assets have the potential to play a greater role in the future and to take over money functions to a certain extent.

Building on the latest literature, this article aims to show that not only the crypto asset system in itself is unstable, but also that an increasing interaction of the crypto system with the traditional financial system is a challenge for the stability of the entire financial system. Crypto assets are unregulated even though they provide very risky investment opportunities and potentially take over money functions. Their partial money-like use promotes toxic developments in the financial system. According to our analysis, the increasing integration with the traditional financial system and especially the shift of banking functions into the unregulated area of decentralized finance (DeFi) increase the danger of systemic financial market instability and negative effects on the real economy.

To develop the argument, the next section first describes the functions of money and contrasts them with the peculiarities of crypto assets. We explain why crypto assets can at best fulfill only limited functions of money. Section 3 begins with the endogenous weaknesses of the crypto asset system. It shows that the decentralized financial system lacks an efficient mechanism to share information as well as a mechanism to assure the stability of the crypto market. Section 4 describes the potentially damaging effects on the economy by identifying and assessing channels for crisis transmission from crypto to traditional finance segments. In the last section, we summarize the results.

2 Digital currencies and their limited functions as money

There are numerous variants of crypto assets, which are also constantly changing and evolving. The biggest crypto asset is Bitcoin, launched in 2009. Since then, the crypto market has shown a strong dynamic development. In June 2023, crypto owners increased globally to 516 million, compared to 425 million in December 2022 (Crypto.com 2023). On 9 January 2024, the crypto market had a capitalization of 1.811 trillion US dollars. This is around the size of the capitalization of the German stock market in October 2023 (CEIC 2024) or 3.4% of the US bond market, which had a size of 51.3 trillion US dollars in 2022 (World Economic Forum 2024). In the past, more than 16,000 different crypto assets were registered, with around 9,000 existing in 2021 alone (IMF 2021 45). The largest market shares fell on Bitcoin (52% in June 2023), followed by Ether with a share of 20% (Crypto.com 2023).

To analyze the crypto market, we follow the ECB's classification of crypto assets into (1) unbacked assets, (2) backed assets, and (3) decentralized finance (DeFi), explained below. While crypto assets are often referred to as money or currency in colloquial usage, they fulfill these functions at least until now only partially at best. We therefore consider the terms money or currency to be misleading, as we will explain below. Instead, we should speak of an asset with money-like functions. We use the term asset for simplicity because, at least for the moment, the crypto asset class resembles the characteristics of a non-money asset more than money.

2.1 Functions of money

According to Frederic Mishkin, money is difficult to define as it "...has taken different forms at different times". It is "...anything that is generally accepted as payment for goods or services or in the repayment of debts." (Mishkin 2016: 95). It is therefore important to examine the different functions of money (see e.g., Mishkin 2016: 96-98). First, it serves as a unit of account not only to express prices for goods and services or values in bookkeeping but also to define credit contracts. The function of a unit of account is the basis of all other functions of money. In the past, silver or gold served for example as units of account. Presently, the US dollar, the euro, the Chinese renminbi and, several other currencies exist and stand in competition with each other. Those that are more stable are better able to fulfill the function of a unit of account. Second, money functions as a means of payment. A good is paid by giving money to the seller of the good. A credit is paid out and paid back when money is transferred. Unilateral obligations, may it be tax obligations or a fine, are fulfilled when money is handed over. Based on the other two functions, money serves as a store of value. A certain stock of money is held by economic agents to be able to buy goods, to have a store of liquidity in case of unexpected expenditures, or for speculative purposes. Finally, money is also held as a saved asset; "the possession of actual money lulls our disquietude" (Keynes 1937: 216) in a world of uncertainty.

Anything that functions as money must have some stability. Credit relationships are distorted when the value of the unit of account substantially increases or decreases in value. The character of money as a safe asset erodes quickly when money loses value. Not all official national currencies equally fulfil the functions required of money, which is discussed in the context of approaches explaining the hierarchy between currencies (e.g., Paula et al. 2017; Fritz et al. 2018; Herr & Nettekoven 2021; 2022). In particular, currencies of emerging and developing countries characterized by high inflation rates may lose their function as a store of value, unit of account in credit contracts, and as a means of payment for more valuable goods. Such a loss in money functions is then often reflected in an increasing degree of substitution of the domestic currency by foreign currency

(dollarization) in the official financial system (e.g. Srithilat et al. 2018 for Asian countries). “Cryptoization” is strongest in developing countries and emerging economies. A UNCTAD study lists several factors which might increase crypto’s attractiveness, such as less regulated financial systems or a lesser extent of macroeconomic stability (UNCTAD 2023).

Banknotes, coins, and deposits with the central bank are legal tender and the embodiment of abstract social wealth. Certain functions of money can be taken over by less liquid deposits in the banking system and other assets. This constitutes a hierarchy of assets, which can take over money functions (Bell 2001). The most liquid form of money in modern economies is central bank money. Close substitutes for central bank money are overnight deposits at commercial banks due to their high liquidity. The less liquid the deposit (i.e., the longer the term contract), the less close a substitute it is to money. In almost all countries, the character of bank deposits as substitutes for money is strengthened by deposit guarantee schemes. Further down in the hierarchy of money substitutes are assets that can fluctuate in price. Money market funds, for example, can become substitutes for bank deposits. The different currency substitutes are reflected by the varying definitions for monetary aggregates, e.g. M1 and M2, whereby broader monetary aggregates reflect an increase in less close substitutes to cash (Mishkin 2016: 102-105).

Further but less suitable substitutes for money can become investments in longer-term government bonds and investment funds of various types. In countries with less stable domestic currencies, foreign currencies can become attractive substitutes, a situation called dollarization. Similarly, to US dollars, crypto assets can act as a substitute to the domestic currency and are consequently included in the hierarchy of money substitutes (Aldasoro et al. 2023).

Which assets take over money functions changes over time and depends on economic development, financial innovations, and regulation of financial systems. During economic expansions with low levels of uncertainty, liquid assets can be considered by wealth owners as money substitutes, while there is an increasing tendency to hold money in the form of overnight deposits or banknotes and coins in crisis periods. This was seen during the financial crisis in 2008; when money markets broke down, the desire to hold short-term liquidity in banks sharply increased.

Analyzing the different substitutes of money shows that the basis of a monetary system is money as a unit of account. In modern monetary economies, the unit of account is defined by the central bank. “Providing the unit of account for the economy is the primary role of the central bank” (BIS 2023: 7). If the unit of account in a country is substituted, the old monetary system disappears and a new one is created. An example is the introduction of the euro, which in 1999 substituted several European currencies. Currently (in the year 2024), 163 national currencies exist that are the official legal tender, implying that 163 different units of accounts provide the basis for a monetary system (Worlddata 2024). Of course, the acceptance and usage of these currencies differ. Some of them play not only a role in the territory where the money is legal tender but also in other countries and international transactions. In the case of partial dollarization, the national currency takes over only part of domestic money functions. The hierarchy of different currencies (issued in different countries) should not be mixed up with the hierarchy of currency substitutes (different assets in a country fulfilling money functions).

With the birth of crypto assets, a new type of asset has been created that competes with the already existing monetary systems. Crypto assets provide a new unit of account that can potentially create a private money system not based on a state-issued unit of account. How far crypto assets can substitute the existing currencies, will also depend on their

acceptance, drawing on the famous quote by Hyman Minsky (1986: 255), according to which everyone could create money, "the problem is to get it accepted". This has not yet happened to any systemically relevant extent. This point will be discussed in more detail in the next section.

2.2 Unbacked crypto assets like Bitcoin

Bitcoins were created as a decentralized "currency" by an anonymous person or group. The "currency" is characterized by the fact that it functions in a peer-to-peer network that does not require or permit central control. Officially, the decentralized crypto-system can circumvent the necessity of an intermediary for tracking the information of a financial transactions. One important element is storing the information in a digital ledger (the blockchain), available to all computers in the network. "...every participant has a copy of the same ledger. When a new transaction is made, it is broadcast to the network and verified by multiple computers using complex algorithms. Once verified, the transaction is added to the ledger as a 'block' and cannot be altered without consensus from the network." (BIS 2023: 1, footnote 1). The underlying technology is an encryption that locks in a transaction, making double spending of the asset impossible. The impossibility of double spending is a central prerequisite for the decentralized control of Bitcoin (Nakamoto 2008).

Digitization enabled the algorithmic implementation of Bitcoin based on the blockchain infrastructure, driven at its core by a libertarian motivation and the belief that a fully deregulated financial system is workable. According to the founders of crypto assets, the traditional financial system is not only inefficient and expensive due to high transaction fees, but it is also subject to the risk of inflationary developments. The "decentralization of authority" is how one of the founders of Ethereum, the platform where Ether is traded, explained his drive to create a cryptocurrency (Nica et al. 2021: 4-5). The destroyed trust in central banks and the established financial system has been a strong motivation to create crypto assets (Weber 2016; Nica et al. 2021, 4-5).

A Bitcoin is a crypto asset without any intrinsic value. Its value is based on its scarcity, which results from the costly process of creating new Bitcoins via so-called mining and an absolute maximum of Bitcoins that can be mined. The maximum of Bitcoins that can be created is 21 million whereas at the end of 2023, over 19 million existed. New Bitcoins can be mined by miners which use computing power to mine new blocks on the Bitcoin blockchain. In every new block, all past transactions in the total Bitcoin history plus information about new transactions are reported. Users of Bitcoins can buy so-called coins and keep them in an anonymous wallet. If they transfer Bitcoins to another wallet for any purpose, to sell or buy coins, this must be validated. Validation happens when the transaction is included in an additional block in the blockchain. The new block can be created, as mentioned, by any miner who is rewarded with new Bitcoins or a fee paid by the user of Bitcoins. When all Bitcoins are mined, new blocks can still be created, but the miners will only be financed through fees. To create new blocks is expensive as huge computer capacities are required. This led to an oligopolistic structure of miners and validators.¹

The price of Bitcoins is very volatile. The Bitcoin price index in US dollars was 3,809 in December 2018. It then increased to 57,849 in November 2021, dropped to 16,604 in December 2022, and increased again to 41,450 in December 2023 (Statista 2024). Crypto assets are even significantly more volatile than gold or silver (ECB 2022). Bitcoins were about ten times as volatile as the exchange rate between the US dollar against the euro or the yen even before the drop-in value in 2022 (Baur & Dimpfl 2021). This makes Bitcoins and other unbacked crypto assets unsuitable for

¹ One of the cost factors is the energy intensity of creating new blocks. From an ecological point of view, the technology is not ideal.

becoming a unit of account and taking over money functions. Bitcoin is an asset whose price is mainly driven by speculation and which has no price anchor. In this regard, Bitcoin can rather be compared to a valuable commodity such as gold (Trotta Vianna 2020, 233-234) or speculative assets in general (Yermack 2015).² The lack of Bitcoins to take over functions of money (Baur & Dimpfl 2021; Yermack 2015; Trotta Vianna 2020) can also be seen in the fact that it has only rarely been used as a means of payment for goods and services.³

Despite its instability, Bitcoin transactions are not only used for pure speculation but also for sending remittances to countries with underdeveloped financial systems, for criminal transactions and to finance terrorist activities. Alnasaa et al. (2022) show in a cross-country regression that crypto usage is higher in the face of capital controls and perceived corruption.

2.3 Backed crypto assets: Stablecoins

The picture is somewhat different for stablecoins such as e.g. Tether, USD Coin, and Binance USD because the value of stablecoins is pegged to other assets – most prominently the US dollar, but also to the euro, yen, and even to gold. There are several motivations for the creation of stablecoins: First, without stablecoins, a stable asset is missing in the universe of the crypto world. It is for example costly to sell and buy Bitcoins for speculative purposes against US dollars. Stablecoins offer a cheaper way to “park” speculative money within the crypto market. Second, stablecoins have the potential to create private money that fulfills the unit of account function and can take over money functions. This is already shown by the turnover of stablecoins which outpace the one of unbacked crypto assets including Bitcoins by several times (BIS, 2023: 4).

There are two different forms of value stabilization: For the above-mentioned stablecoins, a “centralized intermediary” manages the backing of the asset with traditional financial assets like bank deposits, US government bonds or crypto assets (or a mixture of both types) and organizes “the coins’ redemption and creation” (BIS, 2023: 2). These types of stablecoins follow in many cases the same logic as the gold standard in the past when banknotes issued by central banks were backed by gold (Herr 2024). The alternative form of value stabilization is based on an algorithm that controls the quantity of the crypto-currency in circulation. It is supposed to “rebalance supply via arbitrage with a paired volatile token” (BIS 2023: 3).

Yet, the promised backing of stablecoins has not always been provided, and stablecoins have experienced losses in value. One example is Tether (USDT), the most widespread stablecoin. The company was sued back in 2021 by the US Attorney General of New York for misleading information about coverage. Since then, Tether has allegedly been 100% covered by a mix of US dollars, Treasury Bills and corporate bonds, but still only according to the issuer.⁴ In May 2022, there was another collapse of confidence in Tether and a run. The issuing institution had to reduce Tether circulation

² Yet, Stroukal (2018) argues that Bitcoin in principle has the potential to take over money functions in the future. We do not follow the argument.

³ El Salvador has approved crypto assets - and Bitcoin in particular - as legal tender, yet, these assets have not been fully accepted by the population, as the value of Bitcoin is perceived as very unstable (UCA 2021: 8). In the aggregate and in people's everyday lives, crypto assets have so far not played a comparable role to state money, be it national or foreign, in any country in the world.

⁴ Tether has a 1:1 peg of its token to the US dollar. In its Auditors Report it is stated: “All Tether tokens are backed by an equivalent amount of assets held in the reserves by the Group.” (Tether Holding Limited, 2023: 5) The assets held in million US dollar end of Mai 2023 were cash and cash equivalent and other short-term deposits (69,314), corporate bonds (140), precious metals (3,391), Bitcoins (1,500), secured loans (5,349) and other investment (2,138) giving as a total 81,833 US dollar (Tether Holding Limited, 2023: 3).

from \$83 billion to \$76 billion in a fortnight, and the value of Tether fell to 95 cents instead of \$1 before recovering (Browne 2022a; 2022b; BIS 2023, box A).

While backing stablecoins with other assets can stabilize their value, it also increases the likelihood of speculation against them or panic. Let's assume a stablecoin is pegged to the US dollar at a fixed exchange rate and backed by dollar sight deposits and other assets in the US dollar. If the traded value of the stablecoin falls below the officially fixed rate to the US dollar, an arbitrage process immediately begins, because it is profitable to buy the stablecoins on the market with US dollars and then immediately exchange them back into US dollars at the issuing institution.⁵ In the absence of full coverage and the expectation of a decline in value, it makes sense to sell stablecoins in future markets before the decline in value begins, which can lead to self-fulfilling expectations of a decline in value. And even worse, as soon as there are doubts that the stablecoin is insufficiently backed by assets a kind of bank run is triggered as all holders of the stablecoin want to get rid of it as quickly as possible. US Treasury Secretary Janet Yellen commented at a hearing in the US Congress: "They [stablecoins] present the same kind of risks that we have known for centuries in connection with bank runs" (cited in Browne 2022b).

The problem with stablecoins is that their asset holding is unsupervised and unregulated by government regulators and therefore not sufficiently transparent. In a situation of financial panic, this leads to a run, a mass exchange of stablecoins into fiat money. A deeper problem is that liquidity comes from monetary liquidity (holding of actual monetary reserves), funding liquidity (ability to borrow), and market liquidity (converting asset holdings into money) (Aldasoro et al. 2023: 10). Institutions issuing stablecoins lack most likely unlimited funding liquidity, something that is of key importance for commercial banks via money markets in their normal business. Furthermore, in case of financial stress, commercial banks in liquidity crises can rely on the central bank to provide sufficient funds (see below). In periods of high confidence in the future, economic agents increase the number of money substitutes and resort to riskier assets (see e.g., Minsky 1992) such as short-term securities or crypto assets. Once risk awareness increases in crises, crypto assets lose their function as money substitutes, whereby the providers of stablecoins do not have sufficient access to the liquidity of the money market. This means that regular crises in crypto markets are pre-programmed. (Aldasoro et al. 2023: 9f.).

The second type of stablecoins promises that their stability is based on algorithms. Such an algorithm sells and buys as well as creates and cuts its coins in an automatic way to keep its value fixed against a stable asset, usually the US dollar. The example of TerraUSD (UST) illustrates that the algorithm may require liquid markets, which may cease to exist in a crisis; the price of UST dropped to 30 cents in May 2022, instead of staying at the promised equality to the US dollar. UST was affected by a generally strong decrease in prices of crypto assets especially by Luna, a crypto-currency issued by the same institution (Rosenberg 2022).

Up to now, stablecoins have not been approved as an official means of payment and fulfil only very limited monetary functions also as money substitutes. Unbacked stablecoins are unsuitable for performing monetary functions due to their instability. The situation is somewhat different with backed stablecoins. Two developments could make these stablecoins become relevant private money – and would mark a revolution in capitalist monetary history. Firstly, if a big global established network with a high reputation introduces a backed stablecoin this could lead to widespread use of the stablecoin.⁶ Second, there might be activities to regulate crypto assets as a part of the official

⁵ If the value of the stablecoin rises above the fixed rate, stablecoins are exchanged back into US dollars at the issuing institution on the open market.

⁶ In 2018 Facebook, the most used social network of the world, started to plan to issue a backed stablecoin, the Libra, offering a broad range of banking services. It was planned to back the Libra 50% with US dollar, 18% with

financial system. Especially attempts to regulate backed stablecoins are imaginable. In such a case, the trust in stablecoins could increase and they could become competitors to fiat money.

2.5 Decentralized Finance

DeFi is a collective term for financial services that run peer-to-peer - without any central intermediary and based on an underlying blockchain technology. This implies that transactions are processed directly between two people without each knowing the identity of the contract partners. So-called smart contracts become part of a blockchain. A credit agreement, for example, is concluded directly between two participants whose true identity is not known. The contract is then inserted into a new block within a blockchain as described above, and thus validated. For this service, a fee is paid to the validator.

DeFi does not claim to take over money functions but covers a large part of the range of financial services, such as giving and taking credit, buying insurance, trading derivatives, etc. According to the BIS (2023: 5), "... DeFi activities almost exclusively involve exchanging one stablecoin or crypto coin for another and do not finance activity in the real economy. In this sense, the system is mostly self-referential and used for speculation in coins."⁷ Yet, due to the lack of data and transparency, DeFi is used to collateralize real-world projects. And even if DeFi is still rarely used for financing real economy activities at the moment, this is likely to increase in the future.

Asymmetric information in financial transactions, especially credit contracts, involve risks. The use of collateral tries to mitigate the loan default risks for the creditor and to increase the incentives for repayment for the debtor. Yet, this is just mitigating, not erasing risk, as the long history of financial crises since the beginning of capitalism shows. With the development of money markets between commercial banks, money market funds, and other actors, unsecured credits played a substantially smaller role, and collateralized credit contracts (repos) became dominant. Such a repo system allows credit contracts between economic agents without knowing the credibility of the debtor. However, additional risks were created by these types of credit markets. First, only a certain and unstable percentage of the value of an asset serves as collateral (in case of a debt restructuring a "haircut" takes place meaning that part of the loan is not repaid). In a financial crisis, haircuts tend to be more substantial. Second, the value of assets, usually short-term debt securities, may substantially decrease. Third, an asset can serve several times as collateral in such markets – an economic agent gives credit and gets collateral, and at the same, the collateral is used by the same agent to take credit. This implies that the increase of a haircut and a fall in the price of assets hit the market more than one time (Wullweber 2021).⁸

The traditional financial system has institutions that try to dampen these effects: Central banks e.g. have learned that they have to stabilize the price of assets serving as collateral in money markets and step in in a liquidity crisis, if needed (Vestergaard & Gabor 2021). Yet, such institutions are missing for DeFi, even though similar issues might arise. In crypto markets the same instability of collateralized credit contracts exists, be it in credit contracts or derivatives. Collateral plays a central role in smart contracts. But there is no institution that could keep the market liquid. This is so far

euro, 14% with Japanese Yen, 11% with pound sterling and 7% with Singapore dollar (Bartz, 2019). There was an outcry from central banks and governments around the world who opposed the creation of Libra. At the same time, the debate about the creation of a digital central bank money was stimulated. Despite several years of heavy investment, the Libra project was abandoned.

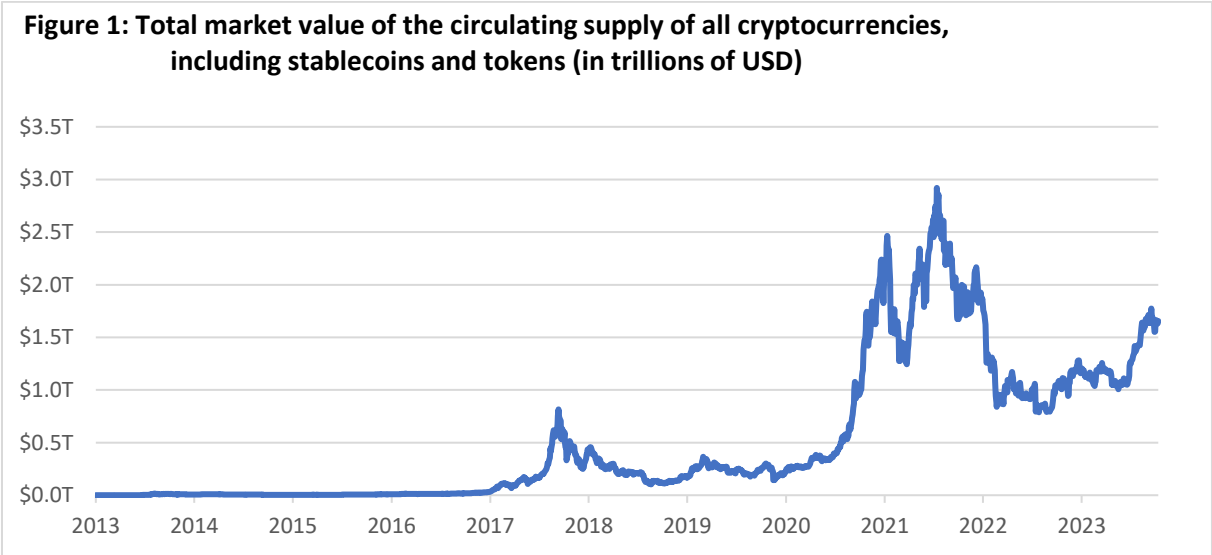
⁷ Ethereum is the most important platform for DeFi activities. There are other platforms as well, for example Binance Smart Chain (BNB), Cardano (ADA), or Solana (SOL).

⁸ The financial crisis demonstrated that liquidity guarantees and credit default swaps similarly acted as a way to increase leverage, by keeping perceived risk low (Dullien/Herr/Kellermann 2011).

mainly a problem for the stability of the system of crypto assets, but it may affect the traditional financial system and the real economy, once crypto credits finance real economy investment or once traditional credits are collateralized by crypto assets, as will be discussed below. Yet, before we focus on the missing institutions, we will first describe why the current crypto system has weaknesses that increase the likelihood of crises.

3 High likelihood for crises in the crypto world

The recent value corrections have shown that the potential for fluctuations in the value of crypto assets is high (see Figure 1). The market capitalization for crypto assets has fallen from just under US\$3 trillion in November 2021 to 1.3 trillion in May 2022 and below 1 trillion in June 2022, less than a third of its value at the time. Then it increased again to over 1.5 trillion in early 2024. The performance of individual crypto assets seems to correlate very strongly so far, but there are still no longer time series that could reliably determine how high the correlation is. The performance of crypto assets also appears to correlate increasingly with that of other risky financial assets (ECB 2022).



Source: CoinMarketCap (2024)

The sharp corrections in the value of crypto assets in May and June 2022 occurred in parallel with expectations of rising interest rates and the associated appreciation of the US dollar and also affected other risky financial assets. In the past, expectations of US dollar appreciation have often triggered financial crises in emerging markets due to the resulting increase in the real debt burden for foreign debt and the outflow of capital from higher-yielding, risky financial assets into safer dollar assets (IMF 2015).

The instability of crypto assets is obvious. The following subsections first present the channels of the impact of crypto asset value instability on the traditional financial system before discussing the possible channels of impact on the real economy. The last subsection also discusses the additional problem of facilitated capital flight from emerging markets.

3.1 Weaknesses within the crypto system

Several factors hamper the acceptance of crypto assets, and thus the assumption of monetary functions. There are problems with the security guarantee of the infrastructure of crypto assets itself, i.e. the blockchain and the wallets of the individual users (IMF 2021: 45; Nica et al. 2021: 14-15 and Yermack 2015). Spectacular hacks occur repeatedly, with the effect that large book values change owners. The encryption technology itself marks the moment of trust and thus also the potential moment of acceptance for the asset class. Thus, the industry remains an important technology driver, but it is also driven by hackers in its ranks. The risk protection of crypto assets is far removed from the quality of traditional deposit protection at banks. In addition, there is no consumer protection as is usually the case with traditional financial investments. There is no protection against misleading information or fraud, no institutionalized complaint procedures, and no protection against market manipulation - and this in a market with increasing complexity of products, high volatility, and low price transparency, in which investments are made with increasing leverage (ECB 2022). However, the security and technical problems are not discussed here. We concentrate on those problems that are systemic to the crypto setup, with a focus on its decentralized structure without intermediaries.

The lack of intermediaries for financial transactions requires that financial transactions have to be validated within the blockchain architecture. One general problem is self-interested users that are anonymous such that they are not motivated to validate transactions to increase their reputation. Instead, financial incentives to participate in the network are needed (BIS 2023: 5). The crypto asset system provides two different ways of incentivizing validators: One is the proof-of-work concept, used for Bitcoin. The incentive to engage in verification in the Bitcoin network is newly “mined” Bitcoins for the unit that is the first in information validation by adding a block. Yet, this decentralized information verification based on a proof-of-work concept is costly because it requires increasingly big and sophisticated computer facilities and high energy costs that only a few participants can afford. Due to the maximum limit on Bitcoin creation, the rewards to the miner in the form of newly mined Bitcoins have decreased over time.⁹ Furthermore, only the first miner gets rewarded. As a consequence, the mining process became more and more concentrated over time. The increasing information that needs to be processed leads to “congestion” within the process of validations (BIS 2023: 9).

The proof-of-work approach requires information validation by decentralized, anonymous agents. To avoid the slow and energy-intensive proof-of-work approach for validation, most crypto assets are less decentralized proof-of-stake concepts that use validators (called “oracles”) to confirm transactions and create new blocks. This not only decreases energy-intensity but also relaxes the problem of congestion. Yet, it comes at the cost of a concentration of authority among a few nodes. If validators are not randomly assigned, but selected or can use their influence or pay for being among the few influential validators, this allows for oligopolistic structures. These developments run counter to the original idea of overcoming the high costs of the traditional financial system (BIS 2023: 9).

The form of organization is not always due to the choice of the emitting/organizing unit, but can also stem from clients’ demands: due to missing IT knowledge or convenience of users, several prefer to use crypto assets via one of the few specialized digital platforms for crypto assets. According to the BIS publication, proof-of-stake concepts based on “oracles” are especially required once data from the traditional financial system is imported into the crypto world or, vice versa. Transactions

⁹ After every 210000 blocks, Bitcoins for successful mining are halved, decreasing from 50 Bitcoins per mined block to only 25 in 2012 (Kroll et al. 2013: 5-6).

between the traditional financial system and the crypto-system require intermediaries that validate the information in a form that is accepted by the traditional financial system (for example, wallets in the crypto world are anonymous, while the traditional financial system mostly requires a bank account connected to a concrete name and address of a person). As only a few entities (often single persons) take care of information transmission, such activities can encourage fraudulent misbehavior (BIS 2023: 10), especially in the anonymous crypto world environment. Yet, better technical solutions may dampen this problem in the future.

Not surprisingly, the less decentralized organizations more or less resemble monopolistic or oligopolistic structures in the traditional financial system and encourage similar issues of market power misuse as in the traditional financial system (with the additional problem of a missing supervisory authority that could control for competition and anti-trust laws). The problem of mismanagement or misbehavior of single persons/entities has been reflected in the before mentioned crashes of supposedly value-keeping “stablecoins” and scandals surrounding trading platforms like e.g. the FTX cryptocurrency exchange platform that had run into trouble from spring 2022 onwards.

3.2 Value stabilizing institutions of the traditional financial system

A history of financial crises has led to institutions and regulations that try to stabilize the financial system. They provide unlimited liquidity in crisis times, close insolvent institutions, and provide to a certain extent compensation for losses to depositors. Among the required institutions is foremost a lender of last resort providing unlimited liquidity when needed (Bagehot 1873; Goodhart 1987; Freixas et al. 2000). An essential function of financial systems is the granting of loans, which are repaid in the future. Due to their function as liquidity providers and lenders to the economy, financial institutions are very susceptible to crises. This is due, on the one hand, to maturity transformation (short-term deposits are often matched by long-term financed projects that cannot be liquidated in the short term or only with high losses, Mishkin 2016, 239-244). Moreover, asymmetric information in lending makes it difficult to decide who should receive loans and at what risk premium (Mishkin 2016, 213-214). At the same time, market risks are difficult to assess correctly in a globally interconnected world with a multitude of potential shocks and only limited rational actors.

For this reason, it is impossible to prevent individual banks or even entire financial systems from getting into trouble. This has happened hundreds of times in the recent past (Kindleberger & Aliber 2011). The rational microeconomic behavior of economic agents who want to protect their assets consists of withdrawing deposits from institutions in difficulty, possibly only based on false rumors. Since it is not always clear whether only a single bank or - due to the similarity of the business models and the interconnectedness within the industry - the entire banking system has liquidity or solvency problems, the crisis of confidence in a panic situation can affect the entire banking system. Bank runs occur (Diamond & Dybvig 1983). Even healthy financial institutions can collapse via such processes because no bank keeps enough liquidity to pay out all investors. In this situation, the mentioned institutions are needed to provide unlimited support or refinancing to financial systems facing liquidity problems.

At the same time, banking supervision should prevent insolvency problems of a single bank from becoming a systemic problem for the entire banking sector. Through regulation and control, it should ensure sufficient liquidity and capital resources and close insolvent banks in an orderly way (Mishkin 2016, 266-274). In addition, deposit protection (usually organized by the state) should reduce the incentive for investors to withdraw all deposits as a precaution in the event of rumors about possible problems at a bank or in the entire sector (MacDonald 1996; Cull et al. 2005). This is to prevent a bank run with the resulting liquidity problems from occurring in the first place. In financial crises, liquidity and solvency problems are also difficult to separate - for example, when securities lose a lot

of value in the short term and then recover again. There is, therefore, a need for state institutions that also rescue insolvent institutions through nationalization, for example, if they are systemically relevant, or wind them up in an orderly manner.

3.3 Lack of value stabilizing institutions in the crypto system

Due to their decentralized organization, the used technology and so far at best rudimentary regulation, crypto assets have neither a lender of last resort, nor supervision of the solvency of individual issuers, nor is there any deposit insurance. The decentralized organization is also likely to make the introduction of such functions more difficult. The lack of institutions to safeguard against liquidity and solvency risks has been reflected in past price collapses of crypto assets. Yet, crypto markets are also likely to become a problem for the stability of the entire financial system if the use of crypto assets expands at the expense of the traditional financial system. If decentralized financial intermediaries extend crypto loans based on collected deposits, they can be affected by a run and will typically not hold enough liquid assets to service the outflows. Companies, households, or other economic units that are indebted in crypto assets may also have debt restructuring and thus liquidity and solvency problems. This becomes a problem when the functions of crypto assets are expanded.

Without regulations and stabilizing institutions, DeFi and the whole crypto financial system is likely to lead to similarly unstable financial developments as characterized by the first phase of capitalism from the end of the 18th century until the gradual establishment of the Classical Gold Standard in the second half of the 19th century. England, the most developed country at that time, started to develop a financial system that could serve the expanding capitalist economy. In 1821 England established a gold standard, which means that banknotes could be exchanged in gold and gold in banknotes. Private banks were allowed to issue their banknotes besides the central bank, the Bank of England. The lack of regulations as well as the absence of a lender of last resort and knowledge about monetary policy led to frequent credit expansions, high issues of banknotes, and speculative bubbles. In the following crises, banks were not able to exchange their banknotes in gold, went bankrupt and the economy suffered from an extremely unstable monetary system and deep crises. John Maynard Keynes (1925: 470) wrote about this period: "We suffered twenty years of continued credit difficulties and crises, the most confused and confused we have ever experienced, and narrowly escaped a revolution."¹⁰

An improvement was Peel's Bank Act from 1844 which restricted private banknotes and demanded almost complete backing of banknotes with gold. In the second half of the 19th century, all countries in the then developed world joined the system. Karl Polanyi (1944) analyzed in detail how the extremely unstable conditions in the first half of the 19th century led to regulations in the financial system, even under the most diverse political regimes, which then stabilized capitalist development until World War I. The relatively stable economic development under the Classical Gold Standard was due to the understanding of the role of the central bank as lender of last resort (Bagehot 1873) and a better understanding of interest rate policy, for example, to minimize gold movements between countries (Goschen 1861). The international financial system was stabilized by the existence of the pound sterling as the leading currency and the role of big banks in London as global lenders of last resort. The lessons of historical development are that financial systems without regulation and stabilizing institutions are extremely unstable and destroy the coherence of the economies. Regulations and institutions are needed to create a relatively stable financial system and to handle financial crises that are difficult to avoid (Keynes 1925; Heine & Herr 2023; Herr 2024).

The financial crisis in 2008 provides another example of unstable developments that could only be stopped by state intervention: money markets in the US and then in other countries froze, the price

¹⁰ Own translation.

of short-term debt securities collapsed and credit default swaps could not be served. Only a comprehensive intervention by the Fed, the US central bank, and other central banks as lender of last resort and even the nationalization of a number of financial institutions could prevent a global meltdown of the financial system in 2008/09 (Detzer et al. 2017).

Such stabilizing institutions are missing for the crypto world: Issuers of stablecoins and crypto assets, in general, are neither supervised by financial authorities nor can they rely in the same way as commercial banks and even other institutions in the traditional financial system on a lender of last resort and other stabilizing government activities. But such institutions are needed. Central banks can provide unlimited liquidity in difficult situations and help stabilize even nonbank financial institutions when the stability of the financial system is in danger. There is already an example of state intervention stabilizing crypto assets: In March 2023 the Fed saved the Silicon Valley Bank, in this way indirectly saving the company Centre, the issuer of the stablecoin USD Coin, as it held large deposits with the Silicon Valley Bank (Aldasoro et al. 2023: 9).

4 Potential for crisis transmission to the real economy

Financial assets with high value fluctuations, including the complete loss of an asset, can lead to systemic financial crises and can have a dampening effect on the real economy, even if investors are individually aware of the risk of value fluctuations associated with the assets. The fact that banks in the traditional financial system are more heavily regulated than other financial institutions and thus have incentives for regulatory arbitrage, i.e. the relocation of activities to less heavily regulated institutions or countries, also contributes to the risks (e.g. Michler 2016). In our view, the global financial system, which is still insufficiently regulated after the financial market crisis, especially concerning non-banks, contains great potential for instability. Globally coordinated, functional regulation, which would regulate all activities with comparable risk in a similar way, would prevent problems from regulatory arbitrage but is currently unrealistic. If crypto assets add another quantitatively relevant and de facto unregulated segment to the existing financial system, the vulnerability of the entire financial system to crises will increase, since all three subsystems – traditional banking system, traditional non-banking system, and crypto assets - are interwoven in many ways.

4.1 Crisis transmission channels

There are a number of transmission channels between the traditional financial system and the system of crypto assets. These are well documented in the ECB's Financial Stability Report (ECB 2022) and BIS-report submitted to the G20 Finance Ministers and Central Bank Governors (BIS 2023). The following transmission channels can be distinguished: (1) Direct effects of changes in the value of crypto assets on the balance sheets of financial institutions, (2) indirect effects due to problems of bank customers using crypto assets (as investments or collateral), (3) loss of confidence in crypto assets, which could lead to contagion effects within the crypto sector, but also beyond it to the entire financial system, (4) tokenization of real-world assets could channel more fiat money into crypto assets, (5) and monetary sovereignty could suffer from easier currency substitution (capital flight). In this subsection the different channels are discussed one after the other, the last channel will be discussed in subsection 4.3.

In the *first* transmission channel, traditional financial institutions (banks or other financial institutions) invest directly into crypto assets to benefit from price increases or yields (speculative activities). A decline in the value of crypto assets then leads to a decline in the assets of the financial institutions and thus reduces the profit or can lead to a loss and, in extreme cases, to the insolvency of the institution if the equity capital is not sufficient to compensate for the losses. Insolvent institutions have to be closed or bailed out by governments. Rumors about possible problems in the

traditional financial system can trigger bank runs and/or the collapse of debt securities of all kinds in secondary markets.

If the share of crypto assets in the balance sheets of financial institutions increases, this alone leads to higher risks in the financial system, as it is difficult to correctly assess the risk of new and complex financial products. That institutions can massively deceive themselves in correctly assessing the risk has been shown by the past financial crisis of 2008/09. The crisis was exacerbated by the fact that many banks had invested in risky financial products via special purpose vehicles with a high degree of credit financing, while at the same time, the equity capital of the special purpose vehicles and the parent companies was far too low (e.g. Dungey et al. 2013; Heine & Herr 2022: 141-144). A rapid expansion of crypto assets on banks' balance sheets is not the most pressing danger as the banking system has become better regulated after the crisis of 2008/09 via the implementation of Basel III as well as ongoing corrections of Basel regulations. However, non-bank financial institutions and international capital flows have hardly been regulated (Detzer et al. 2017, chapter 6; Herr et al. 2019). However, risky investment strategies also including crypto assets remain attractive for hedge funds and other non-bank financial institutions. A spillover of the crisis of these institutions to the commercial banking sector is thus still possible.

In the *second* channel, the assets of financial institutions are indirectly affected as soon as the solvency of their borrowers depends heavily on the performance of crypto assets - either because borrowers hold their assets in crypto assets or have invested in crypto assets with credit. Borrowers can be non-bank financial institutions as well as risk-loving private speculators. The value of companies may also depend on crypto assets. An example is Tesla CEO Elon Musk's announcement in March 2021 that customers would be able to pay for Tesla cars in Bitcoin, which was withdrawn in May of the same year. Presumably, this would have led to a company whose performance depends on the value of Bitcoin to an economically relevant extent.

The *third* transmission channel relates to sharp price declines in crypto assets, which could subsequently trigger such severe losses of confidence in the whole financial system that other risky investments are sold in panic, leading to a broad drop in value for many financial assets. Should this lead to doubts about the liquidity and/or solvency of non-bank financial institutions or even commercial banks, this could trigger bank runs, lead to the collapse of the interbank money market, and intensify credit rationing towards costumers by all types of financial institutions. An example of such an effect is the collapse in the value of securitized real estate loans (asset-backed securities and collateralized debt obligations) in the course of the subprime crisis in the USA. In the autumn of 2008, after the collapse of Lehman Brothers, one of the biggest financial institutions in the US, inter-bank credit markets froze not only in the US but also in Europe (e.g. Heine & Herr 2022: 150-155).

The *fourth* channel is so-called tokenization. This means companies in the crypto world use assets from the traditional economy to back the tokens (the assets or "currencies") they issue. One kind of these assets is stablecoins backed by traditional currencies like the US dollar or euro. But tokenization can go much further. Issued tokens can be backed by equity or bonds, by physical assets like real estate or art, by nontangible assets like intellectual property, etc. Popular became also Non-Fungible Tokens (NFTs). In this case, investors buy part of a work of art, such as a painting by a well-known artist, ownership share of a video or film, clothing articles or weapons of avatars or animals in computer games, etc. NFTs then can be traded following the logic of blockchains. These developments could channel more money, partly borrowed, into the unregulated crypto world, away from the better regulated traditional financial system.

As already described, in early 2024 crypto assets have the size of around 3.4% of the US bond market (see above). This is big enough to create some disturbances, but most likely not big enough to trigger something like the financial crisis of 2007/8 with the following Great Recession in 2009.

Nevertheless, crypto markets are likely to gain in importance in the future. It cannot be excluded that they can take over widespread global money functions in the future, for example when a multinational internet company offers a new token, a new unit of account, in the form of a stablecoin. This means that more loan agreements are also being processed via crypto markets and that the crypto market is playing a greater role in investment activity in the real economy, such as the financing of start-ups or companies that have come into fashion.

As crypto assets become more widespread as an asset of households, companies, and financial institutions, and as they can potentially be used to denominate loans to a larger extent, the risks in the financial system increase. Systemic risks increase in particular when more credit is invested in these assets and/or financial innovations lead to increased borrowing in crypto assets. The crypto asset system then becomes an additional and hitherto deregulated segment of the total financial markets with interconnections to the traditional shadow financial and banking system. The risks of major financial market crises with bad loans and high asset losses increase, potentially leading to severe recessions.

4.2 Real economic effects

So far, mainly the effects of crypto markets on the financial system have been addressed. But substantial effects on the real economy have to be expected as well. The channels of such effects could affect the economy through wealth effects on consumption (1), through effects on business activities of companies (2), and investments (3).

Effects on *consumption* depend on the spread of crypto assets as an asset class held by private households. The more low-income groups hold crypto assets, the stronger the effects. The reason is that this group of households has a higher consumption rate and is less able to cushion declines in wealth. Given the lack of official data on users of crypto assets, there is little reliable information on them. According to a survey for Germany more than 9% of respondents hold crypto assets (Steinmetz et al. 2021). For six large EU countries the ECB (2022) found out that on average 10% of asked persons owned crypto assets. According to the online survey for Germany, holders tend to be "young, male, well-educated and well-off" (Steinmetz et al. 2021), which would imply that asset declines should not be problematic. However, results from the ECB Survey point to a U-curve in ownership by income class. In addition to high-income households, the bottom 20% also hold crypto assets, but middle-income households hold virtually none (ECB 2022). This fits in with the fact that detailed figures in the USA on the distribution of crypto asset holdings find a similar distribution as in the EU. In addition to ownership among high-income individuals, scattered ownership was found among social minorities and workers (NORC 2021). The more there is a tendency for low-income individuals to hold crypto assets, the stronger the expected consumption effects of changes in the value of crypto assets will be.

Another channel is the possible impact on the business activities of companies and their investments. Declines in the value of crypto assets can make it difficult to finance investments stemming from own funds or to obtain or repay a loan - either because crypto assets make up a significant part of the borrower's assets or because the company's business depends on the value of the assets. A sudden drop in crypto asset values may additionally impact investors' mood and increase their risk awareness.

The effects of crypto asset price drops on financial institutions can also lead to a credit crunch. Experience shows that banks act more cautious in financial crises and intensify credit rationing. This was partly visible in the financial crisis of 2007/08; confidence and expectations by creditors and investors in real capital deteriorated and investment demand for capital goods collapsed despite low interest rates and despite central banks interventions with massive liquidity injections (Detzer & Herr

2015: 115f.). This implies that a financial crisis in almost all cases leads to a collapse in lending to the real economy, falling investment and shrinking economic activity.

Should the crypto sector therefore account for an increasing share in balance sheets of financial institutions and the business activities of companies in the future, and also become attractive to broader sections of the population as an investment or credit-financed speculative object, increased negative effects for the stability of economies must be expected.

4.3 Easier capital flight as shock amplifier

The surveys on crypto asset use reported in subsection 4.2 were all conducted in developed countries. However, crypto assets seem to be particularly attractive and in demand in developing and emerging countries. Contributing factors are that the demand for crypto assets is relatively high in countries with unstable currencies, poor economic development and less sophisticated financial markets lacking (safe) speculation opportunities. In addition, crypto assets seem to be a less costly alternative for transferring remittances. Indicators for the regional use of crypto assets show a strong concentration in less developed emerging and developing markets, especially regarding crypto trading platforms (IMF 2021). In countries with high inflation, crypto assets are especially popular (Marmora 2021) and seem to play a bigger role in countries with stricter capital controls and /or high corruption problems (Alnasaa et al. 2022). The higher use of crypto assets in developing countries in the Global South with “low levels of financial development and unstable fiat currencies” increases financial instability risks as Di Casola et al. (2023) show for a sample of 44 countries. Overall, crypto assets increase the problems which are connected with dollarization. Capital flight becomes easier, even for the less wealthy people. The monetary policy space decreases, as the central bank has to keep interest rates very high to stabilize demand for the domestic currency. This dampens investment financed in domestic currency (Herr 2018).

The introduction of Bitcoin as a legal tender in El Salvador in 2021 could raise expectations that crypto assets could contribute to stabilization of financial markets and economic developments in countries like El Salvador. However, this is unlikely. In emerging markets, currency crises are often coupled with financial market crises, as the 1980s and 1990s in particular showed, a phenomenon called “twin crises”. Such twin crises developed after countries in the Global South opened their financial markets and abolished capital controls. Credit flows in these countries increased sharply whereas the credits were denominated in foreign currency, especially US dollar. As soon as investors became concerned about the possibility of countries to pay back credits, capital inflows stopped, financial problems emerged, capital flight developed and the countries suffered from strong devaluations and an explosion of the real debt burden of foreign debt (Kaminsky & Reinhart 1999; Diaz-Alejandro 1985).¹¹

Crypto assets are unlikely to reduce the problem of initially high capital inflows and later unexpected strong outflows. On the contrary, crypto assets facilitate capital flight and make capital controls for capital outflows more difficult. This is because, on the one hand, the decentralized, anonymous organization makes state control more difficult, and on the other hand, the transaction costs for exchanging domestic currency into cryptos are usually lower than the costs for traditional exchanges into a foreign currency. Doubts about the stability of a country's currency or actual or only suspected problems in a country's financial sector can therefore lead to capital outflows more quickly than before, since shifting assets into crypto assets has fewer hurdles than investing in real capital or

¹¹ Even though credits in foreign currency decreased during the 2000s and 2010s, as several emerging markets and developing countries were able to borrow in domestic currency, these countries have been faced with capital outflows and increasing debt levels once yields on the safe haven currency, the US dollar, increased, a phenomenon discussed as “Original Sin Redux” (De Paula et al. 2020; Bertaut et al. 2023).

investing foreign currency in foreign accounts. In addition, anonymity of wallet owners in the crypto world decreases the abilities of the government to avoid capital flight or to tax financial wealth.

4.4 Lack of macro-control of the economy's liquidity supply

The problem with DeFi is potentially even deeper, because capitalist economies require a relatively stable price level especially for credit contracts, which is potentially undermined by decentralized financing models in crypto assets. Irving Fisher (1933) used the Great Depression of 1929 to show how fatal the combination of a falling price level and debt in the deflating currency is. The capitalist economic system has a high potential for instability and is subject to the danger of cumulative processes. Deflation and the increasing real debt burden caused by it is one of the many examples. Capitalism requires a set of institutions and a monetary and fiscal policy that permanently stabilize the economy. Thus, not only inflationary and deflationary tendencies alternate, but also phases of overheating and phases of low growth, long-term stagnation or even recession. Along with fiscal policy, monetary policy is one of the important and absolutely necessary pillars for stabilizing economic development. Interest rate policy plays a central role in capitalist systems, because the central banks control the money market interest rate on the interbank market and thus the short-term interest rate through their refinancing interest rate. The development from 2012 onwards in the European Monetary Union has shown that central banks can, at least to some extent control the long-term interest rate via open market policy (Heine & Herr 2022: 194-207).

Decentralized financing models based on crypto assets are not subject to any macro control. However, money should not only be scarce but also elastic, for example if a long-term stable development with a stable price level requires a stable increase in the money supply. Bitcoin and similar currencies have no mechanism to increase the money supply according to the needs of the economy – in case of Bitcoins a maximum quantity is fixed. The scarcity of money creation, which is particularly inherent in the Bitcoin system, ultimately has a deflationary effect in case Bitcoin or similar crypto assets would take over unit of account functions for credit contracts (Trotta Vianna 2020). Limiting the maximum amount of Bitcoin that can be mined leads to Bitcoins rising in value as demand increases. This would lead to the prices of goods and services in Bitcoin falling. The resulting deflation of the price level would be destabilizing for economic development. Keynes (1936: 236) having the misled reestablished gold standard after World War I in mind was very clear about this point: “It is interesting to notice that the characteristic which has been traditionally supported to render gold especially suitable for use as a standard of value, namely, its inelasticity of supply, turns out to be precisely the characteristic which is at the bottom of the trouble. “

In the case of stablecoins like Tether or other variants of cryptocurrencies created by institutions, there is no guarantee that a macroeconomically functional increase in the money supply can or will be created by the respective institutions, because the providers of these currencies follow microeconomic calculations. And, similar to private banknotes in the early phase of capitalism, there is no lender of last resort which could help such currencies when there is a mass exodus from them.

Finally, in all variants of crypto assets, there is no macroeconomically oriented interest rate policy, which is an essential element for the management of a capitalist economy. In the case of crypto assets which are created via algorithms, this is obvious. If crypto assets are created via institutions, it is conceivable that these could develop into crypto banks, grant crypto loans and set interest rates. This would result in a system with a multitude of crypto assets and crypto banks that set interest rates on the basis of microeconomic calculations. The system would have to be regarded as extremely unstable, since the development of interest rates as well as the expansion of loans and crypto assets does not follow any macroeconomic logic and uncontrolled boom-bust phases are to be expected.

5 Conclusion

The creation and growth of crypto assets in the global financial system has a complex technological, economic and political history. Contagious and amplifying crisis dynamics in various traditional financial markets, a widespread loss of confidence in the established financial system and the widespread shift of payment and value storage functions to the non-bank financial system led to an explosive growth of crypto assets during the last few years. The scale, the growing complexity of crypto assets as well as the cross-connections to the regular financial sector are calling national and global regulators to action.

Even though they might be regarded as close substitutes to traditional money, we show that they lack important functions of money due to their high instability, especially regarding the unit of account function for credit contracts and the store of value function. Yet, crypto assets are also seldom used as a means of payment, related to the missing stability. Similar to fiat money, they would require a supervising authority with the ability to enforce regulation and close insolvent entities, an institution acting as lender of last resort and a deposit insurance. As it is difficult to set up such institutions in the crypto world given the emphasis of no intermediaries (see e.g. the discussion of governance issues in such decentralized networks in Kroll et al. 2013), it is likely that periods of high volatility will show up repeatedly.

Due to their increasing size, functions and unstable performance, crypto assets have become a challenge for financial market stability and inhibit the potential as crisis triggers and accelerators of an already fragile system. Main reasons are the interconnections with and the expansion of the various transmission channels between the crypto world and the established financial system. According to our analysis, the probability of unstable developments in the financial system already increases with the increasing use of crypto assets in the traditional financial system as another type of risky financial investment. Negative effects on the real economy are to be expected in particular in the case of a widespread use of crypto assets as financial investments, increasing relevance of crypto assets for corporate activities and lending in these assets (be it credit-financed or not).

The instability of national financial systems and the global financial system would increase further if crypto assets gradually adopt monetary functions, for example in the form of increasing lending in crypto assets. It is not very likely that unbacked crypto assets like Bitcoin take over far-reaching monetary functions. But it cannot be excluded for stablecoins that they become widespread used new privately-issued units of account and take over money functions. Developments in this direction would lead to a new type of additional instability in the global financial system. It is also important to note that private issuers would have no incentive to increase the supply in a macroeconomically stabilizing way, in contrast to state issued fiat currencies.

Special attention is needed with regard to a potential expansion of DeFi in the field of credit contract or other financial instruments, as this system does not provide any institutions to stabilize the supply of liquidity to the economy and would allow even less for an elastic supply of liquidity that is necessary for monetary policy in line with macroeconomic fluctuations.

The history of capitalism has shown that a comprehensive and targeted regulation of banks and the financial system as a whole is one of the basic conditions for making the system viable and efficient. In the case of crypto assets, institutions are lacking that stabilize endogenously unstable financial markets and, moreover, economic development in general. If crypto assets were to play an increasingly relevant role in the credit system without such institutions and regulation, the overall capitalist system would become even more unstable.

Central banks discuss the introduction of Central Bank Digital Currency (CBDCs) which means that private households and firms can have bank accounts directly at the central bank (for an overview see Bank of Canada 2023). Central banks want to deliver a safe asset in a world with a decreasing role of cash and at the same time modernize the payment system, respectively make the payment system less dependent on private companies. Such CBDCs may bring some advantages, but it is nothing new. Before World War I central banks in many countries also served as commercial banks, had deposits from private agents and carried out transfers from account to another. CBDCs would not reduce the risk of crypto assets for the stability of the financial system and the economy as a whole. For this purpose, crypto assets have to be controlled and some versions may have to be legally banned.

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